Distortions to Agricultural Incentives

A Global Perspective, 1955–2007

Edited by Kym Anderson



DISTORTIONS TO AGRICULTURAL INCENTIVES

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A GLOBAL PERSPECTIVE, 1955–2007

Kym Anderson
Editor

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DEDICATION

To the memory of T. W. Schultz (1902–98), D. Gale Johnson (1916–2003), and Bruce L. Gardner (1942–2008), whose fine minds were sharpened at the University of Chicago and who contributed perhaps more than any other economists of the 20th century to our understanding of the need to reduce distortions to agricultural incentives around the world.

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FOREWORD

In his seminal 1973 book on *World Agriculture in Disarray*, Professor D. Gale Johnson despaired at the persistence of high agricultural protection in Organisation for Economic Co-operation and Development (OECD) countries, the anti-agricultural and antitrade policies of developing countries, and the tendency for both sets of countries to insulate their domestic food market from international price fluctuations, thereby exacerbating price volatility for the rest of the world. Since the vast majority of the world's poorest households depend on farming for their livelihoods, this disarray not only was highly inefficient but also contributed to global inequality and poverty. Yet the situation worsened over the next dozen years, with agricultural protection in Europe, North America, and Japan peaking and international food prices plummeting in 1986, thanks in large measure to an agricultural export subsidy war between the United States and the European Community.

The World Bank's *World Development Report 1986* was devoted to the issue of agricultural protection. It urged reform via the General Agreement on Tariffs and Trade's Uruguay Round, which was launched in September of that year and which had agricultural trade-related policies high on its agenda. Simultaneously, under the direction of its chief economist at the time, Anne Krueger, the Bank undertook a research project aimed at measuring the extent to which 18 developing-country governments were pursuing antiagricultural policies. That Krueger, Schiff, and Valdés project was summarized in an article in the *World Bank Economic Review* in 1988 and detailed in a series of five books in 1991 and 1992. It revealed that, during 1960–84, most developing countries were reducing farm incomes not only by heavily taxing agricultural exports, but even more so by protecting manufacturers from import competition and overvaluing the national currency.

However, from the 1980s, many low-income and some high-income countries began to reform their agricultural price and trade policies. Sometimes this reform was undertaken unilaterally, but some was also undertaken in response to international pressures such as Uruguay Round stipulations, commitments required for accession to the World Trade Organization, and structural adjustment loan conditionality by international financial institutions. Meanwhile, reforms in some middle-income economies (most noticeably the Republic of Korea) had "overshot," going from taxing their farmers to protecting them from import competition, which raised concerns that other emerging economies may follow suit and pursue the same agricultural protection growth path of more-advanced economies.

Though the OECD Secretariat began to monitor its members' agricultural policies beginning in the late 1980s, there has been no systematic comparable monitoring of policy developments in developing countries. The World Bank launched a major research project in 2006 aimed at filling this void. The papers emerging from that project (see http://www.worldbank.org/agdistortions) have since been edited into a series of four regional books, which are summarized in this volume along with comparable studies of high-income countries' policies since the mid-1950s. By including 75 countries that together account for more than 90 percent of global gross domestic product (GDP), agricultural output, and population, the study provides a representative study of global developments in policies affecting farmer incentives over the past half century. Moreover, the project generated a global panel dataset of annual estimates of distortion by product and country. By making this dataset freely available to the public, the expectation is that further economic analysis of these critical questions will be stimulated.

The present volume concludes by reporting results from a global economy-wide model aimed at addressing the following questions, among others: How much have reforms since the early 1980s improved net incomes of farmers in developing countries? What more could be achieved by removing the remaining distortions to agricultural incentives? The authors find that the economic welfare cost to the world of global distortions to goods trade fell by 58 percent between the early 1980s and 2007, and the cost to developing countries fell by 46 percent. That is, the world has gone about halfway toward liberalizing goods markets globally during the past quarter century. Developing countries have gained disproportionately from those reforms, and their farmers have gained far more than nonfarmers in those countries. Moreover, developing countries would benefit 50 percent more than high-income countries from completely freeing global markets for agricultural and other goods, and again their farmers would be the major beneficiaries. Of the prospective overall gain to developing countries, half

would be due to agricultural policy reforms; such is the extent of global distortions remaining in agriculture relative to other goods markets. In turn, this suggests that developing countries have a huge stake in whether the Doha Development Agenda, especially its agricultural negotiations, are brought to a successful conclusion.

Justin Yifu Lin
Senior Vice President and Chief Economist
The World Bank

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This book provides an overview of the evolution of distortions to agricultural incentives caused by price, trade, and exchange rate policies in a large sample of countries spanning the world. Following the introduction and summary chapter, it includes studies of four sets of high-income economies and five sets of emerging economies that together account for more than 90 percent of agricultural production and 95 percent of global GDP. The chapters are followed by two appendixes: one provides the methodology used to measure the nominal and relative rates of assistance to farmers and the taxes and subsidies on food consumption, while the other provides statistical information on the coverage of annual estimates of those rates of assistance.

The authors of the five emerging-economy chapters are indebted to the other authors of the country case studies underlying those regional summaries. The country studies are reported in four companion volumes, published by the World Bank in 2008 and early 2009, which cover Africa (coedited by Kym Anderson and William A. Masters), Asia (coedited by Kym Anderson and Will Martin), Latin America (coedited by Kym Anderson and Alberto Valdés), and European transition economies (coedited by Kym Anderson and Johan Swinnen).

Staff of the World Bank's regional departments provided generous and insightful advice and assistance throughout the project, including participating in Bankwide seminars on the draft studies of each region. The World Bank's country directors also offered advice on the studied countries when clearing the working paper versions of each chapter. The authors of this book's chapters benefited from feedback provided by many participants at workshops and conferences in which draft papers were presented over the past two years. We also appreciate the insightful comments and questions from the book's external reviewers. All the country authors are extremely grateful to Ernesto Valenzuela and the team of very able research assistants he managed, including PhD students Johanna L.

Croser, Esteban Jara, Marianne Kurzweil, Signe Nelgen, Francesca de Nicola, and Damiano Sandri, all of whom helped compile the global mega-spreadsheet of distortion estimates (accessible at http://www.worldbank.org/agdistortions, along with more than 70 working papers that have detailed appendixes not included in the published volumes). Our thanks extend to Johanna L. Croser and Marie Damania for assisting in the initial copyediting of many of the country chapters; to Janice Tuten, who handled the production and all the final copyediting of the manuscript; and to Stephen McGroarty, who supervised its publication.

Both methodologically and in terms of previous estimates of distortions, we are indebted to the economists who have plowed this ground before us. They include the team of authors and editors who contributed to the seminal Krueger, Schiff, and Valdés volumes published in 1991–92; the team at the International Food Policy Research Institute (IFPRI) led by David Orden that generated a recent research report on producer support estimates and consumer support estimates (PSEs and CSEs) that covered four large Asian countries; and especially the team in the Trade and Agriculture Directorate of the Organisation for Economic Co-operation and Development (OECD), who have been generating PSEs and CSEs for high-income countries for more than two decades and for some transition and developing economies during the past four years. We are extremely grateful to OECD staff members for providing access to their files and for many useful comments on our work as it progressed.

The direct contributions to the project by IFPRI (for the Ethiopian and Indian case studies and the South Asian overview), the OECD and the Food and Agriculture Organization of the United Nations (FAO, for the Ghana case study), and the United States Department of Agriculture (for the Russian case study) are also greatly appreciated. The OECD and FAO are jointly seeking funds from the Bill and Melinda Gates Foundation to continue the estimation of agricultural policy indicators for developing countries beyond the time series covered in the present study, beginning with a sample of African countries.

Our thanks extend to the project's senior advisory board, whose members have provided sage advice and much encouragement throughout the planning and implementation stages of the project. The Board comprises Yujiro Hayami, Bernard Hoekman, Anne Krueger, John Nash, Johan Swinnen, Stefan Tangermann, Alberto Valdés, Alan Winters and, until his untimely death in March 2008, Bruce Gardner.

For financial assistance, grateful thanks go to the Development Research Group of the World Bank and trust funds of the governments of the United Kingdom, The Netherlands. Japan, and Irelend. This combined support made it possible for the study to include countries from all regions of the world except the

Middle East (which accounts for less than 2 percent of global agricultural production). We also are extremely grateful to the Rockefeller Foundation for providing the opportunity for the authors of this book to gather to plan the project's final outputs at the Rockefeller Conference Center in beautiful Bellagio, Italy, November 13–17, 2006.

This book is dedicated to the memory of my mentors, T. W. (Ted) Schultz (1902–98) and D. Gale Johnson (1916–2003), and to Bruce Gardner (1942–2008), all of whose fine minds were sharpened at the University of Chicago's Department of Economics and who contributed directly and indirectly perhaps more than any other economists of the 20th century to our understanding of the need to reduce distortions to agricultural incentives around the world.[1] Bruce Gardner, who was professionally active until shortly before his death, was a strong supporter of the present research project, both as a member of its senior advisory board and as author of the North America chapter in this volume. He was a gentleman as well as a scholar, and is sorely missed by friends and colleagues alike.

Kym Anderson
March 2009

1. T. W. Schultz's famous book, *Transforming Traditional Agriculture* (Yale University Press, 1964), helped the world understand that farmers, however poor, are efficient producers who respond to incentives and hence to government distortions to prices. The volume arising from a workshop he organized on resources, incentives, and agriculture for the American Academy of Arts and Sciences (*Distortions of Agricultural Incentives,* Indiana University Press, 1978), further clarified the wastefulness of government intervention in agricultural markets. The trade paper in that volume is by D. G. Johnson, who drew on his seminal book, *World Agriculture in Disarray* (Macmillan, 1973) which pointed to the inequity as well as inefficiency of farmers being taxed in poor countries and subsidized in rich countries. Both economists' contributions are celebrated in special features of journals: Schultz in the *Review of Agricultural Economics* 28 (3), fall 2006; Johnson in *Economic Development and Cultural Change* 52 (3), April 2004. Bruce Gardner's seminal contributions include his paper "Causes of U.S. Farm Commodity Programs," in *Journal of Political Economy* 95 (2), April 1987, and his book *American Agriculture in the Twentieth Century: How It Flourished and What It Cost* (Harvard University Press, 2002).

CONTRIBUTORS

Kym Anderson is the George Gollin Professor of Economics at the University of Adelaide and a research fellow of the Centre for Economic Policy Research, London. During 2004–07, he was on an extended sabbatical as lead economist (trade policy) in the Development Research Group of the World Bank in Washington, DC.

Johanna L. Croser has been a short-term consultant with this project and is a PhD and law student at the University of Adelaide, having completed her graduate economics coursework at the University of British Columbia in Vancouver, Canada.

Bruce L. Gardner was a professor and the department chair of agricultural and resource economics at the University of Maryland in College Park, MD, until his untimely death in March 2008. He also served as an assistant secretary in the U.S. Department of Agriculture.

Ashok Gulati is the Asian Director for the International Food Policy Research Institute in New Delhi, India. Prior to that, he headed the institute's Markets, Trade, and Institutions Division in Washington, DC.

Yujiro Hayami is the chair of the graduate faculty of the Foundation for Advanced Studies on International Development and a visiting professor in the National Graduate Institute of Policy Studies, Tokyo.

Masayoshi Honma is a professor of agricultural and resource economics at the University of Tokyo, where he focuses on farm policy issues. He is also a member of the board of trustees of the International Food Policy Research Institute in Washington, DC.

Tim Josling is professor emeritus at the Freeman Spogli Institute for International Studies, and previously was a professor in the Food Research Institute at Stanford University. His research covers a wide range of agricultural trade policy areas, including protectionism.

Marianne Kurzweil is a young professional at the African Development Bank in Tunis. During 2006–07, she was an extended-term consultant with this project in the Development Research Group at the World Bank in Washington, DC.

Ralph Lattimore is a private consultant, but during much of the period of this project he was an economist with the Trade and Agriculture Directorate of the Organisation for Economic Co-operation and Development in Paris.

Peter J. Lloyd is professor emeritus in and former dean of the Department of Economics at the University of Melbourne. Prior to that, he was a professorial fellow in the Institute of Advanced Studies at the Australian National University, Canberra.

Donald MacLaren is an associate professor in the Department of Economics at the University of Melbourne. His theoretical and empirical research focuses on agricultural trade policy issues, including the analysis of nontariff barriers to trade.

Will Martin is research manager of the Rural Development Unit in the Development Research Group at the World Bank in Washington, DC. He specializes in trade and agricultural policy issues globally, but especially in Asia, and has written extensively on trade policies affecting developing countries.

William A. Masters is a professor and the associate head of the Department of Agricultural Economics at Purdue University. He is currently coeditor of the journal *Agricultural Economics*. Previously, he was a lecturer at the University of Zimbabwe (1988–90).

Signe Nelgen was a short-term consultant with this project before becoming a PhD student at the University of Adelaide. Previously, she was associated with the Hamburg Institute of International Economics.

Garry Pursell is a visiting fellow at the Australia South Asia Research Centre at Australian National University, after serving for many years in the South Asia Department of the World Bank in Washington, DC.

Damiano Sandri is a PhD candidate in economics at the Johns Hopkins University. During 2006–07, he was a short-term consultant with this project in the Development Research Group at the World Bank in Washington, DC.

Johan Swinnen is a professor in the Department of Economics and director of LICOS Center for Institutions and Economic Performance at the Katholieke Universiteit Leuven in Belgium, and a senior fellow of the Center for European Policy Studies in Brussels.

Alberto Valdés is a research associate at Universidad Católica de Chile in Santiago. Previously, he was an adviser in the Agriculture Department of the World Bank and director of trade and food security at the International Food Policy Research Institute, both in Washington, DC.

Ernesto Valenzuela is a lecturer and research fellow at the School of Economics and Centre for International Economic Studies at the University of Adelaide. During 2005–07, he was an extended-term consultant at the Development Research Group of the World Bank in Washington, DC.

Dominique van der Mensbrugghe is the lead economist in the Development Prospects Group of the Development Economics Vice Presidency of the World Bank in Washington, DC, where he specializes in the global economywide modeling.

ABBREVIATIONS

AIDA	Agricultural Income Disaster Assistance (of Canada)
AMTA	Agricultural Market Transition Act (of the United States)
ASEAN	Association of Southeast Asian Nations
CAIS	Canadian Agricultural Income Stabilization
CAP	Common Agricultural Policy (of the European Union)
CCC	Commodity Credit Corporation (of the United States)
CDI	consumer distortion index
CEE	Central and Eastern Europe
CET	common external tariff
CFIP	Canadian Farm Income Program
CGE	computable general equilibrium (model)
cif	cost, insurance, and freight
CIS	Commonwealth of Independent States (of the former Soviet Union)
CMEA	Council of Mutual Economic Assistance (of Eastern Europe and Central Asia)
CMO	common market organization
CPI	consumer price index
CSE	consumer support estimate (or earlier, consumer subsidy equivalent)
CTE	consumer tax equivalent
CWB	Canadian Wheat Board
DDA	Doha Development Agenda (of the WTO)
EAEC	Eurasian Economic Community
EC	European Community
ECU	European currency unit

EEC	European Economic Community
EEP	Export Enhancement Program (of the United States)
EFTA	European Free Trade Association
ERA	effective rate of assistance
EU	European Union
FAO	Food and Agriculture Organization
FAS	Foreign Agriculture Service (of the United States)
fob	free on board
GATT	General Agreement on Tariffs and Trade
GDP	gross domestic product
GNP	gross national product
GRIP	Gross Revenue Insurance Program (of Canada)
GSE	gross subsidy equivalent
GTAP	Global Trade Analysis Project
IAC	Industries Assistance Commission (of Australia)
IFPRI	International Food Policy Research Institute
IMF	International Monetary Fund
ITC	International Trade Commission
Mercosur	Mercado Común del Sur (Southern Common Market)
MFP	multifactor productivity
NAFTA	North American Free Trade Agreements
NDP	net domestic product
NFF	National Farmers Federation (of Australia)
NISA	Net Income Stabilization Account (of Canada)
NPS	non-product-specific
NRA	nominal rate of assistance
NRP	nominal rate of protection
NSE	net subsidy equivalent
NTB	nontariff barriers to trade
NTM	nontariff measure
OECD	Organisation for Economic Co-operation and Development
PAC	political action committee (in the United States)
PDI	producer distortion index
PDS	public distribution system
PPP	purchasing power parity
PRSP	Poverty Reduction Strategy Paper (of the World Bank)
PSE	producer support estimate (or earlier, producer subsidy equivalent)
REER	real effective exchange rate
RRA	relative rate of assistance

SAL	Structural adjustment loan (from the World Bank)
SMAs	statutory marketing authorities (in Australia)
STE	state trading enterprise
TBI	trade bias index
TEC	tax equivalent to consumers
TFP	total factor productivity
TRI	trade reduction index
TRQ	tariff rate quota
UNCTAD	United Nations Conference on Trade and Development
URAA	Uruguay Round Agreement on Agriculture
USDA	U.S. Department of Agriculture
WDI	World development indicators
WRI	Welfare reduction index
WPI	Wholesale price index
WTO	World Trade Organization

Note: All dollar amounts are U.S. dollars (US$) unless otherwise indicated.

The 75 Focus Countries
(*Shown in grey*)



This map was produced by the Map Design Unit of the World Bank. The boundaries, colors, denominations, and any other information shown on this map do not imply, on the part of the World Bank Group, any judgment on the legal status of any territory, or any endorsement or acceptance of such boundaries.

PART I

INTRODUCTION

1

FIVE DECADES OF DISTORTIONS TO AGRICULTURAL INCENTIVES

Kym Anderson

"When you can measure what you are speaking about, and express it in numbers, you know something about it; but when you cannot measure it, when you cannot express it in numbers, your knowledge is of a meagre and unsatisfactory kind; it may be the beginning of knowledge, but you have scarcely, in your thoughts, advanced to the stage of science."

— Sir William Thompson (1889, pp. 73–74)

Every decade or two, food becomes newsworthy globally. Mostly it is about a price spike, either upward (hurting consumers, as in 1973 and 2008) or downward (hurting farmers in open economies, as in 1986), and most such price spikes are a consequence of major policy shifts, since local weather-induced supply shocks in a many-country trading world tend to offset each other. In 1986, for example, it was the food export subsidy war between Western Europe and North America that drove real international food prices to their lowest level since 1930. The price hikes of 1973 and 2008, by contrast, were partly a consequence of a unilateral policy decisions by a single large player. In 1973, the Soviet Union departed from its policy of self-reliance and entered the international grain market in a significant way to offset a domestic shortfall (Morgan 1979). In 2008, the United States and the European Union (EU) decided to subsidize biofuel production and mandate targets for its use domestically. On both occasions, other governments imposed export restrictions to help insulate their consumers from the price rise, which

pushed international prices even higher and drove more exporting countries to follow suit. Policy thus contributes to market volatility, an undesirable situation because volatility around the long-run trend terms of trade slows economic growth (Williamson 2008). Yet trade policy measures are very blunt instruments for dealing with volatility, especially in the modern era of myriad financial instruments for risk management, and their beggar-thy-neighbor feature diminishes the international public good contribution of trade openness.

Less newsworthy to the mass media, but probably far more important in its effect on the long-run growth and distribution of global welfare, are gradual policy developments in individual countries and their combined effect on other countries via the trend terms of trade in international markets.[1] This study is about one such set of trade-related policy developments that, over the past half century, has had dramatic effects—in some ways negative, in others positive—on distortions to agricultural incentives and thus also to consumer prices for food. Given the importance of farm and food prices for the world's poor, those policy-imposed distortions affect not only economic growth but also income inequality and poverty.

The benefits from specialization in production and exchange have been recognized for millennia, yet governments have chosen to restrict international trade, including in agricultural goods. Sometimes, these restrictions are carried out via export taxes, to raise government revenue or to lower the price of food for domestic consumers. An early example was the tax on wine exports from Greece in the first century BC and from France and Germany in the dark ages (Johnson 1989). More commonly, trade restrictions take the form of import duties or bans, often as part of a broader foreign policy, as with the United Kingdom's imports of wine from France versus Portugal and Spain in the 1700s and 1800s (Nye 2007). The practice was so striking that wine was used as the example of British imports in the first treatise on the theory of comparative advantage (Ricardo 1817).

For advanced economies, the most common reason for farm trade restrictions in the past two centuries has been to protect domestic producers from import competition as they come under competitive pressure to shed labor in the course of economic development. But in the process, those protective measures hurt not only domestic consumers and exporters of other products but also foreign producers and traders of farm products, and they reduce national and global economic welfare. For decades, agricultural protection and subsidies in high-income (and some middle-income) countries have been depressing international prices of farm products, which lowers the earnings of farmers and associated rural businesses in developing countries. The Haberler (1958) report to the General Agreement on Tariffs and Trade (GATT) contracting parties forewarned that such distortions might worsen, and indeed they did between the 1950s and the early 1980s (Anderson and Hayami 1986), thereby adding to global inequality and

poverty because three-quarters of the world's poorest people depend directly or indirectly on agriculture for their main income (World Bank 2007).[2]

In addition to this external policy influence on rural poverty, the governments of many developing countries have directly taxed their farmers over the past half century. A well-known example is the taxing of plantation crop exports in postcolonial Africa (Bates 1981). At the same time, many developing countries have chosen also to pursue an import-substituting industrialization strategy, predominantly by restricting imports of manufactures, and to overvalue their currency. Together, those measures indirectly taxed producers of other tradable products in developing economies, predominantly farmers (Krueger, Schiff, and Valdés 1988, 1991). Thus, the price incentives facing farmers in many developing countries have been depressed by agricultural price and international trade policies in both their own and other countries.

This disarray in world agriculture, as Johnson (1991) described it in the title of his seminal book, means there has been overproduction of farm products in high-income countries and underproduction in more-needy developing countries. It also means there has been less international trade in farm products than would be the case under free trade, thereby thinning markets for these weather-dependent products and thus making them more volatile. Using a stochastic model of world food markets, Tyers and Anderson (1992) find that instability of international food prices in the early 1980s was three times greater than it would have been under free trade in those products.

During the past quarter century, however, numerous countries have begun to reform their agricultural price and trade policies, a process that has raised the extent to which farm products are traded internationally (see table 1.A.1 in the annex of this chapter), but not nearly as fast as globalization has proceeded in the nonfarm sectors of the world's economies.[3] A key purpose of the present study is to examine empirically the extent to which those reforms have reversed the above-mentioned policy developments of the previous three decades. True, empirical indicators of farm sector support (called producer support estimates, or PSEs) have been provided in a consistent way for 20 years by the secretariat of the Organisation for Economic Co-operation and Development (OECD) for its 30 member countries (OECD 2008a). However, there are no comprehensive time series rates of assistance to producers of nonagricultural goods to compare with the PSEs, nor are there PSE figures for advanced economies in earlier decades, which are of more immediate relevance if how the two groups of countries' policies evolved during similar stages of development is to be seen. As for developing countries, almost no comparable time series estimates have been generated since the Krueger, Schiff, and Valdés (1988) study, which covered the 1960–85 period for just 17 developing countries.[4] An exception is a new set of estimates of nominal

rates of protection for key farm products in China, India, Indonesia, and Vietnam since 1985 (Orden et al. 2007). The OECD (2006) also has released PSEs for Brazil, China, and South Africa, and for several Eastern European countries. The present study complements and extends those two efforts and the seminal Krueger, Schiff, and Valdés (1988) study. It builds on them by providing similar estimates for other significant (including many low-income) developing economies, by developing and estimating new, more comprehensive policy indicators, and by employing the calculated price wedges in a global economy-wide model to estimate the effects of recent and prospective policy developments.

These estimates can be helpful, as evidenced in subsequent chapters in this book, in addressing such questions as: Where is there still a policy bias against agricultural production? To what extent has there been overshooting in the sense that some developing-country food producers are now being protected from import competition along the lines of the examples of earlier-industrializing Europe and Japan? What are the political economy forces behind the more-successful reformers, and how do they compare with those in less-successful countries where major distortions in agricultural incentives remain? Over the past two decades, how important have domestic political forces been in bringing about reform relative to international forces (for example, loan conditionality, rounds of multilateral trade negotiations within the GATT, regional integration agreements, accession to the World Trade Organization [WTO], and the globalization of supermarkets and other firms along the value chain) and compared with forces operating in earlier decades? What explains the pattern of distortions across industries and the choice of support or tax instruments within the agricultural sector of each country? What policy lessons and market implications may be drawn from these differing experiences with a view to ensuring better growth-enhancing and poverty-reducing outcomes—including less overshooting, which results in protectionist regimes—in still-distorted economies during their reforms in the future?

The study is timely for at least three reasons. First, the WTO is in the midst of the Doha Round of multilateral trade negotiations, and agricultural policy reform is one of the most contentious issues in those talks. Indeed economy-wide modeling suggests that as much as two-thirds of the global welfare gains from removing all merchandise trade restrictions and agricultural subsidies would come from reform of agricultural policies, even though agriculture accounts for less than 8 percent of world gross domestic product (GDP) and exports (Anderson, Martin, and van der Mensbrugghe 2006). Second, poorer countries and their development partners are striving to achieve the Millennium Development Goals by 2015, in particular the goals related to alleviation of hunger and poverty. And third, world food prices spiked in 2007 and 2008 to extremely high levels. Governments in

some developing countries, in their haste to deal with the inevitable protests from consumers, reacted in far from optimal ways. Examining the policy responses to this and other episodes of food prices spikes (most notably in 1973–74) is important in determining which responses work better than others.

The present study includes 75 countries that together account for between 90 and 96 percent of the world's population, farmers, agricultural GDP, and total GDP. The sample countries also account for more than 85 percent of farm production and employment in Africa, Asia, Latin America, and the transition economies of Europe and Central Asia. Per capita income in the sample countries covers a broad spectrum, from some of the poorest countries (Ethiopia and Zimbabwe) to the richest.[5] Nominal rates of assistance and consumer tax equivalents (NRAs and CTEs) are estimated for more than 70 products, with an average of almost a dozen per country. In aggregate, the coverage represents around 70 percent of the gross value of agricultural production in the focus countries, and just under two-thirds of global farm production valued at undistorted prices over the period covered. Not all countries had data for the entire 1955–2007 period; the average number of years covered is 41 per country.[6] Of the world's 30 most valuable agricultural products, the NRAs cover 77 percent of global output, ranging from two-thirds for livestock, three-quarters for oilseeds and tropical crops, and five-sixths for grains and tubers. Those products represent an even higher share (85 percent) of global agricultural exports (see appendix B of this volume for details).

Having such a comprehensive coverage of countries, products and years offers the prospect of obtaining a reliable picture of both long-term trends in policies, and annual fluctuations around those trends, for individual countries and commodities as well as for country groups, regions, and the world as a whole. The results can also serve as inputs into explanations of why government policies evolved as they did, and can thereby contribute to policy dialogues because, as Stigler (1975, p. ix) wrote, "Until we understand *why* our society adopts its policies, we will be poorly equipped to give useful advice on how to change those policies."

This chapter begins with a brief summary of the long history of national distortions to agricultural markets. It then outlines the methodology used to generate annual indicators of the extent of government interventions in markets, details of which are provided in Anderson et al. (2008a, 2008b) and appendix A of this volume. A description of the economies being examined and their economic growth and structural changes over recent decades is then briefly presented as a preface to the main section of the chapter, in which the NRA and CTE estimates are summarized across regions and over the decades since the 1950s. These estimates are discussed in far more detail in the regional studies that follow, chapters 2–10. A summary of an additional set of indicators of agricultural price distortions, presented in chapter 11, is based on the trade restrictiveness index first

developed by Anderson and Neary (2005). In chapter 12, the focus shifts from countries to commodities, and various distortion indicators are used to provide a sense of how distorted each of the key farm commodity markets is globally. Chapter 13 uses the study's NRA and CTE estimates to provide a new set of results from a global economy-wide model. It quantifies the impacts of reforms undertaken since the early 1980s, and of the policies still in place as of 2004, on global markets, net farm incomes, and welfare. That chapter concludes by drawing on the lessons learned to speculate on the prospects for further reducing the disarray in world agricultural markets.

National Distortions to Farmer Incentives: The Long History, Briefly

While much government intervention in agricultural trade over the centuries has been aimed at stabilizing domestic food prices and supplies, there has been a general tendency for poor agrarian economies to tax agriculture relative to other sectors. As nations industrialize, their policy regimes typically gradually change from negatively to positively assisting farmers relative to other producers, and from subsidizing to taxing food consumers.

Consider the United Kingdom, the first country to have an industrial revolution. Prior to that period—from the late 1100s to the 1660s—England used export taxes and licenses to prevent domestic food prices from rising excessively. Then, from 1660–90, a series of laws gradually raised food import duties (making imports prohibitive under most circumstances) and reduced export restrictions on grain. Under the Corn Laws of 1815, these provisions were made even more protective of British farmers. The famous repeal of the Corn Laws in the mid-1840s is often said to have heralded a period of relatively unrestricted food trade for the United Kingdom, although even then protection was retained for another generation for breweries and distilleries—and hence grain producers—via restrictions on imports of wine and spirits. According to Nye (2007), it was only after the passage of the 1860 Anglo-French Treaty of Commerce that Britain moved closer to free trade than France, and that other European countries began to open up. But agricultural protection returned in the 1930s, and steadily increased over the next five decades. Indeed, the period of opening up in the 19th century was quite short for some countries in Europe, and agricultural protection levels in those countries throughout the 20th century were somewhat higher on average than in Britain.

Kindleberger (1975) describes how the 19th century free trade movements in Europe reflect the national economic, political, and sociological conditions of the time. Agricultural trade reform was less difficult for countries, such as the United

Kingdom, with overseas territories capable of providing the metropole with a ready supply of farm products. The fall in the price of grain imports from the United States in the 1870s and 1880s provided a challenge for all, however. Denmark coped relatively well, by moving more into livestock production to take advantage of cheaper grain. Italy coped by sending many of its citizens to the New World. Farmers in France and Germany successfully sought protection from imports, however, and so began the post-industrial-revolution growth of agricultural protectionism in densely populated countries. Meanwhile, tariffs on West European imports of manufactures were progressively reduced after the GATT came into force in the late 1940s, thereby encouraging agricultural production relative to manufacturing production (Lindert 1991; Anderson 1995).

Japan provides an even more striking example of the tendency to switch from taxing to increasingly assisting agriculture relative to other industries. Its industrialization began later than in Europe, after the opening up of the economy following the Meiji Restoration in 1868. By 1900, Japan had switched from being a small net exporter of food to becoming increasingly dependent on imports of rice (its main staple food, which was responsible for more than half the value of domestic food production). This was followed by calls from farmers and their supporters for rice import controls. Their calls were matched by equally vigorous calls from manufacturing and commercial groups for unrestricted food trade, since the price of rice at that time was a major determinant of real wages in the nonfarm sector. The heated debates were not unlike those that led to the repeal of the Corn Laws in the United Kingdom six decades earlier. In Japan, however, protectionist forces triumphed, and a tariff was imposed on rice imports from 1904. That tariff then gradually increased over time, raising the domestic price of rice to more than 30 percent above the import price during World War I. Even when there were food riots because of shortages and high rice prices just after the war, the Japanese government's response was not to reduce protection but instead to extend it to its colonies and to shift from a national to an imperial rice self-sufficiency policy. That involved accelerated investments in agricultural development in the Korean and Taiwanese colonies behind an ever-higher external tariff wall that by the latter 1930s had driven imperial rice prices to more than 60 percent above those in international markets (Anderson and Tyers 1992). After Japan lost its colonies at the end of World War II, its agricultural protection growth resumed and spread from rice to an ever-wider range of farm products.

Other high-income countries, which were settled by Europeans relatively recently and are far less densely populated, have had a strong comparative advantage in farm products for most of their history following Caucasian settlement. They have thus felt less need to protect their farmers than Europe or Northeast Asia. Indeed, until the present decade, Australia and New Zealand, like developing

countries, had in place policies that discriminated against their farmers (Anderson, Lloyd, and MacLaren 2007).

In the Republic of Korea and in Taiwan, China in the 1950s, as in many newly independent developing countries, an import-substituting industrialization strategy was initially adopted, which harmed agriculture. But in those two economies, unlike in most other developing countries, that policy was replaced in the early 1960s with a more neutral trade policy that resulted in very rapid export-oriented industrialization. This development strategy in those densely populated economies imposed competitive pressure on the farm sector, which, just as in Japan in earlier decades, prompted farmers to lobby (successfully, as it happened) for ever-higher levels of protection from import protection (Anderson and Hayami 1986).

Many less-advanced and less rapidly growing developing countries not only adopted import-substituting industrialization strategies in the late 1950s and early 1960s (Little, Scitovsky, and Scott 1970; Balassa and associates 1971) but also imposed direct taxes on their exports of farm products. It was common in the 1950s and 1960s—and in some cases all the way to the 1980s—to also use dual or multiple exchange rates so as to indirectly tax both exporters and importers (Bhagwati 1978; Krueger 1978). This added to the antitrade bias of developing countries' trade policies. Certainly within the agricultural sector of each country, import-competing industries tended to enjoy more government support than those that were more competitive internationally (Krueger, Schiff, and Valdés 1988; Herrmann et al. 1992; Thiele 2004). The Krueger, Schiff, and Valdés study also reveals that, at least up to the mid-1980s, direct disincentives for farmers, such as agricultural export taxes, were less important than indirect disincentives, such as import protection for the manufacturing sector or overvalued exchange rates, both of which pulled resources away from agricultural industries producing tradable products.

In short, historically, countries have tended to gradually shift from taxing to subsidizing agriculture relative to other sectors in the course of their economic development, although less so, and at a later stage of development, the stronger a country's comparative advantage in agriculture (Anderson and Hayami 1986; Lindert 1991). Hence, at any point in time, farmers in poor countries have tended to face depressed terms of trade relative to product prices in international markets, while the opposite was true for farmers in rich countries (Anderson 1995). The exceptions were rich countries with an extreme comparative advantage in agriculture—Australia and New Zealand.

While the economic policy history of developing countries has been documented extensively in previous surveys, less well known is the extent to which many emerging economies have belatedly followed the example of Korea and Taiwan, China in abandoning import substitution and opening their economies.

Some countries (for example, Chile) started in the 1970s while others (for example, India) did not do so in a sustained way until the 1990s. Other countries have adopted a very gradual pace of reform, with occasional reversals, while others have moved rapidly to open markets. Still others have adopted the rhetoric of reform but in practice have done little to open their economies. To get a clear sense of the overall impact of these reform attempts, there is no substitute for empirical analysis that quantifies the nature and degree of market intervention by governments over time.

Methodology for Measuring Price Distortions[7]

The main focus of the present study's methodology is on the government-imposed distortions that create a gap between domestic prices and what they would be under free markets. Since it is not possible to understand the characteristics of agricultural development with a sectoral view alone, the study not only estimates the effects of direct agricultural policy measures (including distortions in the foreign exchange market) but also generates estimates of distortions in nonagricultural sectors for comparative evaluation.

Specifically, the NRA for each farm product is computed as the percentage by which government policies have raised gross returns to farmers above what they would be without the government's intervention (or lowered them, if the NRA is less than zero). Product-specific input subsidies are included in those NRA estimates. A weighted average NRA for all covered products is derived using the value of production at undistorted prices as weights (in contrast to the PSEs and consumer support estimates, or CSEs, computed by OECD [2008a], which are expressed as a percentage of the distorted price). To that NRA for covered products is added a "guesstimate" of the NRA for noncovered products (on average around 30 pecent of the total) and an estimate of the NRA from non-product-specific (NPS) forms of assistance or taxation. Since the 1980s, some high-income governments have also provided "decoupled" assistance to farmers, though because that support in principle does not distort resource allocation, its NRA has been computed separately and is not included for direct comparison with the NRAs for other sectors or for developing countries.[8] Each farm industry is classified as import-competing, a producer of exportables, or a producer of nontradables (with its status sometimes changing over the years) in order to generate the weighted average NRAs for the two different groups of covered tradable farm products for each year. A production-weighted average NRA for nonagricultural tradables is also generated, for comparison with that for agricultural tradables, via the calculation of a percentage relative rate of assistance

(RRA), defined as: RRA = $100^{*}[(100 + NRAag^{t})/(100 + NRAnonag^{t}) - 1]$, where $NRAag^{t}$ and $NRAnonag^{t}$ are the percentage NRAs for the tradable parts of the agricultural (including noncovered) and nonagricultural sectors, respectively.[9] Since the NRA cannot be less than −100 percent if producers are to earn anything, neither can the RRA (since the weighted average $NRAnonag^{t}$ is non-negative in all our country case studies). If the agricultural and nonagricultural sectors are equally assisted, the RRA is zero. This measure is useful in that if it is below (above) zero, it provides an internationally comparable indication of the extent to which a country's sectoral policy regime has an antiagricultural (proagricultural) bias.

This approach is not well suited to analysis of the policies of former socialist economies in Europe and Asia prior to their reform era, as prices played only an accounting function and currency exchange rates were enormously distorted. The price comparison approach, however, provides a valuable a set of indicators for the reform era in these countries, as for other market economies, of distortions to incentives for farm production, consumption, and trade, and of the income transfers associated with interventions.[10]

In addition to the mean NRA, a measure of the dispersion or variability of the NRA estimates across the covered farm products also is generated for each economy. The cost of government policy distortions to incentives in terms of resource misallocation tends to grow as the degree of substitution in production increases. In the case of agriculture, which involves the use of farmland that is sector-specific but transferable among farm activities, the greater the variation of NRAs across industries within the sector, the higher the welfare cost of those market interventions. A simple indicator of dispersion is the standard deviation of the covered industries' NRAs.

While most of the focus is on agricultural producers, this study also considers the extent to which consumers are taxed or subsidized. To do so, a CTE is calculated by comparing the price that consumers pay for their food and the international price of each food product at the border. Differences between the NRA and the CTE arise from distortions in the domestic economy that are caused by transfer policies and taxes and subsidies that cause the prices paid by consumers (adjusted to the farmgate level) to differ from those received by producers. In the absence of any other information, the CTE for each tradable farm product is assumed to be the same as the NRA from border distortions and the CTE for nontradable farm products is assumed to be zero.

To obtain dollar values of farmer assistance and consumer taxation, the country authors' NRA estimates are multiplied by the gross value of production at undistorted prices to obtain an estimate in U.S. dollars of the direct gross subsidy equivalent (GSE) of assistance to farmers. These GSE values are calculated in constant dollars and are also expressed on per-farm-worker basis. Likewise, a value of the consumer transfer is derived from the CTE, by assuming consumption value is

the gross value of production at undistorted prices divided by the self-sufficiency ratio for each product (production divided by consumption, derived from national volume data or the Food and Agriculture Organization's [FAO's] commodity balance sheets). These transfer values can be summed across products for a country, and across countries for any or all products, to obtain regional aggregate transfer estimates for the studied economies.

Needless to say, there are numerous challenges in applying the above methodology, especially in developing economies with poor-quality data. Ways to deal with the standard challenges are detailed in the second section of appendix A, while country-specific issues are discussed in the relevant subsequent chapters.

The next section summarizes estimates that have emerged from aggregating the NRA and related estimates provided by the project's country case studies,[11] prefaced by a brief review of the relative size, economic growth, and structural changes that have taken place in key regions of the world over recent decades. After the national country studies were completed and the global database of NRA and CTE estimates was assembled (see Anderson and Valenzuela 2008), it was possible to estimate partial equilibrium country and global commodity indexes of the trade and welfare restrictiveness of agricultural policies. Since those estimates are not part of the country studies reported in Parts II and III of this volume, the methodology for them is not laid out until chapter 11, following which is a summary of the index estimates.

Empirical Estimates of National Distortions to Farmer Incentives

For the purposes of the present study, the world economy is divided into high-income areas (Western Europe, the United States and Canada, Japan, and Australia and New Zealand),[12] three developing country regions (Africa, Asia, and Latin America), and Europe's transition economies in the 1990s plus Turkey. (Turkey is included in this last group because it is in the same geographic region and, like others in that region, has been seeking EU accession, which necessarily has influenced the evolution of its agricultural price and trade policies.)

North America and Europe (including the newly acceded eastern members of the EU) each account for almost one-third of the global economy, and the remaining one-third is shared almost equally by developing countries and the other high-income countries. When the focus turns to just agriculture, however, developing countries are responsible for slightly over half the value added globally, with Asia accounting for two-thirds of that lion's share. The developing countries' majority becomes stronger still in terms of global population and even more so in terms of farmers, almost three-quarters of whom are in Asian developing countries. Hence the vast range of per capita incomes and agricultural land

per capita, and thus agricultural comparative advantages, across the country groups in table 1.1 and the strong concentration of poor people in Asia. The number of poor people in Asia has diminished dramatically over the past quarter century, though, and even more as a percentage of Asia's population (unlike in Africa), but 60 percent of the world's population living on less than US$1 a day still lived in Asia in 2005 (down from 87 percent in 1981 and 76 percent in 1993—see table 1.2). The decline in Asian poverty was associated with much faster economic growth and export-led industrialization in the region than in the rest of the world: since 1980, Asia's per capita GDP has grown at four times, and exports at nearly two times, the global average (table 1.3). The share of Asia's GDP that is exported is now one-third above that for the rest of the world and for Latin America, as summarized from the World Bank (2007) by Sandri, Valenzuela, and Anderson (2007).

In 2000–04, just 12 percent of Asia's GDP came from agriculture, on average. That stands in contrast to the situation in Africa, where the share for our focus countries ranges from 20 to 40 percent, and in even starker contrast to Latin America and Europe's transition economies, where it is down to 6 percent (and to just 2 percent on average in high-income countries). The share of employment in agriculture remains very high in Asia, however, at just under 60 percent—the same as in Africa and three times the share in Latin America and Eastern Europe, although more farmers work part-time on their farms in Asia than in other developing countries. By contrast, less than 4 percent of workers in high-income countries are still engaged in agriculture. Hence the much greater impact of own-country and rest-of-world distortions to agricultural incentives to welfare, inequality, and poverty in developing countries than in high-income countries.

NRAs and GSEs to agriculture

Perhaps the simplest measure for capturing the aggregate extent of distortions to agricultural prices globally is to examine the trend in the GSE of assistance (positive or negative) to farmers. Figure 1.1a shows the GSE for five-year periods since 1960 for the world as a whole, for developing countries, and for high-income countries plus Europe's transition economies. The dark line suggests that, apart from the dip during the period of high world food prices in 1973–74, the net global GSE has been steadily rising over the past half century, especially when the decoupled assistance to farmers in high-income countries is included.[13]

The decomposition of those global transfers by country group in figure 1.1a reveals two distinct trends, each kinked partway through the period. On one hand, aggregate support for farmers in high-income countries rose steadily throughout the period from the 1950s to the early 1990s, before declining slightly over the 15 subsequent years—somewhat more rapidly at the end of the period, when

Table 1.1. Key Economic and Trade Indicators of Focus Countries, by Region, 2000–04

	Share (%) of world				National relative to world (world = 100)			Agricultural trade specialization index[b]
	Population	Total GDP	Agricultural GDP	Agricultural workers	GDP per capita	Agricultural land per capita	RCA,[a] agriculture and food	
Africa	10	1	6	11	14	148	—	—
Asia	51	10	37	73	20	34	80	−0.03
Latin America	8	5	8	3	64	171	—	—
Europe and Central Asia	7	4	6	3	48	178	—	—
Western Europe	6	29	16	1	454	46	106	−0.03
United States and Canada	5	33	11	0.3	636	186	119	0.08
Australia and New Zealand	0.4	2	2	0.1	405	2,454	354	0.62
Japan	2	13	5	0.2	610	5	12	−0.84
All focus countries	90	96	91	92	—	—	—	—
Other (nonfocus) developing and transition economies	10	4	9	8	—	—	—	—

Source: Sandri, Valenzuela, and Anderson (2007), compiled mainly from World Bank 2007.

a. RCA, the revealed comparative advantage index, is the share of agriculture and processed food in national exports as a ratio of that sector's share of global exports.
b. Primary agricultural trade specialization index is net exports as a ratio of the sum of exports and imports of agricultural and processed food products (world average = 0.0).

Table 1.2. Poverty in Africa, Asia, Latin America, and Europe's Transition Economies, 1981–2005

	1981	1993	2005	% of people living on less than US$1/day who are rural, 2002
People living on less than $1/day (millions):				
Sub-Saharan Africa	157	247	299	69
East Asia and Pacific	948	600	180	85
of which China	*730*	*444*	*106*	90
South Asia	387	341	350	75
of which India	*296*	*280*	*267*	74
Latin America and the Caribbean	27	34	28	34
European transition economies	3	10	16	50
World	1,528	1,237	879	74
Asia's share of world	*87*	*76*	*60*	*n.a.*
People living on less than $1/day (% of population):				
Sub-Saharan Africa	40	44	39	
East Asia and Pacific	69	36	10	
of which China	*74*	*38*	*8*	
South Asia	42	29	24	
of which India	*42*	*31*	*24*	
Latin America and the Caribbean	7	7	5	
European transition economies	1	2	3	
World	42	27	16	

Source: Chen and Ravallion (2008) and, for rural share, Ravallion, Chen, and Sangraula (2007).

Note: n.a. = not applicable.

world food prices shot up. On the other hand, farmers in developing countries were increasingly taxed by price and trade policies from the early 1960s to the late 1970s and early 1980s, a trend that gradually reversed and, by the mid-1990s, resulted in positive aggregate assistance to farmers. Thus, the GSE contributions of the two groups to the global trend are offsetting in the 1980s but additive from the early 1990s to 2004. Over 2005–07, when food prices in international markets rose steeply, transfers to farmers in high-income countries fell back considerably (similar to what happened in 1973–74). Though there are not sufficient estimates to show the change during those recent years for developing countries, their governments also responded by reducing or suspending import tariffs and temporarily restricting the export of food, so developing countries may have contributed to, rather than offset, the downward GSE trend in high-income countries.

Table 1.3. Growth of Real GDP and Exports, Focus Countries, 1980–2004

(at constant 2000 prices, percent per year, trend-based)

	Agriculture	Industry	Services	Total GDP	GDP per capita	Export volume
Africa	—	—	—	—	—	—
Asia	3.1	8.6	7.5	7.1	5.5	11.2
Latin America	—	—	—	5.4	3.6	7.2
Europe and Central Asia	—	—	—	—	—	—
Western Europe	0.8	1.4	2.6	2.3	2.0	5.5
United States and Canada	2.7	2.6	3.4	3.2	2.0	6.7
Australia and New Zealand	2.8	2.5	3.6	3.3	2.0	6.5
Japan	−1.7	2.0	3.0	2.5	2.1	4.0
All focus countries						
World	2.0	2.5	3.2	3.0	1.4	6.1

Source: Sandri, Valenzuela, and Anderson (2007), compiled from World Bank 2007.

Note: — = not available.

Figure 1.1. Gross Subsidy Equivalents of Assistance to Farmers, over Time and by Region,[a] 1955–2007

a. Over time

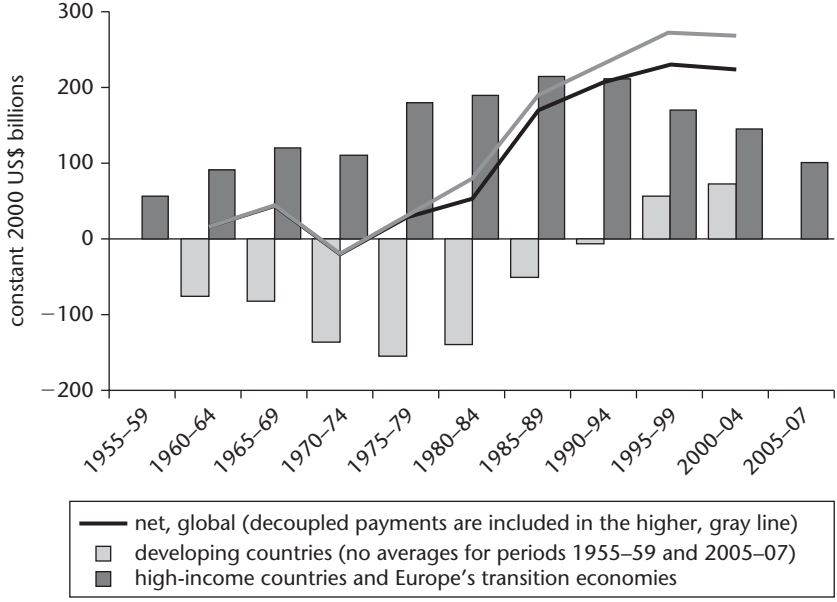
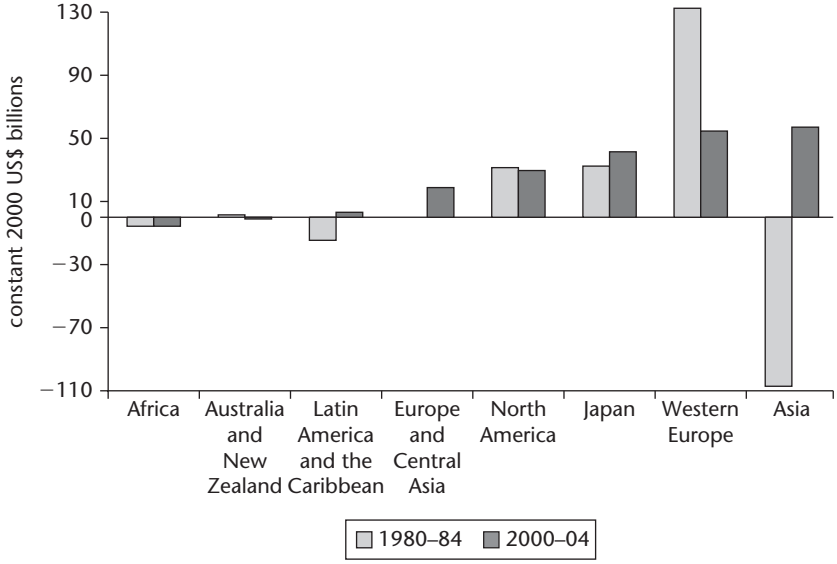
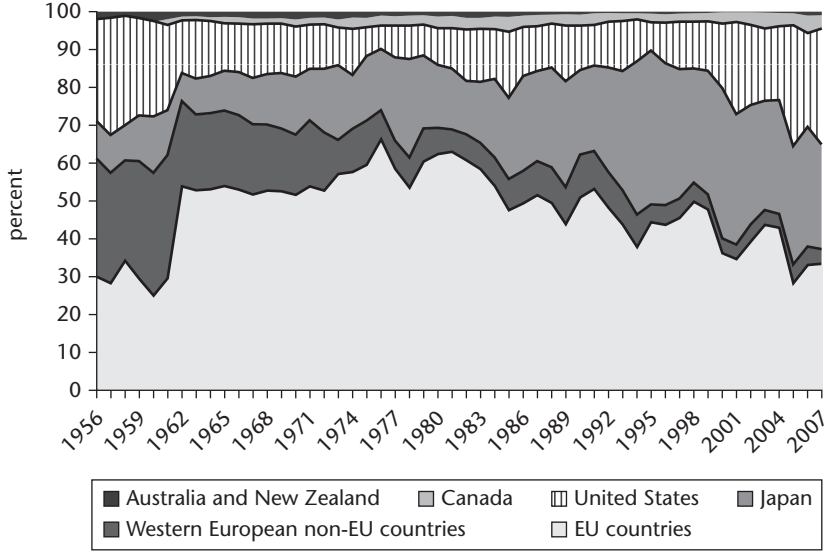


Figure 1.1. (*continued*)

b. By region



c. Among high-income countries

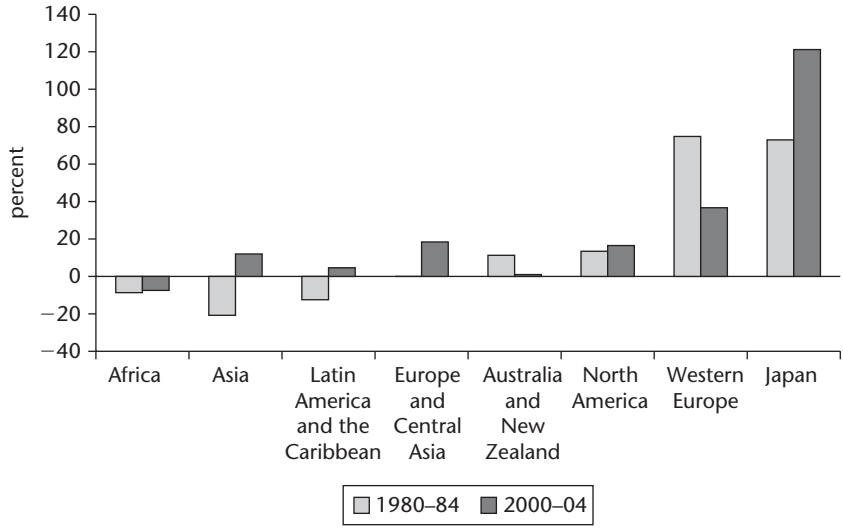


Source: Anderson and Valenzuela (2008), based on estimates reported in the project's national country studies.

In figure 1.1b, GSE contributions are further subdivided into four high-income regions and four developing-country regions. It is clear that Japan and Western Europe are the biggest contributors among high-income countries and that Asia is the biggest contributor by far to the developing country trends—in both subperiods. As will become clear, the latter result is largely driven by China and India, although growth in protection in Korea added to the overall increase in assistance in the region. Figure 1.1c shows a further disaggregation of the contribution of the various high-income countries over the full time series. It reveals that while the EU (the EU-15, ignoring the new East European members), Japan, and the United States were equally large contributors in 2005–07, the original six members of the European Economic Community were responsible for more than half of the aggregate support in high-income countries during the first decade of the Common Agricultural Policy (CAP) (1963–72) and Japan and the United States for less than one-fifth each.

Though the GSE estimates account for inflation, by being expressed in constant dollar terms, they do not take into account the fact that the agricultural sector is growing and at different rates across countries. That shortcoming is avoided by using the NRA, which is the extent of policy-induced price support expressed as a percentage of the value of agricultural output at undistorted prices. Figure 1.2 and table 1.4, which show the same eight country groups as figure 1.1b,

Figure 1.2. NRAs to Agriculture,[a] by Regions, 1980–84 and 2000–04[a]



Source: Anderson and Valenzuela (2008), based on estimates reported in the project's national country studies.

a. Includes noncovered products and NPS (but not decoupled) assistance.

Table 1.4. NRAs to Agriculture,[a] Focus Countries, 1955–2007[c]
(percent)

	1955–59	1960–64	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–04	2005–07
Africa	−14	−8	−11	−15	−13	−8	−1	−9	−6	−7	—
Asia	−27	−27	−25	−25	−24	−21	−9	−2	8	12	—
Latin America	−11	−8	−7	−21	−18	−13	−11	4	6	5	—
Europe and Central Asia[b]	—	—	—	—	—	—	—	10	18	18	25
Western Europe	44	57	68	46	56	74	82	64	44	37	18
United States and Canada	13	11	11	7	7	13	19	16	11	17	11
Australia and New Zealand	6	7	10	8	8	11	9	4	3	1	2
Japan	39	46	50	47	67	72	119	116	120	120	81
Developing countries	−26	−23	−22	−24	−22	−18	−8	−2	6	9	—
High-income countries	22	29	35	25	32	41	53	46	35	32	17
All focus countries (weighted average)	3	5	6	0	2	5	17	18	17	18	—

Source: Anderson and Valenzuela (2008), based on estimates reported in the project's national country studies.

Note: — = not available.

a. Weighted average for each country, including NPS assistance and authors' guesstimates for noncovered farm products (but not decoupled assistance), with weights based on gross value of agricultural production at undistorted prices. Estimates for China pre-1981 and India pre-1965 are based on the assumption that the NRA to agriculture in those years was the same as the average NRA estimates for those countries for 1981–84 and 1965–69, respectively, and that the gross value of production in those missing years is that which gives the same average share of value of production in total world production in 1981–84 and 1965–69, respectively. Developing-country and world aggregates are computed accordingly.

b. Countries in Europe and Central Asia are not included in the high-income or developing-country aggregates.

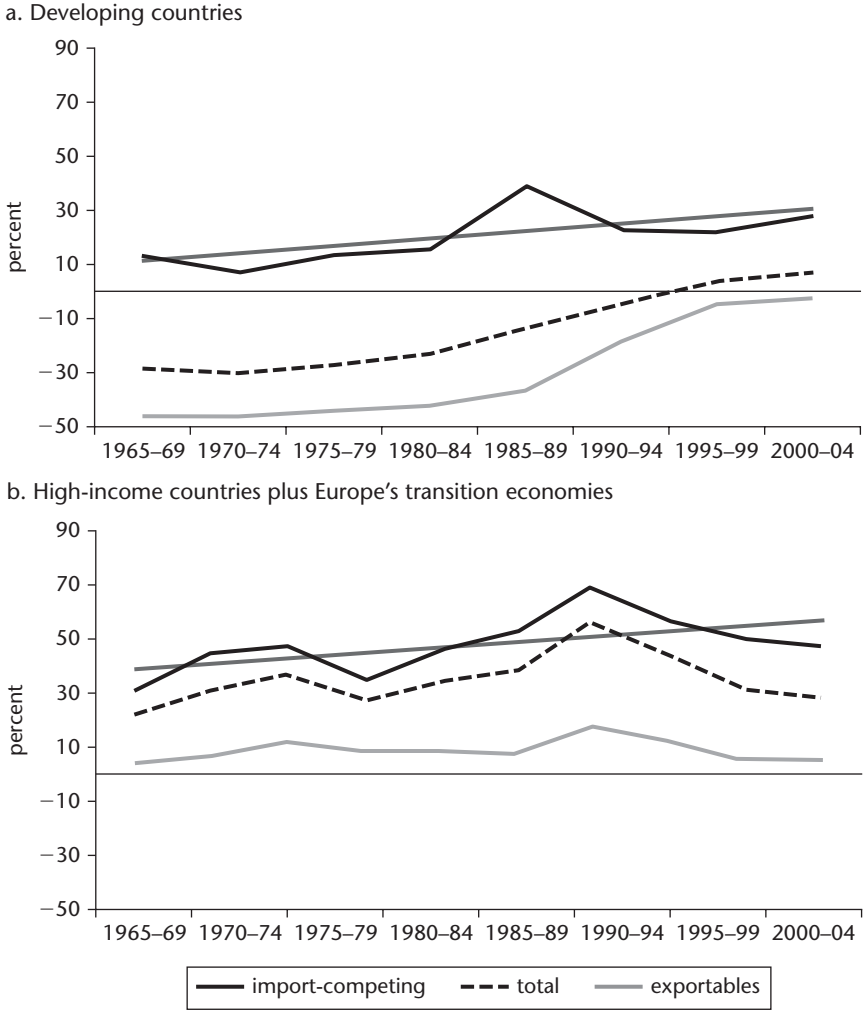
reveal much more similarity among the regions' NRAs than the GSEs for the developing-country groups. They also reveal that Japan is now proportionately far more protective of its farmers than Western Europe. The bottom row of table 1.4 provides a similar trend to the GSE trend line: the global average NRA, which was close to zero up to the early 1980s, increased as developing countries began to phase out export taxation, and has since hovered at about 18 percent.

The GSE and NRA numbers are based not only on estimates of assistance to covered products but also on NPS assistance and on guesstimates of assistance to the roughly 30 percent of the value of farm products that have not been included in the study's explicit price comparison exercise. Figure 1.3 summarizes the most robust NRA estimates for covered farm products, categorized each year as either exportable, import-competing, or nontradable. The weighted average trends across those covered products are very similar to the GSE trends both for high-income countries and, in a slightly more muted fashion, for developing countries.

What is more striking about figure 1.3 is the marked difference in the levels of support to import-competing versus exportable covered products. Exportables in high-income countries have received relatively little support other than during the export subsidy war of the mid-1980s, while in developing countries they were increasingly taxed from the late 1950s until the 1980s. Taxation has been gradually phased out over the past two decades, although a little remained in 2004, for example in Argentina, and considerably more was added by various developing countries in 2008 in response to concerns about the spike in international food prices. Importables, by contrast, have been assisted throughout the past five decades, and the long-run fitted trend line has almost the same slope for both sets of countries (but a lower intercept for developing countries). Two lessons can be drawn from this: first, there is a strong antitrade bias for agricultural goods in high-income and developing countries that has not diminished much over the past half century (in fact, it increased substantially in the 1980s); and second, growth in agricultural import protection appears to have accompanied global economic growth through the 1990s, and has slowed only slightly since then. These lessons hold even when the eight regions examined here are disaggregated, as shown in table 1.5, which also reports estimates of a trade bias index (TBI) for each region. Though the index confirms the broad global conclusion, it indicates a sizable decline in the antitrade bias in developing countries since the 1980s, especially in Asia.

That antitrade bias means that the rates of assistance are not uniform across commodities, which indicates that the resources being used within the farm sector are not being put to their best use. The extent of that inefficiency—over and above that caused by too many or too few resources in aggregate in the sector—is crudely indicated by the standard deviation of NRAs among covered products in each

Figure 1.3. NRAs to Exportable, Import-Competing, and All Covered Agricultural Products,[a] High-Income and Developing Countries, 1955–2004



Source: Anderson and Valenzuela (2008), based on estimates reported in the project's national country studies.

a. Covered products only. The total also includes nontradables.

focus country. This dispersion index, summarized for our eight regions in table 1.6, has fluctuated across time and varied between regions, but the global average has remained around 70 percent throughout the period, with no discernable trend.

Table 1.5. NRAs to Agricultural Exportables, Import-Competing Products, and the TBI,[a] Focus Regions, 1955–2007

(percent)

	1955–59	1960–64	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–04	2005–07
Africa											
NRA, agricultural exportables	—	−30.1	−38.4	−42.6	−42.6	−35.0	−36.7	−35.8	−26.1	−24.6	—
NRA, agricultural import-competing products	—	18.6	11.8	1.9	14.5	13.2	58.3	5.2	9.8	1.6	—
TBI	—	−0.41	−0.45	−0.44	−0.50	−0.43	−0.60	−0.39	−0.33	−0.26	—
Latin America											
NRA, agricultural Exportables	—	−20.4	−12.8	−27.0	−25.2	−27.1	−25.0	−10.5	−3.5	−4.6	—
NRA, agricultural import-competing products	—	26.3	8.7	−2.8	1.1	13.6	5.1	19.4	12.5	20.6	—
TBI	—	−0.37	−0.20	−0.25	−0.26	−0.36	−0.29	−0.25	−0.14	−0.21	—
South Asia[c]											
NRA agricultural exportables	—	−37.5	−37.2	−30.0	−36.1	−27.9	−20.6	−15.8	−12.0	−6.2	—
NRA agricultural import-competing products	—	39.2	41.2	39.4	45.1	37.9	63.3	25.1	14.5	26.5	—
TBI	—	−0.55	−0.56	−0.50	−0.56	−0.48	−0.51	−0.33	−0.23	−0.26	—
China and Southeast Asia[c]											
NRA, agricultural exportables	—	−55.5	−55.1	−51.8	−50.1	−50.0	−41.0	−20.8	−2.2	0.1	—
NRA, agricultural import-competing products	—	−10.3	−8.9	−9.4	−2.6	0.5	15.1	3.3	13.3	12.3	—
TBI	—	−0.50	−0.51	−0.47	−0.49	−0.50	−0.49	−0.23	−0.14	−0.11	—

(*Table continues on the following pages.*)

Table 1.5. NRAs to Agricultural Exportables, Import-Competing Products, and the TBI,[a] Focus Regions, 1955–2007 (*continued*)

(percent)

	1955–59	1960–64	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–04	2005–07
Japan, Korea, and Taiwan, China											
NRA, agricultural exportables	−18.1	5.7	4.3	15.4	10.3	25.1	48.9	57.1	57.0	70.3	—
NRA, agricultural import-competing products	35.6	43.3	52.8	54.1	76.6	83.7	124.9	127.4	127.0	134.6	122.6
TBI	−0.40	−0.26	−0.32	−0.25	−0.38	−0.32	−0.34	−0.31	−0.31	−0.27	—
European transition economies											
NRA, agricultural exportables	—	—	—	—	—	—	—	−3.2	−1.0	−1.0	15.2
NRA, agricultural import-competing products	—	—	—	—	—	—	—	32.5	35.4	35.7	32.3
TBI	—	—	—	—	—	—	—	−0.27	−0.27	−0.27	−0.13
Western Europe											
NRA, agricultural exportables	9.3	17.4	31.7	22.5	33.3	31.1	50.1	38.0	15.0	8.1	1.7
NRA, agricultural import-competing products	59.4	77.2	82.9	55.7	61.7	79.5	87.6	67.2	52.8	50.5	28.9
TBI	−0.31	−0.34	−0.28	−0.21	−0.18	−0.27	−0.20	−0.17	−0.25	−0.28	−0.21
North America											
NRA, agricultural exportables	2.7	2.8	6.1	5.1	2.9	5.4	10.5	6.0	5.4	7.6	4.1
NRA, agricultural import-competing products	8.6	9.3	8.8	6.7	10.5	19.7	23.6	18.6	11.3	16.8	11.0
TBI	−0.05	−0.06	−0.02	−0.01	−0.07	−0.11	−0.10	−0.10	−0.05	−0.08	−0.06
Australia and New Zealand											
NRA, agricultural exportables	3.8	4.7	6.6	5.8	5.5	7.6	6.5	3.6	2.2	0.2	0.2
NRA, agricultural import-competing products	7.9	8.3	9.3	11.7	8.7	8.4	6.5	3.8	2.0	2.0	1.5
TBI	−0.04	−0.03	−0.02	−0.05	−0.03	−0.01	0.00	0.00	0.00	−0.02	−0.01

Developing countries[c]											
NRA, agricultural exportables	—	−46.5	−44.6	−45.4	−43.9	−41.4	−35.8	−18.7	−5.5	−3.0	—
NRA, agricultural import-competing products	—	12.7	13.5	7.8	12.8	16.5	37.7	22.6	22.0	23.0	—
TBI	—	−0.53	−0.51	−0.49	−0.50	−0.50	−0.53	−0.34	−0.23	−0.21	—
High-income countries											
NRA, agricultural exportables	4.2	7.4	13.5	10.3	11.3	12.1	22.3	15.9	8.1	6.9	2.9
NRA, agricultural import-competing products	31.2	45.9	50.2	36.5	47.4	58.1	71.4	62.4	53.9	50.7	30.8
TBI	−0.21	−0.26	−0.24	−0.19	−0.24	−0.29	−0.29	−0.29	−0.30	−0.29	−0.21
World[c]											
NRA, agricultural exportables	—	−23	−20	−23	−25	−24	−17	−7	−1	0	—
NRA, agricultural import-competing products	—	35	37	27	34	38	57	43	38	36	—
TBI	—	−0.43	−0.42	−0.39	−0.44	−0.45	−0.47	−0.35	−0.28	−0.26	—

Source: Anderson and Valenzuela (2008), based on estimates reported in the project's national country studies.

Note: — = not available.

a. NRAs for noncovered products are included here (unlike in figure 1.3).

b. TBI = $(1 + NRAag_x/100)/(1 + NRAag_m/100) - 1$, where $NRAag_x$ and $NRAag_m$ are the weighted average percentage NRAs for the exportable and import-competing parts of the agricultural sector, with weights based on production valued at undistorted prices. TBIs shown here are calculated using the regional five-year averages of $NRAag_x$ and $NRAag_m$.

c. Estimates for China pre-1981 and India pre-1965 are based on the assumption that NRAs to agriculture in those years were the same as the average NRA estimates for those countries for 1981–84 and 1965–69, respectively, and that the gross value of production in those missing years is that which gives the same average share of value of production in total world production in 1981–84 and 1965–69, respectively. The developing-country and world averages are computed accordingly.

Table 1.6. Dispersion of NRAs across Covered Agricultural Products,[a] Focus Regions, 1965–2007
(percent)

	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–04	2005–07
Africa	31	30	37	36	36	31	25	25	—
Asia	56	42	49	53	66	56	57	64	—
Latin America	49	44	52	52	44	42	32	40	—
Europe and Central Asia	34	33	41	26	39	56	39	45	44
Western Europe	119	85	112	98	122	86	69	74	64
United States and Canada	29	15	31	62	71	39	31	37	28
Australia and New Zealand	40	45	26	17	20	14	12	7	5
Japan	69	82	156	143	175	162	136	143	116
All focus countries (weighted average)	54	45	55	51	59	53	43	48	—
Product coverage[b]	68	70	71	73	73	72	71	68	70

Source: Anderson and Valenzuela (2008), based on estimates reported in the project's national country studies.

Note: — = not available.

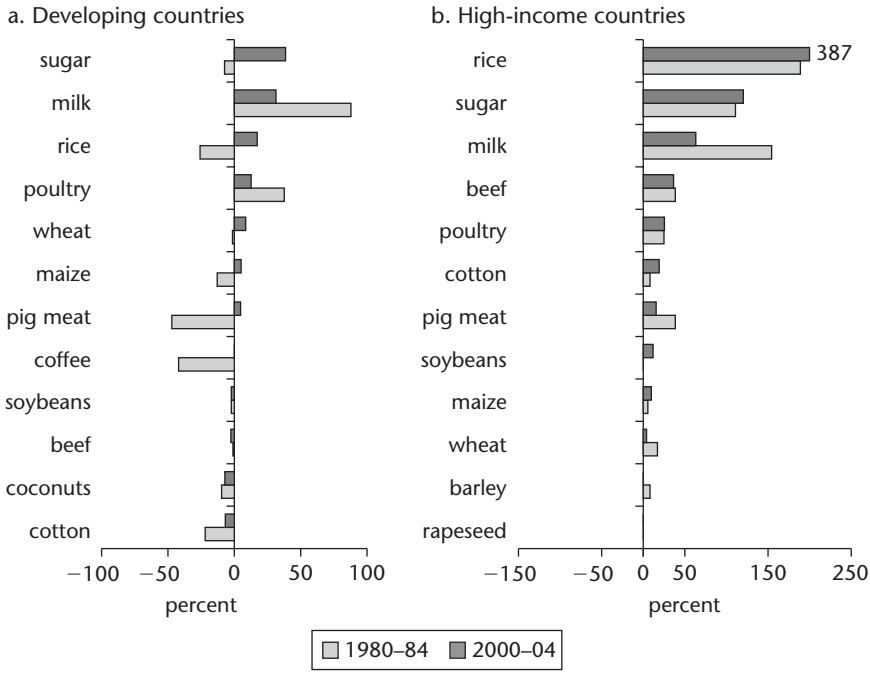
a. Dispersion for each region is a simple average of the country-level annual standard deviations around a weighted mean of NRAs per country across covered products each year.

b. Share of gross value of total agricultural production at undistorted prices accounted for by covered products.

The NRAs for different covered products are not random, because their weighted averages across developing or high-income countries cover a wide spectrum. Figure 1.4 shows that rice, sugar, and milk (the rice pudding ingredients) are by far the most assisted farm industries in both sets of countries, with beef and poultry next. For high-income countries, cotton has the next-highest NRA after beef and poultry, yet it has the lowest (most negative) NRA in developing countries.

When the country authors' best guesstimates of the NRAs for the various non-covered farm products are aggregated across countries, their weighted average tends to be less than half that for covered products. This finding is not surprising, since many of them are nontraded staples or fruits and vegetables that receive little or no government attention—part of the reason they were not covered by authors in the first place. Their inclusion in the weighted average across all products therefore dampens the positive or negative NRA average for a region's covered products. Though NPS and decoupled assistance to farmers added only a

Figure 1.4. NRAs, Key Covered Products, High-Income and Developing Countries, 1980–84 and 2000–04



Source: Anderson and Valenzuela (2008), based on estimates reported in the project's national country studies.

little to the NRA for most developing countries, NPS added 2 or 3 percentage points until the early 1980s and has contributed about 5 points since then for high-income countries. If decoupled payments are included, the NRA for high-income farmers rises another 5 percentage points for the 1980s and early 1990s and as many as 10 points by during the present decade (table 1.7).

Assistance to nonfarm sectors and RRAs

The antiagricultural policy biases of the past were due to more than agricultural policies. Also important in developing countries, according to Krueger, Schiff, and Valdés (1988), has been border protection to the manufacturing sector—the dominant intervention in the tradables part of nonagricultural sectors. Unfortunately, it has not been possible with the resources available for this study to quantify the distortions to nonfarm tradable sectors as carefully as for agriculture. Authors typically have had to rely on applied trade taxes (for exports as well as imports) rather than being able to undertake price comparisons, and hence they usually do not capture quantitative restrictions on trade, which were important in earlier decades but decreasingly so in recent times. Nor do they capture distortions in the services sectors, some of which now produce tradables (or would in the absence of interventions preventing their emergence). As a result, the estimated NRAs for nonfarm importables are smaller and decline less rapidly than in fact was the case—and likewise for nonfarm exportables, except their NRAs in some cases would have been negative. Of those two elements of underestimation, the former bias certainly dominates, so the authors' estimate of the overall NRA for nonagricultural tradables should be considered a lower-bound estimate (more so in the past), so that its decline is less rapid than it should be.[14]

Despite these methodological limitations, the estimated NRAs for nonfarm tradables are very sizeable prior to the 1990s. For developing countries as a whole, the average NRA value has steadily declined throughout the past four to five decades, from around 45 percent in the 1960s to around 30 percent in the 1970s, 16 pecent in the 1980s, and less than 10 percent since the mid-1990s as policy reforms have spread (second last row of table 1.7). The decline in NRA has contributed to a decline in the estimated negative RRA for farmers: the weighted average RRA was worse than −50 percent up to the mid-1970s but improved to an average of −38 percent in the 1980s, −12 percent in the 1990s, and just above zero (1 percent) in 2000–04. The trend in RRAs and their two component NRAs for developing countries is starkly illustrated in figure 1.5, where it is clear that the falling positive NRAs for nonfarm producers have contributed even more to the rise of the RRA than has the gradual disappearance of the negative NRAs for farmers. When trends are decomposed by region, it is clear that Asia has been the major contributor to this

Table 1.7. NRAs to Agricultural Products Relative to Nonagricultural Industries, 1955–2007
(percent, weighted averages)

a. Developing countries[d]

	1955–59	1960–64	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–04
NRA, covered products	−33.4	−29.6	−28.8	−30.2	−27.6	−23.3	−13.2	−4.9	3.8	6.7
NRA, noncovered products	−9.0	−7.9	−7.6	−9.8	−9.8	−7.1	0.3	0.1	3.9	6.3
NRA, all agricultural products	−27.1	−24.0	−23.1	−24.9	−23.1	−19.1	−9.8	−3.5	3.9	6.6
Total agricultural NRA (including NPS)[a]	−25.8	−22.7	−21.8	−23.7	−22.0	−17.8	−8.3	−1.8	5.7	8.7
NRA, decoupled assistance	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.3
Total agricultural NRA (including NPS + decoupled assistance)	−25.8	−22.7	−21.8	−23.7	−22.0	−17.8	−8.3	−1.6	5.9	9.0
NRA, all agricultural tradables[a]	−27.9	−25.4	−25.3	−28.2	−25.7	−20.9	−10.3	−2.2	6.2	8.9
NRA, nonagricultural tradables	56.9	43.1	45.0	30.6	27.3	18.8	14.0	12.7	9.0	5.7
RRA[c]	−54.1	−47.7	−48.4	−44.9	−41.6	−32.9	−21.2	−13.1	−2.5	3.1

(*Table continues on the following page.*)

Table 1.7. NRAs to Agricultural Products Relative to Nonagricultural Industries, 1955–2007 (*continued*)
(percent, weighted averages)

b. High-income countries (including Europe and Central Asia)

	1955–59	1960–64	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–04	2005–07
NRA, covered products	22.0	30.9	37.0	27.2	34.2	38.9	55.6	43.2	32.0	28.7	16.6
NRA, noncovered products	10.0	14.6	14.9	11.5	14.1	13.7	21.1	17.0	17.0	16.7	91.9
NRA, all agricultural products	18.5	26.2	30.7	22.8	28.6	31.8	45.6	35.6	27.5	25.0	12.6
Total agricultural NRA (including NPS)[ba]	22.3	28.8	32.4	23.7	30.2	36.3	49.6	40.0	31.3	29.4	16.5
NRA, decoupled assistance	0.0	0.0	0.0	0.0	0.6	4.7	5.8	5.5	8.1	9.6	9.9
Total agricultural NRA (including NPS + decoupled assistance)	22.3	28.8	32.4	23.7	30.8	41.0	55.4	45.5	39.4	39.0	26.4
NRA, agricultural tradables	23.0	30.2	34.2	25.0	32.2	37.9	52.0	41.7	32.5	30.1	17.0
NRA, nonagricultural tradables	7.5	8.7	9.1	6.3	4.5	3.8	3.7	2.5	2.1	1.8	−0.2
RRA[c]	14.3	19.7	23.0	17.6	26.5	32.8	46.6	38.2	29.8	27.8	17.2

Source: Anderson and Valenzuela (2008), based on estimates reported in the project's national country studies.

a. NRAs including NPS assistance, that is, the assistance to all primary factors and intermediate inputs as a percentage of the total primary agricultural production valued at undistorted prices.

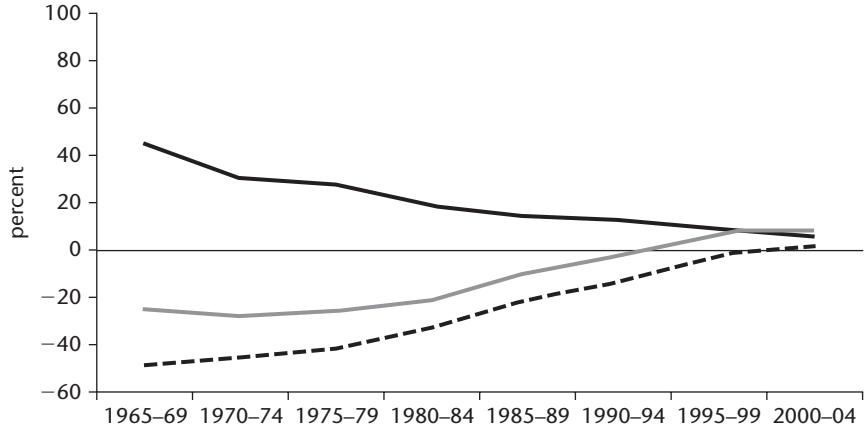
b. TBI = $(1 + NRAag_x/100)/(1 + NRAag_m/100) - 1$, where $NRAag_m$ and $NRAag_x$ are the average percentage NRAs for the import-competing and exportable parts of the agricultural sector. The regional average TBI is calculated from the regional averages of the NRAs for exportable and import-competing parts of the agricultural sector.

c. RRA = $100*[(100 + NRAag^t)/(100 + NRAnonag^t) - 1]$, where $NRAag^t$ and $NRAnonag^t$ are the percentage NRAs for the tradables parts of the agricultural and nonagricultural sectors, respectively.

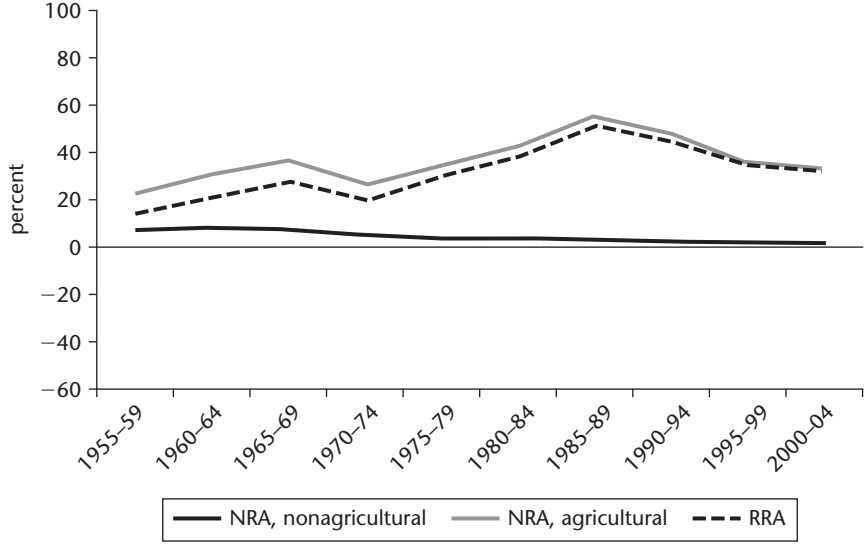
d. Estimates for the NRA and RRA for China pre-1981 and India pre-1965 are based on the assumption that the agricultural NRAs in those years were the same as the average NRA estimates for those countries for 1981–84 and 1965–69, respectively, and that the value of production in those missing years is that which gives the same average share of value of production in total world production in 1981–84 and 1965–69, respectively. Developing-country and world aggregates are computed accordingly.

Figure 1.5. NRAs to Agricultural and Nonagricultural Tradable Products and RRA,[a] All Focus Countries, 1955–2004

a. Developing countries[b]



b. High-income countries (not including those in Europe and Central Asia)

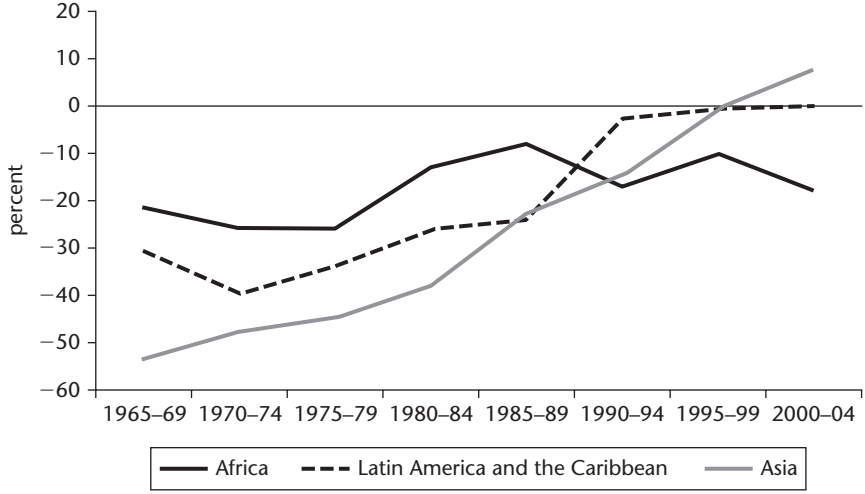


Source: Anderson and Valenzuela (2008), based on estimates reported in the project's national country studies.

a. The RRA is defined as 100*[(100 + $NRAag^t$)/(100 + $NRAnonag^t$) − 1], where $NRAag^t$ and $NRAnonag^t$ are the percentage NRAs for the tradables parts of the agricultural and nonagricultural sectors, respectively.

b. Estimates for China pre-1981 and India pre-1965 are based on the assumption that the NRA to agriculture in those years was the same as the average NRA estimates for those countries for 1981–84 and 1965–69, respectively, and that the gross value of production in those missing years is that which gives the same average share of value of production in total world production in 1981–84 and 1965–69, respectively.

Figure 1.6. RRAs to Tradables,[a] Asia, Africa, and Latin America, 1965–2004



Source: Anderson and Valenzuela (2008), based on estimates reported in the project's national country studies.

a. Five-year weighted averages with value of production at undistorted prices as weights. In Asia, estimates for China pre-1981 are based on the assumption that the NRA to agriculture and nonagricultural tradables, and hence the RRA in those earlier years, were the same as the average NRA estimates for China in 1981–89.

dramatic reform (figure 1.6 and table 1.8). Within Asia, China and India have contributed most to that outcome (Anderson and Martin 2009b).

Although average changes in NRAs and RRAs for high-income countries look minor by comparison with those for developing countries, they hide major differences across the high-income countries. Even figure 1.7 doesn't do justice to the striking case of Australia and New Zealand, where the phasing out of high manufacturing tariffs provided nearly as large a boost to farmer incentives as in developing countries as a group. There are two differences between the trend in those two farm-exporting countries and the trend in developing countries, however. One is that much of the cut in Australia's manufacturing protection occurred in the decade before 1955–59, when the RRA was far more negative (not shown in figure 1.7 but see Anderson et al. 2009); the other is that Australian and New Zealand farmers enjoyed considerable direct assistance for much of the time manufacturing was protected, and that farm assistance was cut at the same time as was manufacturing protection, which kept the RRA from rising greatly starting in the 1970s (table 1.8).

Despite the very considerable policy reforms of the past quarter century, there is still a long way to go before differences in rates of assistance across countries are

Table 1.8. NRAs to Agricultural and Nonagricultural Tradables, and the RRA,[a] by Region, 1955–2007
(percent)

	1955–59	1960–64	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–04	2005–07
Africa											
NRA, agricultural	—	−13.3	−19.6	−25.0	−22.1	−13.5	−0.3	−15.4	−8.7	−12.0	—
NRA, nonagricultural	—	3.7	2.7	1.5	5.7	1.6	9.2	2.7	2.0	7.3	—
RRA	—	−15.2	−21.4	−26.0	−25.9	−13.1	−8.3	−17.1	−10.4	−18.0	—
Latin America											
NRA, agricultural	—	−11.4	−9.3	−23.0	−19.0	−12.9	−11.2	4.4	5.5	4.9	—
NRA, nonagricultural	—	26.9	31.3	27.8	23.3	18.5	16.8	7.3	6.6	5.4	—
RRA	—	−30.2	−30.9	−39.8	−34.2	−26.6	−24.0	−2.7	−1.0	−0.5	—
South Asia[b]											
NRA, agricultural	—	4.1	4.4	9.7	−7.7	1.8	47.1	0.2	−2.4	12.7	—
NRA, nonagricultural	—	114.4	117.8	81.7	57.8	54.6	39.9	18.6	15.0	10.1	—
RRA	—	−51.5	−51.9	−39.8	−41.6	−33.3	5.1	−15.5	−14.9	3.4	—
China and Southeast Asia[b]											
NRA, agricultural	—	−43.6	−42.6	−40.1	−35.7	−34.5	−27.8	−12.0	4.9	7.1	—
NRA, nonagricultural	—	36.5	36.5	33.7	30.8	20.6	23.3	19.8	9.6	5.5	—
RRA	—	−58.7	−58.0	−55.2	−50.8	−43.4	−41.6	−26.4	−4.2	1.5	—
Japan, Korea, and Taiwan, China											
NRA, agricultural	30.1	39.9	48.8	51.3	75.5	78.8	124.3	129.9	130.5	138.1	126.1
NRA, nonagricultural	8.6	8.3	6.1	4.2	3.5	2.4	2.5	1.4	1.1	0.6	1.0
RRA	19.7	29.1	40.2	44.9	69.6	74.6	118.7	126.7	128.1	136.7	123.7

(*Table continues on the following pages.*)

Table 1.8. NRAs to Agricultural and Nonagricultural Tradables, and the RRA,[a] by Region, 1955–2007 (*continued*)
(percent)

	1955–59	1960–64	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–04	2005–07
European transition economies											
NRA, agricultural	—	—	—	—	—	—	—	10.0	18.3	16.1	17.0
NRA, nonagricultural	—	—	—	—	—	—	—	9.8	5.5	4.6	2.7
RRA	—	—	—	—	—	—	—	0.1	12.2	11.0	13.9
Western Europe											
NRA, agricultural	43.8	57.0	67.5	45.7	56.3	74.4	82.0	63.4	43.6	36.8	18.5
NRA, nonagricultural	8.0	7.2	5.7	3.8	2.5	1.5	1.7	1.3	1.5	1.4	1.2
RRA	33.1	46.5	58.6	40.4	52.6	71.9	79.0	61.3	41.5	34.9	17.1
North America											
NRA, agricultural	12.5	10.5	10.9	7.5	7.6	13.8	20.2	16.1	11.4	17.3	11.2
NRA, nonagricultural	6.1	7.4	7.4	5.5	4.1	3.8	3.7	3.3	2.1	1.5	1.3
RRA	6.0	2.9	3.3	1.8	3.4	9.7	15.8	12.4	9.1	15.5	9.7
Australia and New Zealand											
NRA, agricultural	5.5	6.6	8.3	7.9	7.3	10.6	8.7	4.3	2.9	1.0	0.6
NRA, nonagricultural	20.0	21.5	24.0	19.7	14.3	13.5	10.3	6.4	3.4	2.4	2.4
RRA	−12.1	−12.2	−12.6	−9.9	−6.1	−2.6	−1.5	−2.0	−0.5	−1.4	−1.8
Developing countries[b]											
NRA, agricultural	—	−24.0	−27.3	−31.9	−25.5	−21.0	−15.6	−3.9	4.0	7.4	—
NRA, nonagricultural	—	58.3	60.0	45.8	37.3	34.6	27.0	16.7	9.8	6.3	—
RRA	—	−52.0	−54.5	−53.3	−45.8	−41.3	−33.6	−17.6	−5.3	1.1	—

High-income countries											
NRA, agricultural	23.0	30.9	36.8	26.5	34.7	43.0	55.5	48.2	36.6	33.9	18.3
NRA, nonagricultural	7.5	8.5	7.7	5.4	3.6	3.4	3.2	2.5	1.7	1.3	−0.7
RRA	14.3	20.6	27.1	19.9	30.1	38.3	50.6	44.6	34.3	32.1	19.2
World[b]											
NRA, agricultural	—	5.6	7.6	0.8	2.6	5.7	18.7	19.7	18.4	18.6	—
NRA, nonagricultural	—	19.0	20.5	16.1	13.7	10.0	9.8	7.6	6.0	4.0	—
RRA	—	−11.3	−10.7	−13.2	−9.8	−3.6	8.1	11.3	11.8	14.0	—

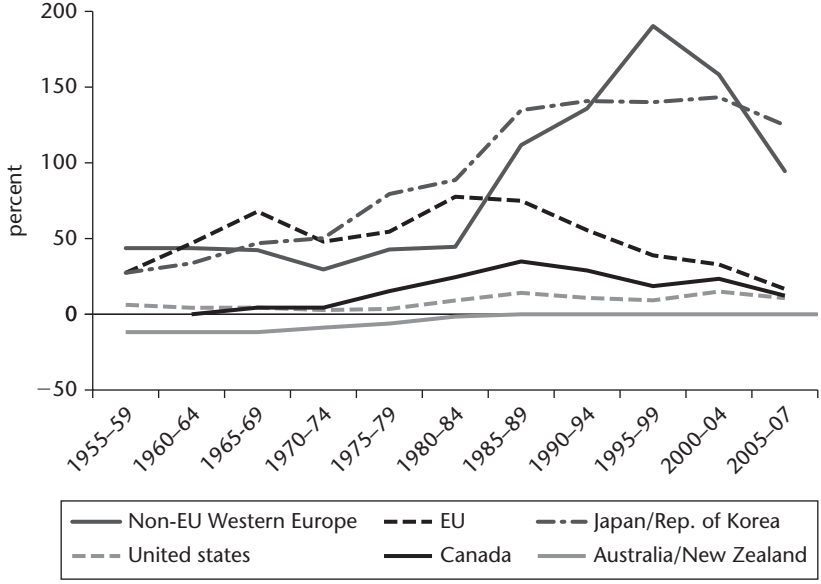
Source: Anderson and Valenzuela (2008), based on estimates reported in the project's national country studies.

Note: — = not available.

a. The RRA is defined as 100*[(100 + $NRAag^t$)/(100 + $NRAnonag^t$)−1], where $NRAag^t$ and $NRAnonag^t$ are the percentage NRAs for the tradables parts of the agricultural and nonagricultural sectors, respectively.

b. Estimates for the RRA for China pre-1981 and India pre-1965 are based on the assumption that the agricultural NRAs in those years were the same as the average NRA estimates for those countries for 1981–84 and 1965–69, respectively, and that the value of production in those missing years is that which gives the same average share of value of production in total world production in 1981–84 and 1965–69, respectively. Developing-world and country aggregates are computed accordingly.

Figure 1.7. RRAs to Agriculture,[a] High-Income Countries, 1955–2007



Source: Anderson and Valenzuela (2008), based on estimates reported in the project's national country studies.

a. The RRA is defined as 100*[(100 + $NRAag^t$)/(100 + $NRAnonag^t$) − 1], where $NRAag^t$ and $NRAnonag^t$ are the percentage NRAs for the tradable parts of the agricultural and nonagricultural sectors, respectively.

removed. The spread of NRAs and RRAs for all our focus countries for 2000–04 is shown in figure 1.8. As economic growth continues, there are fewer countries below the zero lines in those ladders, reflecting an ongoing tendency for political economy forces to transform countries from taxing to subsidizing their farmers relative to producers of nonfarm goods as per capita incomes grow. For the whole panel dataset, that tendency over the 50-year period examined appears to be almost exactly the same for developing as for high-income countries, the only difference being the average RRA starting point (see the country fixed effects regression lines in figure 1.9).[15]

A final way of summarizing two of the reform indicators used above—the RRA and the TBI, which allow assessment of changes in the antiagricultural or proagricultural production and trade biases in policy regimes—is to map them in two-dimensional space. Figure 1.10 shows agriculture's TBI on the horizontal axis and the RRA on the vertical axis. An economy with no antiagricultural or proagricultural bias (RRA = 0) and no antitrade or protrade bias within the farm sector (TBI = 0) would be located at the intersection of the two axes in figure 1.10. Africa, Asia, and Latin America (the last shown in the figure as Latin America and

Figure 1.8. Cross-Country Dispersion of NRAs and RRAs, 2000–04

a. NRA[a]

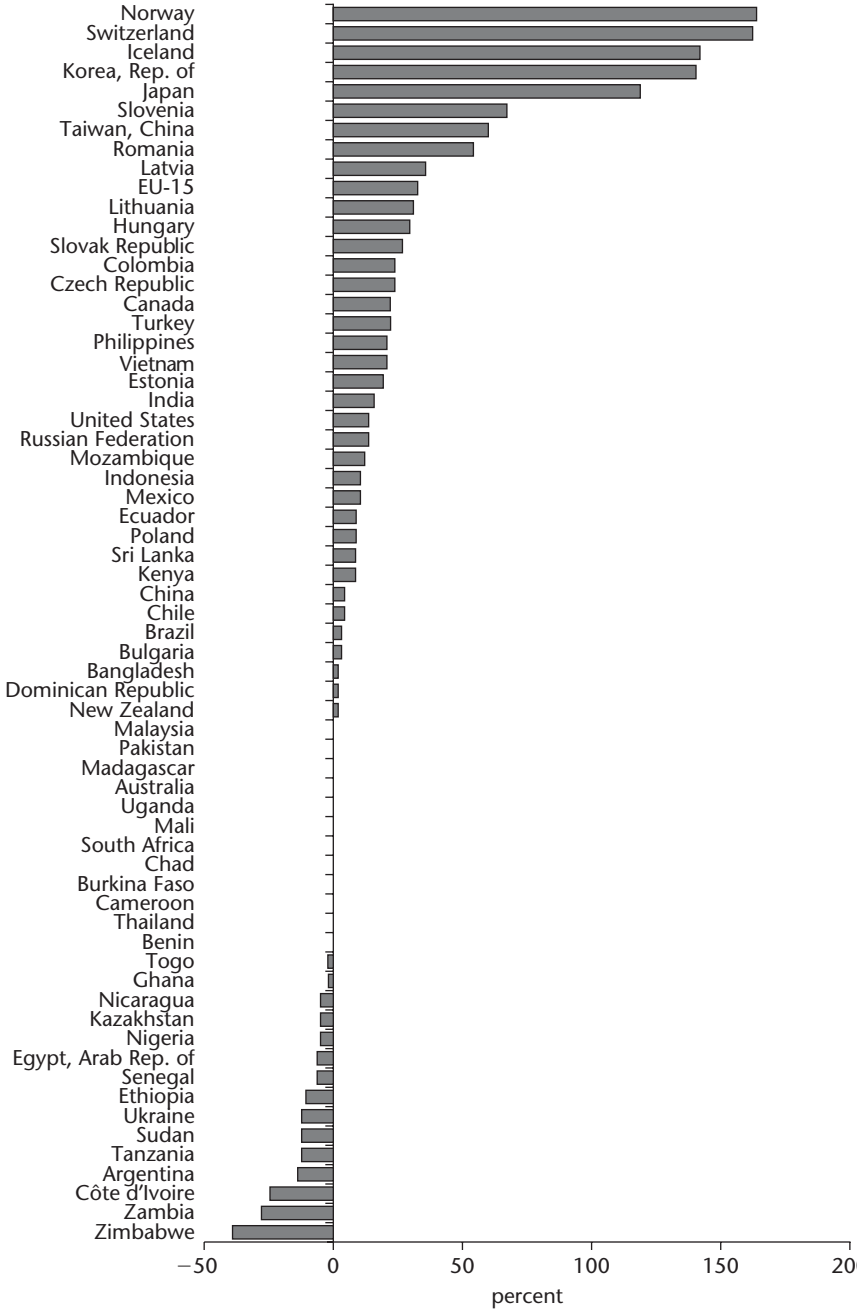
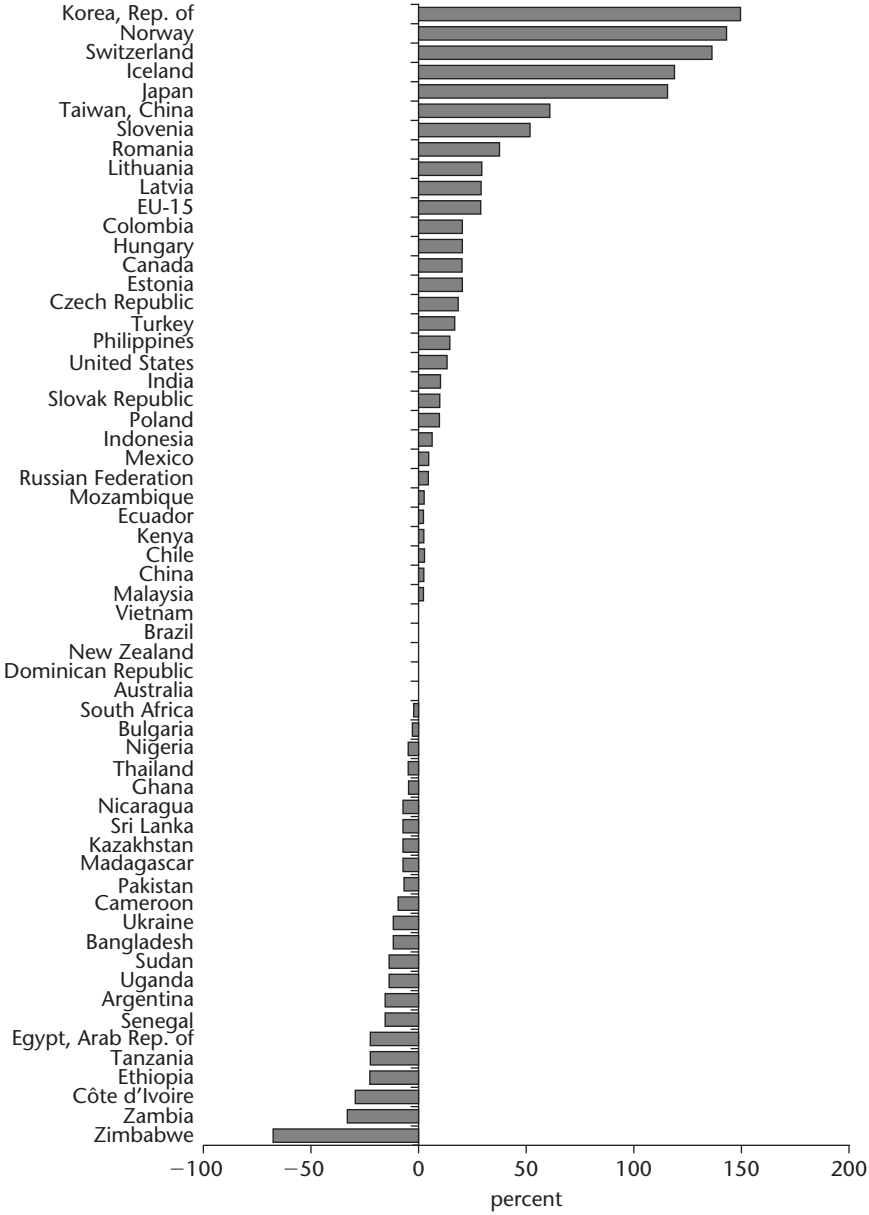


Figure 1.8. (*continued*)

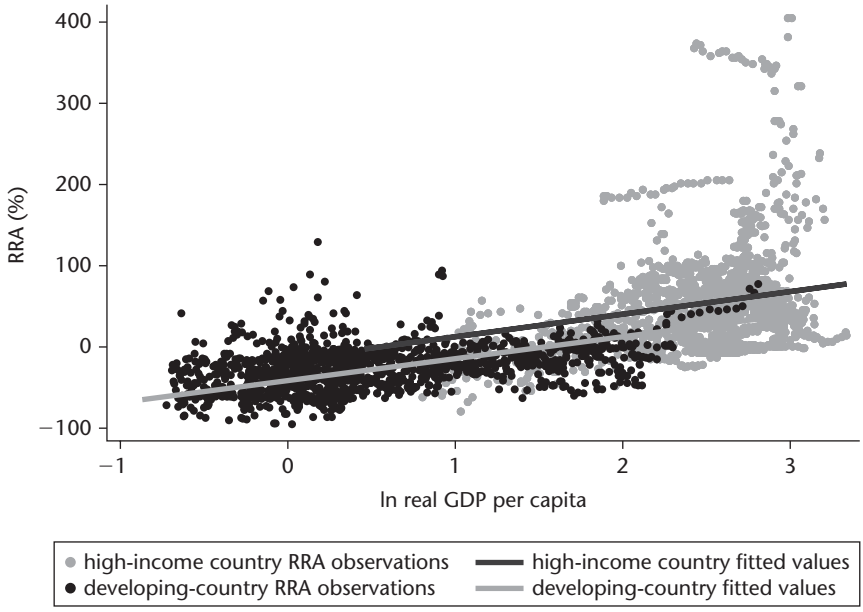
b. RRA



Source: Anderson and Valenzuela (2008), based on estimates reported in the project's national country studies.

Note: NRA for all agriculture products, including NPS.

Figure 1.9. Relationships between Real GDP Per Capita and RRA,[a] All Focus Countries, 1955–2007



	Coefficient	Standard error	R^2
Developing countries	0.26	0.02	0.17
High-income countries	0.28	0.03	0.14

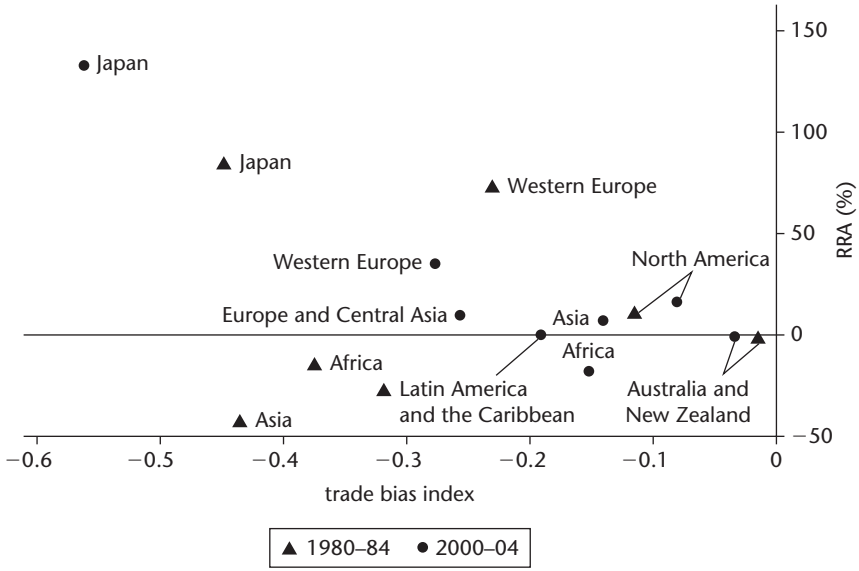
Source: Author's derivation with country fixed effects, using data in Anderson and Valenzuela (2008) that are based on RRA estimates reported in the project's national country studies.

the Caribbean) were all well to the southwest of that neutral point as of 1980–84, but by 2000–04 all had moved much closer to the vertical axis (meaning they had reduced their antitrade bias in agriculture), and all but Africa had become closer to the horizontal axis—although Asia is now above rather than below that axis, which means the countries in that region are assisting farmers relatively more than producers of other tradable products. While that can lead to just as much waste of resources as the earlier, antiagricultural, policy bias, it is only in Korea and in Taiwan, China that the 2000–04 RRA is well above zero (it is just 1 percent for China and 4 percent for Southeast Asia).

Producer assistance and consumer taxation in value terms

In conclusion, this survey returns to the dollar values mentioned at the outset. Table 1.9 shows the full time series, in aggregate and by per person engaged in

Figure 1.10. Relationship between RRA and the TBI for Agriculture, Focus Regions, 1980–84 and 2000–04



Source: Author's derivation using data in Anderson and Valenzuela (2008) that are based on NRA and RRA estimates reported in the project's national country studies.

agriculture. Two points are worth stressing from the latter estimates. One is that for high-income countries, when decoupled payments are included, assistance per farmer has continued to rise over time, even when expressed in constant 2000 U.S. dollars. By 2000–04, the annual transfer was double what it was in 1975–79, which, in turn, is more than double the transfer in 1965–69. At US$13,400 per farmer, that is a very large transfer to a group whose household incomes are not significantly below those of nonfarm workers when adjusted for differences between urban and rural costs of living.[16] The second point to note from table 1.9b is that for half this period, farmers in developing countries were effectively taxed between US$0.30 and US$0.50 per day by price-distorting policies, at a time when many hundreds of millions of them were struggling to survive on less than US$1 a day per household member. Thankfully, most of the export taxation that drove those transfers was dismantled, although some was resurrected in response to high international food prices in 2007 and 2008. The move from negative to positive transfers to developing country farmers since the mid-1990s is not necessarily a good thing, however, even if society believes farmers should be compensated for the cost of adjusting to the structural changes that accompany rapid economic growth—there are almost always more efficient ways to raise welfare of poor people than via price and trade policies.

Table 1.9. GSEs of Assistance to Farmers, Total and Per Farm Worker, by Region, 1965–2007

a. Total (*constant 2000 US$ billions per year*)

	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–04	2005–07
Africa	−5	−9	−11	−6	−1	−7	−5	−6	—
Asia	−69	−110	−126	−106	−38	−8	38	57	—
Latin America	−2	−13	−13	−14	−10	4	5	4	—
Europe and Central Asia [a]	−3	−1	−2	−10	1	4	19	19	26
Western Europe	89	76	124	133	123	117	76	55	34
United States and Canada	19	16	19	31	36	30	20	30	32
Australia and New Zealand	1	1	1	1	1	1	0	0	0
Japan	16	18	37	33	53	59	53	42	22
All focus countries	46	−21	30	64	165	201	208	202	—
Developing countries	−79	−133	−152	−136	−48	−6	58	75	—
High-income countries	125	112	182	199	214	207	150	127	80
High-income countries, including decoupled [b]	125	112	186	223	238	235	193	173	130
World (scaled) [c]	51	−24	34	70	192	225	233	223	—

(*Table continues on the following page.*)

Table 1.9. GSEs of Assistance to Farmers, Total and Per Farm Worker, by Region, 1965–2007 (*continued*)

b. Per person engaged in agriculture (*constant 2000 US$ per year*)

	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–04	2005–07
Africa	−77	−137	−142	−81	−10	−69	−44	−46	—
Asia	−114	−166	−174	−136	−45	−9	41	60	—
Latin America	−79	−410	−408	−407	−305	132	177	143	—
Europe and Central Asia	−123	−54	−101	−443	45	141	541	569	888
Western Europe	4,259	4,433	8,163	10,097	10,889	12,397	9,617	8,427	5,141
United States and Canada	3,733	3,436	4,189	6,730	8,220	7,478	5,582	9,182	8,763
Australia and New Zealand	3,504	3,452	3,492	4,744	3,226	1,613	1,221	442	1,061
Japan	1,301	1,845	4,830	5,432	10,234	13,957	16,234	16,933	12,469
All focus countries	59	−27	34	66	164	185	181	172	—
Developing countries	−116	−177	−185	−154	−51	−6	53	67	—
High-income countries	3,261	3,491	6,483	8,166	9,972	11,325	9,745	9,871	7,180
High-income countries, including decoupled[a]	3,261	3,491	6,625	9,151	11,091	12,857	12,539	13,447	11,681

Source: Anderson and Valenzuela (2008), based on estimates reported in the project's national country studies.

Note: — = not available.

a. Data for Europe and Central Asia are only Turkey until 1991. Figures are from FAOSTAT, which may differ from national statistics. Estimates for the NRA and RRA for China pre-1981 and India pre-1965 are based on the assumption that the agricultural NRAs in those years were the same as the average NRA estimates for those countries for 1981–84 and 1965–69, respectively, and that the value of production in those missing years is that which gives the same average share of value of production in total world production in 1981–84 and 1965–69, respectively. Developing-country and world aggregates are computed accordingly.

b. Decoupled payments to farmers are excluded from all rows except the final two.

c. These figures assume that the NRA in nonfocus countries is the same as the average for the focus countries in each region (including decoupled payments in the case of other high-income countries), and that their share of the value of regional agricultural production at undistorted prices is the same as their average share of the region's agricultural GDP at distorted prices during 1990–2004. For the countries of North Africa (other than the Arab Republic of Egypt) and the Middle East, NRAs are assumed to be the same as Turkey's.

Since it is mostly border (trade) policies rather than domestic measures that are responsible for the nominal assistance provided to farmers, those border measures also confer a tax on consumers of farm products. The extent of those CTEs, shown in table 1.10 for all covered farm products, also differs from NRAs in that the consumption weights are not the same as production weights for tradable products. But in percentage terms, their order of magnitude is similar to the NRAs. Again, two points are noteworthy. One is that developing countries' price-distorting policies prior to the 1990s provided up to US$0.30 per capita per year to consumers, directly at the expense of farmers, who on average are far poorer than urban dwellers. The other is that the cost to consumers in high-income countries of farm support policies is miniscule relative to their incomes, amounting even at their peak in the most protected countries (other than Japan) to well under US$1 a day. It is thus not surprising that domestic opposition to these policies is weak.

Additional Indicators of Agricultural Price Distortions

The indicators used above to summarize trends in the extent of distortions within the agricultural sector of a country include the unweighted or weighted mean NRA of covered products, the standard deviation of covered product NRAs, the weighted mean NRA for exportable versus import-competing covered products, and the TBI of the agricultural sectors' covered plus noncovered tradable products. The reason for reporting these various indicators of dispersion of NRAs—apart from their being informative in their own right—is that theory suggests the national economic welfare cost of government policy distortions to incentives in terms of resource misallocation tends to be greater, the greater the degree of substitution in production in response to changes in price. In the case of agriculture, which involves the use of farmland that is sector-specific but substitutable among farm activities, the greater the variation of NRAs across industries within the sector then the higher will be the welfare cost of those market interventions.

While these various indicators of dispersion are useful, it would also be helpful to have a single indicator to capture the overall welfare or trade effect of each country's regime of agricultural price distortions in place at any time, and to trace its path over time and make cross-country comparisons. To that end, chapter 11 draws on a theoretical literature that has developed in recent years to provide such indicators for national price and trade policies that are well grounded in theory. They belong to the family of indexes first developed by Anderson and Neary (2005) under the catch-all name of trade restrictiveness indexes.

Table 1.10. CTEs of Policies Assisting Producers of Covered Farm Products, Percent and Per Capita, by Region, 1965–2007

a. Percent

	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–04	2005–07
Africa	−12	−16	−9	−6	16	−8	0	−3	—
Asia	−12	−15	−2	−15	−14	−3	5	10	—
Latin America	−7	−18	−13	−12	−10	13	6	8	—
Europe and Central Asia[a]	−17	−6	−7	−28	1	−2	9	17	12
Western Europe	74	49	59	70	65	49	37	32	17
United States and Canada	8	6	7	13	10	2	−5	−2	2
Australia and New Zealand	15	11	10	10	10	8	4	2	1
Japan	67	68	93	99	135	119	116	107	81
Developing countries	−12	−16	−5	−14	−10	0	5	8	—
High-income countries	42	30	40	45	50	41	32	27	16
All focus countries	23	14	21	10	15	16	15	16	—

b. Per capita (*constant 2000 US$ per year*)

	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–04	2005–07
Africa	−15	−27	−16	−12	21	−10	0	−3	—
Asia	−6	−13	−2	−22	−18	−4	6	10	—
Latin America	−4	−24	−22	−31	−16	34	11	12	—
Europe and Central Asia[a]	−20	−9	−9	−41	1	−13	15	30	20
Western Europe	240	202	306	276	247	207	138	103	50
United States and Canada	40	35	43	67	42	8	−18	−9	11
Australia and New Zealand	112	87	80	68	56	49	22	12	8
Japan	130	157	287	258	435	498	443	344	221
Developing countries	−7	−15	−5	−22	−13	−1	6	8	—
High-income countries	153	136	207	195	199	176	124	94	59
All focus countries	30	18	39	23	27	29	26	23	—

Source: Anderson and Valenzuela (2008), based on estimates reported in the project's national country studies.

Note: — = not available.

a. Europe and Central Asia data are for Turkey only until 1991.

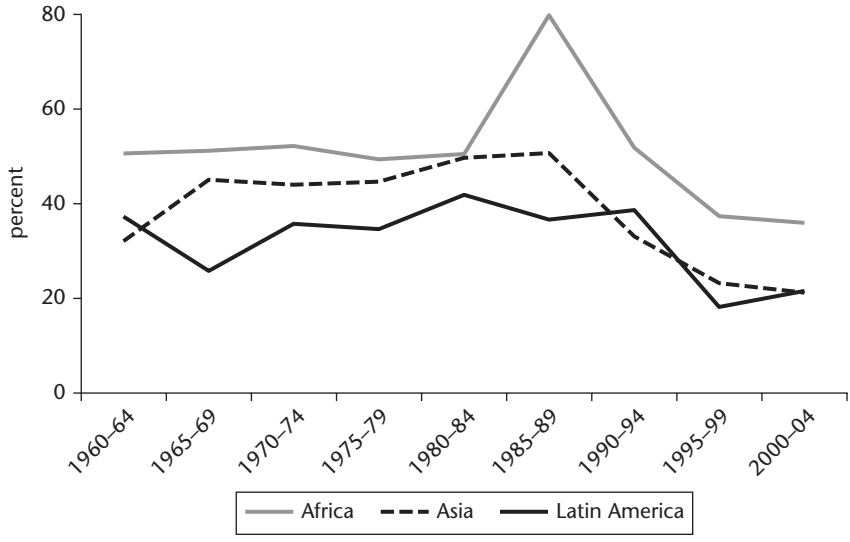
To capture distortions imposed by each country's border and domestic policies on its economic welfare and its trade volume, Lloyd, Croser, and Anderson (2009a) define a welfare reduction index (WRI) and a trade reduction index (TRI) and estimate them for the project's focus countries since 1960, taking into account that for some covered products the NRA and CTE differ (because there are domestic measures in place in addition to or instead of trade measures). As their names suggest, these two new indexes respectively capture in a single indicator the (partial equilibrium) welfare- or trade-reducing effects of distortions to consumer and producer prices of covered farm products from all agricultural and food policy measures in place (while ignoring noncovered farm products and indirect effects of sectoral and trade policy measures directed at nonagricultural sectors). The WRI measure reflects the welfare cost of agricultural price-distorting policies better than the NRA or CTE because it recognizes that the cost of a government-imposed price distortion is related to the square of the price wedge. It thus captures the disproportionately higher welfare costs of peak levels of assistance or taxation, is larger than the mean, and is positive regardless of whether the government's agricultural policy favors or hurts farmers. The WRI and TRI measures also have the advantage of providing a theoretically sound indicator of the welfare (or trade) effect in a single sectoral measure that is comparable across time and place. In this way, the WRI and TRI come close to what a computable general equilibrium (CGE) can provide in the way of estimates of the trade and welfare (and other) effects of the price distortions captured by the product NRA and CTE estimates, while having the advantage of providing an annual time series. The time series derived for this project, available as Anderson and Croser (2009), is detailed in chapters 11 and 12.

The WRI estimates in figure 1.11 indicate an increasing tendency for covered products' policies to reduce welfare between the 1960s and the mid-1980s, and then to improve welfare in the 1990s (when the WRI declines). This pattern is generated by different policy regimes in the different country groups, though: in high-income countries, covered products were assisted throughout the years reported, although less so after the 1980s, whereas covered products in developing countries were disprotected until the most recent years. That is, the WRI has the desirable property of correctly identifying the welfare consequences that result from both positive and negative assistance regimes, because it captures the dispersion of NRAs among covered products: the larger the variance in assistance levels, the greater the potential for resources to be used in activities that do not maximize economic welfare.

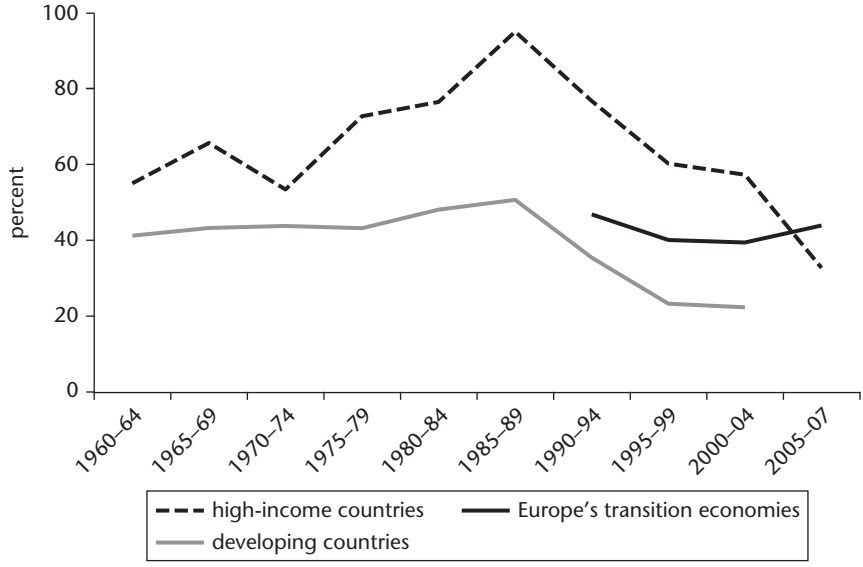
One consequence of these tendencies is that the WRI values are much higher than the NRAs for high-income countries. Another is that the WRI for Africa spikes in the mid-1980s, in contrast to the NRA, which moves close to zero. The

Figure 1.11. Welfare Reduction Indexes for Covered Tradable Farm Products, by Region, 1960–2007

a. Africa, Asia, and Latin America



b. Developing countries, high-income countries, and Europe's transition economies



Source: Authors' calculations based on NRAs and CTEs in Anderson and Valenzuela (2008).

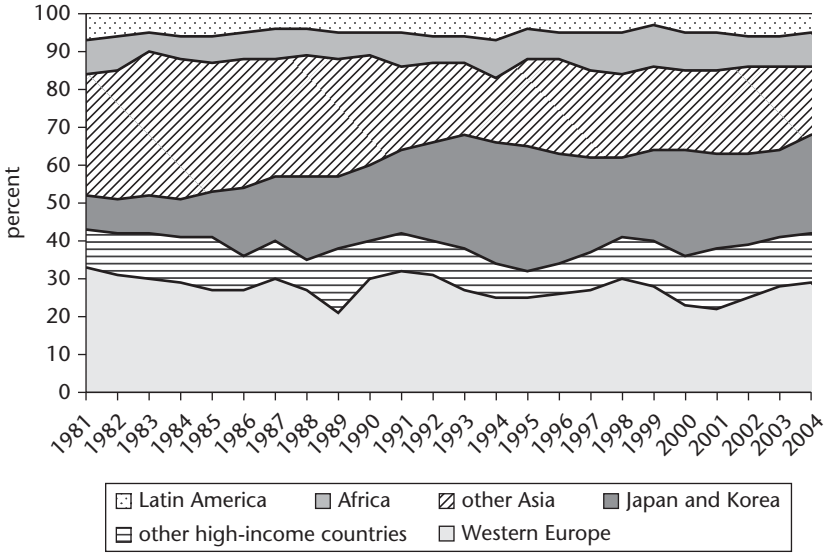
reason is that while Africa was still taxing exportables, it moved (temporarily) from low to very high positive levels of protection for import-competing farm products (table 1.4). At the aggregate level, African farmers received almost no government assistance then (NRA close to zero), but the welfare cost of its mixture of agricultural policies as a whole was at its highest according to the WRI. A third consequence is that for developing countries, the average WRI in the years 1995 to 2004 is around 20 percent, even though the average NRA for covered products in those years is close to zero (see figure 1.3), again reflecting the high dispersion across product NRAs—particularly between exportables and import-competing goods—in each country.[17]

It is possible to use the value of production (at undistorted prices) to estimate the contribution to global welfare reduction by the various regions' policies affecting covered agricultural products. Figure 1.12a shows that, since 1993, high-income countries (plus Korea) have been responsible for around 60 percent of that global welfare reduction, developing Asia for about 25 percent, and Africa for nearly 10 percent. Asia's share has been about 40 percent for the whole period since 1981, but as developing Asia's contribution declined over the 1980s, the contribution of Japan and Korea grew. Figure 1.12b reveals that China's contribution has fallen substantially over the 1990s. Recall, though, that the WRI picks up the variance for these countries' product NRAs within the sector. Thus, even though China had an aggregate agricultural NRA of only 6 percent in the period 1994–2005, it had negative NRAs on cotton and rice and positive NRAs for other products, so it still had a moderately large WRI.

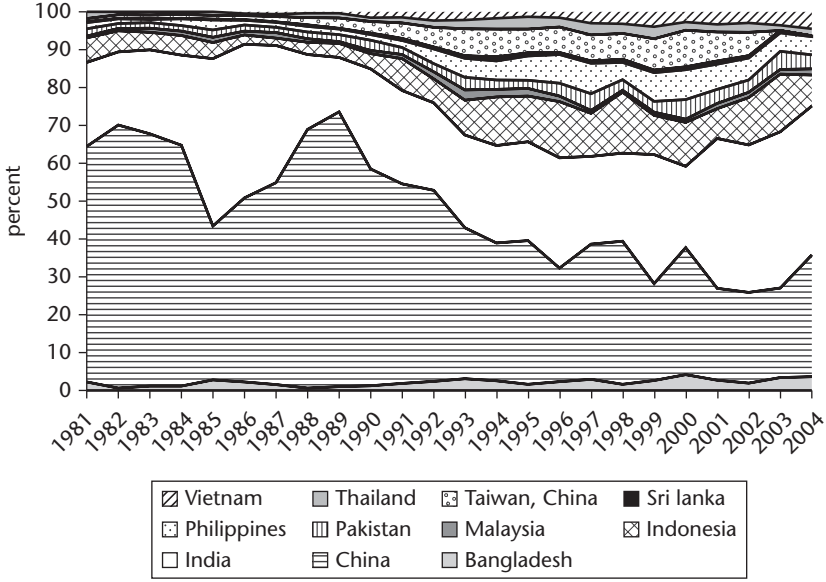
For developing countries as a group, the trade restrictiveness of agricultural policy was roughly constant until the early 1990s. Thereafter it declined, especially for Asia and Latin America, according to the TRI estimates. For high-income countries, the TRI time path was similar, although the decline began a few years later. Aggregate results for developing countries are driven by the exportables subsector, which is being taxed, and the import-competing subsector, which is being protected (albeit by less than in high-income countries). For high-income countries, policies have supported both exporting and import-competing agricultural products. Even though these policies heavily favor the latter, assistance to exporters has offset the antitrade bias from the protection of import-competing producers to some degree in terms of impacts on those countries' aggregate volume of trade in farm products. Thus, up to the early 1990s, the TRI for high-income countries was below that for developing countries. To use again the example of Africa, the TRI peaked in 1985–89, when the NRA was closest to zero, correctly identifying the trade-reducing effect of positive protection to the import-competing farmers and disprotection to producers of exportables (figure 11.6 and table 11.4 of Lloyd, Croser, and Anderson 2009a).

Figure 1.12. Regional Shares of Global and Country Shares of Asian Welfare Reduction[a] from Agricultural Policies, 1981–2004

a. Regional share of global welfare reduction



b. National share of welfare reduction in developing Asia (excluding Rep. of Korea)

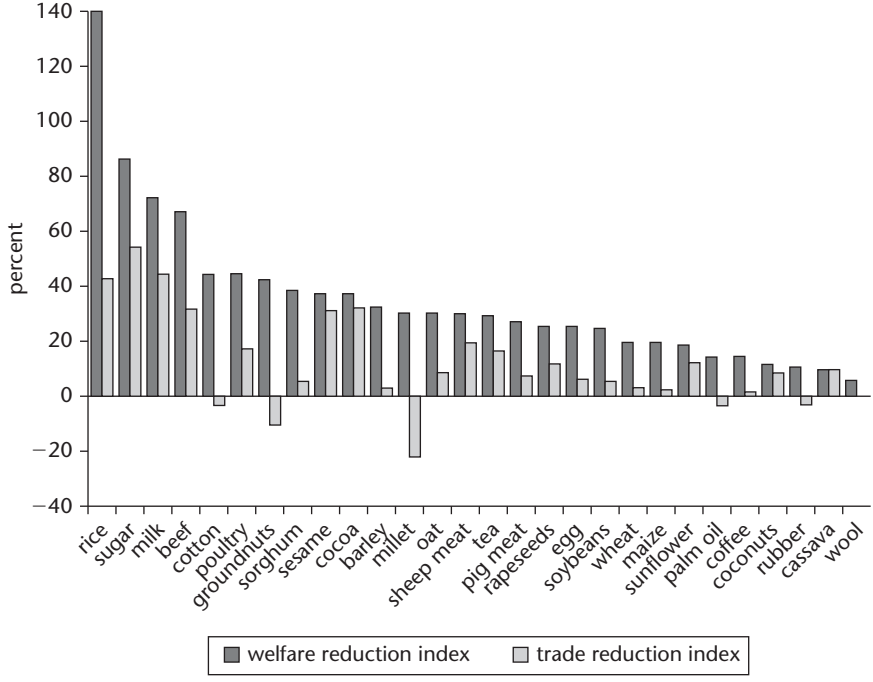


Source: Author's derivation using data from Anderson and Croser (2009), based on estimates in Anderson and Valenzuela (2008).

a. The value of welfare reduction is computed as the WRI multiplied by the value of production at undistorted prices valued at constant 2000 U.S. dollars. European transition economies are not included, nor are countries not included in the Anderson and Valenzuela sample (together, these make up less than 5 percent of global GDP).

Chapter 12 differs from the preceding chapters in that it focuses on commodities rather than countries, showing to what extent global markets for some farm commodities are distorted relative to others. It also shows that the basic food staples of the poor in low-income countries are reasonably well covered in our database for African countries where they matter most, and that their noncoverage in other regions does not bias the aggregate NRA estimates for covered products. Chapter 12 also reports new partial equilibrium estimates of global commodity TRIs and WRIs, to parallel the country-based ones reported in chapter 11. A summary of both indicators for 28 key farm commodities is provided in figure 1.13 (taken from Lloyd, Croser, and Anderson 2009b). It shows that the most distorted of all commodities in 2000–04, in terms of both their global welfare cost and their trade restrictiveness, are rice, sugar, milk, and beef—although cocoa trade is just as restricted as beef, because export restrictions are still prevalent in major supplying countries such as Côte d'Ivoire.

Figure 1.13. Trade and Welfare Reduction Indexes for 28 Major Agricultural Products, 2000–04



Source: Lloyd, Croser, and Anderson (2009b).

Economy-Wide Effects of Past Reforms and Remaining Policies

It is clear that there has been a great deal of change over the past quarter century in policy distortions to agricultural incentives throughout the world: the antiagricultural and antitrade biases of policies of many developing countries have been reduced; export subsidies of high-income countries have been cut; and some reinstrumentation toward less inefficient and less trade-distorting forms of support, particularly in Western Europe, has begun. However, protection from agricultural import competition has continued an upward trend in both rich and poor countries, notwithstanding the Uruguay Round Agreement on Agriculture (URAA), which aimed to bind and reduce farm tariffs.

What, then, have been the net economic effects of agricultural price and trade policy changes around the world since the early 1980s? And how do those effects on global markets, farm incomes, and economic welfare compare with the effects of price distortions still in place as of 2004? The final chapter by Valenzuela, van der Mensbrugghe, and Anderson (2009) uses a global economy-wide model to provide a combined retrospective and prospective analysis that seeks to assess how far the world has come—and how far it still has to go—in harmonizing world agricultural policy. It quantifies the impacts of both past reforms and current policies by comparing the effects of the project's NRA and CTE distortion estimates for the period 1980–84 with those of 2004.

Several key findings from that economy-wide modeling study are worth emphasizing. First, the policy reforms from the early 1980s to the mid-2000s improved global economic welfare by US$233 billion per year, and removing the distortions remaining as of 2004 would add another US$168 billion per year. This change suggests that in terms of global welfare, the world had moved three-fifths of the way toward global free trade in goods over a quarter century.

Second, developing economies benefited proportionately more than high-income economies (1.0 percent compared with 0.7 percent of national income) from those past policy reforms, and would gain nearly twice as much as high-income countries by completing the reform process (an average increase of 0.9 percent compared with 0.5 percent for high-income countries). Of the prospective welfare gains from global liberalization, 70 percent would come from agriculture and food policy reform. This is a striking result given that the shares of agriculture and food in global GDP and global merchandise trade are only 3 and 6 percent, respectively. The contribution of farm and food policy reform to the prospective welfare gain for just developing countries is even greater, at 72 percent.

Third, the share of global farm production exported (excluding intra-EU trade) in 2004 was slightly smaller as a result of those reforms since 1980–84, because there were less farm export subsidies. Agriculture's 8 percent share in

2004 contrasts with the 31 percent share for other primary products and the 25 percent for all other goods—a "thinness" that is an important contributor to the volatility of international prices for weather-dependent farm products. If the policies distorting goods trade in 2004 were removed, the share of global production of farm products that is exported would rise from 8 to 13 percent, thereby reducing the instability of prices and quantities of products traded.

Fourth, developing countries' share of the world's primary agricultural exports rose from 43 to 55 percent, and its farm output share from 58 to 62 percent, because of those reforms, with increases in both in nearly all agricultural industries except rice and sugar. Removing the remaining goods market distortions would boost export and output shares to 64 and 65 percent, respectively.

Fifth, the average real price in international markets for agricultural and food products would have been 13 percent lower had policies not changed over the past quarter century. Evidently, the impact of the decline in RRA in high-income countries (including the cuts in farm export subsidies) on international food prices more than offset the opposite impact of the increase in RRA (including the cuts in agricultural export taxes) in developing countries over that period, and the net effect was higher food prices. By contrast, removing the distortions remaining as of 2004 is projected to raise the international price of agricultural and food products by less than 1 percent on average. This is contrary to earlier modeling results based on the Global Trade Analysis Project (GTAP) protections database. For example, Anderson, Martin, and van der Mensbrugghe (2006) estimated prices would rise by 3.1 percent, or for just primary agriculture, by 5.5 percent. The lesser impact in the new results presented here is due to the fact that export taxes in developing countries based on the above NRA estimates (most notably for Argentina) are included in the new database: removing those taxes offsets the international price-raising effect of eliminating import protection and farm subsidies elsewhere.

Sixth, for developing countries as a group, net farm income (value added in agriculture) is estimated to be 4.9 percent higher than it would have been without the reforms of the past quarter century, which is more than ten times the proportional gain for nonagriculture. If policies remaining in 2004 were removed, net farm incomes in developing countries would rise a further 5.6 percent, compared with just 1.9 percent for nonagricultural value added. In addition, returns to unskilled workers in developing countries—the majority of whom work on farms—would rise more than returns to other productive factors from that liberalization. Together, these findings suggest both inequality and poverty could be alleviated by such reform, given that three-quarters of the world's poor are in farm households in developing countries (Chen and Ravallion 2007).

Finally, removal of agricultural price-supporting policies in high-income countries would undoubtedly lead to painful reductions in income and wealth for farmers in those countries if the farmers were not compensated. It should be kept in mind, though, that the majority of farm household income in high-income countries comes from off-farm sources (OECD 2008b), and that the gainers in the rest of their societies could readily afford to compensate the losers from the benefits of freeing trade.

Prospects for Further Reform

It is not obvious how future agricultural policies might develop. A quick glance at the indicators could lead one to view developments from the early 1960s to the mid-1980s as an aberrant period of welfare-reducing policy divergence (negative and declining RRAs in low-income countries alongside positive and rising RRAs in most high-income countries) that has given way to welfare-improving and poverty-reducing reforms during which the two country groups' RRAs are converging. But on inspection of the NRAs for exporting and import-competing subsectors of agriculture (figure 1.3), it is clear that the convergence of NRAs to near zero is mainly with respect to the exporting subsector, while NRAs for import-competing farmers are positive and trending upward over time at the same rate in both developing and high-income countries—notwithstanding the URAA, which aimed to bind and reduce farm tariffs. True, applied tariffs have been lowered or suspended as a way of dealing with the international food price spike in 2008, but this, and the food export taxes or quantitative restrictions imposed that year by numerous food-exporting developing countries, may be in place only until international prices return to trend (as happened after the price hike of 1973–74 and the price dip of 1986–87).

Indications are very mixed as to why some countries have reformed their price-distorting agricultural and trade policies more than others in recent decades. Some reforming countries have acted unilaterally, apparently convinced that it is in their national interest to do so. China is the most dramatic and significant example of a developing country adjusting its agricultural and trade policy over the past three decades according to its national interest, while among high-income countries only Australia and New Zealand (and to a lesser extent the EU) are in that category. Others countries have reformed their policies partly to secure bigger and better loans from international financial institutions and then, having taken that first step, have continued the process, even if somewhat intermittently. India is one example, but there are numerous others in Africa and Latin America. Few countries have gone backwards in terms of increasing their antiagricultural bias, but Zimbabwe and perhaps Argentina qualify during the present decade—and

numerous others joined them in 2008, at least temporarily, in response to the sudden spike in international food prices. Still other countries have reduced their agricultural subsidies and import barriers at least partly in response to the GATT's multilateral URAA, the EU being the most important example (encouraged by its desire for preferential trade agreements, including its recent eastward expansion).

EU reforms suggest growth in agricultural protection can be slowed and even reversed if accompanied by reinstrumentation away from price supports to decoupled measures or more direct forms of farm income support. The starker examples of Australia and New Zealand show that one-off buyouts can bring faster and even complete reform.[18] But in developing countries, where levels of agricultural protection are generally lower than in high-income countries, there are fewer signs of a slowdown in the upward trend in agricultural protection from import competition over the time period studied.

Indeed, there are numerous signs that developing-country governments want to retain the option to raise agricultural NRAs in the future, particularly via import restrictions. One indicator is the high tariff bindings developing countries committed themselves to following the Uruguay Round of the WTO: as of 2001, actual applied tariffs on agricultural products averaged less than half the corresponding bound tariffs for developing countries of 48 percent, and less than one-sixth in the case of least developed countries (Anderson and Martin 2006).

Another indicator of reluctance to undertake agricultural trade reform is the unwillingness of many developing countries to agree to major cuts in bound agricultural tariffs in the WTO's ongoing Doha Round of multilateral trade negotiations. Indeed, many developing countries believe that high-income countries should commit to reducing their remaining farm tariffs and subsidies before developing countries should offer further reform commitments of their own. Yet modeling results reported in Valenzuela, van der Mensbrugghe, and Anderson (2009) suggest that if high-income countries alone were to liberalize their agricultural markets, such subglobal reform would provide less than two-thirds of the potential gains to developing countries that could result from global agricultural policy reform.

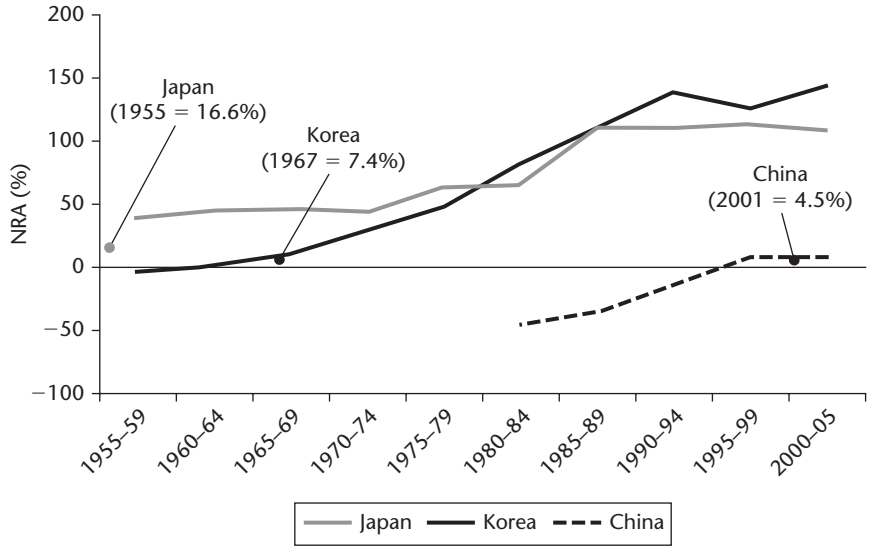
In addition, current negotiations have brought to the fore a new proposal for agricultural protectionism in developing countries, based on the notion that agricultural protection is helpful and needed for food security, livelihood security, and rural development. This view has succeeded in bringing "special products" and a "special safeguard mechanism" into the multilateral trading system's agricultural negotiations, despite the fact that such policies, which would raise domestic food prices in developing countries, may worsen poverty and jeopardize the food security of the poor (Ivanic and Martin 2008).

For developing countries to wait for high-income country reform before liberalizing their own farm trade is unwise as a poverty alleviating strategy, not least because the past history revealed in the NRAs summarized above suggests such reform will be, at best, slow in coming. In the United States, for example, the most recent two five-year farm bills were a step backwards from the previous regime, which at least sought to reinstrument protection toward less trade-distorting measures (Gardner 2009). Nor have the world's large number of new regional integration agreements of recent years been very successful in reducing farm protection. Furthermore, for developing countries to postpone their own reform would be to forego a major opportunity to boost their own and (given the size and growth in South-South trade of late) their neighbors' economies. It would be doubly wasteful if, by being willing to commit to reform in that way, they are able to convince high-income countries to reciprocate by signing on to a more ambitious Doha Round, the potential global benefits of which are considerable.[19]

Developing countries that continue to open their domestic markets and practice good macroeconomic governance will keep growing. Typically, growth will be more rapid in manufacturing and services activities than in agriculture, especially in the more densely populated countries where agricultural comparative advantage is likely to decline. Whether such economies become more dependent on imports of farm products depends, however, on what happens to their RRA. The first wave of Asian industrializers (Japan, and then Korea and Taiwan, China) chose to slow the growth of food import dependence by raising their NRAs for agriculture even as they were reducing their NRAs for nonfarm tradables, such that their RRAs became increasingly above the neutral zero level. A key question is: will later industrializers follow suit, given the past close association of RRAs with rising per capita income and falling agricultural comparative advantage? Figure 1.9 suggests developing countries' RRA trends of the past three decades have been on the same trajectory as the high-income countries prior to the 1990s, so unless new forces affect their policies, the governments of later industrializing economies may well follow suit.

One new force is constraints on farm subsidies and protection policies of WTO member countries following the Uruguay Round. Earlier industrializers were not bound under GATT to keep down their agricultural protection. Had there been strict discipline on farm trade measures at the time Japan and Korea joined GATT in 1955 and 1967, respectively, their NRAs may have been halted at less than 20 percent (figure 1.14). At the time of China's accession to WTO in December 2001, its NRA was less than 5 percent according to this present study, or 7.3 percent for just import-competing agriculture. Its average bound import tariff commitment was about twice that (16 percent in 2005), but what matters most is China's out-of-quota bindings on the items whose imports are restricted by tariff

Figure 1.14. NRAs for Japan, Republic of Korea, and China, and Date of Accession to GATT or WTO, 1955–2005



Source: Based on estimates in Anderson and Valenzuela (2008).

rate quotas. The latter tariff bindings as of 2005 were 65 percent for grains, 50 percent for sugar and 40 percent for cotton (Anderson, Martin, and Valenzuela forthcoming). Clearly, the legal commitments even China made on acceding to the WTO are a long way from current levels of support for its farmers, and so are unlikely to constrain the government very much in the next decade or so. The legal constraints on developing countries that joined the WTO earlier are even less constraining. For India, Pakistan, and Bangladesh, for example, estimated NRAs for agricultural importables in 2000–04 are 34, 4, and 6 percent, respectively, whereas the average bound tariffs on their agricultural imports are 114, 96, and 189 percent, respectively (WTO, ITC, and UNCTAD 2007). And like other developing countries, these countries have high bindings on product-specific domestic support (10 percent), and another 10 percent for NPS assistance, for a total of 20 more percentage points of NRA (17 percent in China's case) that legally could come from domestic support measures—compared to 10 percent in India and less than 3 percent in the rest of South Asia.

It is hoped developing countries will choose not to make use of the legal wiggle room they have allowed themselves in their WTO agreements to follow Japan, Korea, and Taiwan, China into high agricultural protection. A much more efficient and equitable strategy would be to instead treat agriculture in the same way they have been treating nonfarm tradable sectors. That would involve opening the sector to international competition, relying on more efficient domestic policy

measures for raising government revenue (for example, income and consumption or value-added taxes), and assisting farm families—including younger members seeking off-farm employment—via public investment in rural education and health, rural infrastructure, and agricultural research (Otsuka and Yamano 2006; Otsuka, Estudillo, and Sawada 2009). Historically, developing countries' expenditure on public agricultural research has amounted to the equivalent of less than 1 percent of the gross value of farm production (table 1.11), so it would not be difficult to double that level of investment with a diversion of just a small amount of the price support currently provided to farmers in those developing countries that provide farm import protection or input subsidies.

As for high-income countries, the above distortion estimates show that they have all lowered price supports for their farmers since the 1980s. In some countries, those supports have been partly replaced by assistance that is at least somewhat decoupled from production. If that trend continues at the pace of the past quarter century, and if there is no growth of agricultural protection in developing countries, most of the disarray in world food markets may be removed before the middle of this century. However, if the WTO's Doha Development Agenda collapses, and governments thereby find it more difficult to ward off agricultural protection lobbies, it is more likely that developing countries will follow the same agricultural protection path this century as that which was taken by high-income countries during the last century. One way to encourage developing countries to follow a more liberal policy path could be to extend the Integrated Framework's Diagnostic Trade Integration Study process to a broader range of low-income countries. That process, which provides action plans for policy and institutional reform and lists investment and technical assistance needs, could be expanded to include the "aid for trade reform" proposal that has been discussed in the context of the Doha Round (Hoekman 2005)—regardless of the fate of that round.

Table 1.11. Intensity of Public Agricultural R&D Investment, High-Income and Developing Countries, 1971–2004

(expenditure as percentage of gross value of agricultural production at undistorted prices, unweighted average across available countries)

	1970s	1980s	1990s	2000–04
All high-income countries	3.6	2.8	1.9	1.5
All developing countries	1.0	0.8	1.0	1.0
Asia	0.3	0.6	0.7	1.3
Latin America	0.2	0.4	0.6	0.6
Sub-Saharan Africa (not including South Africa)	1.2	1.0	0.9	0.7

Source: Anderson and Valenzuela (2008), based on R&D data from the Consultative Group on International Agricultural Research (CGIAR) Agricultural Science and Technology Indicators Website at http://www.asti.cgiar.org.

Areas for Further Research

The fact that indications are mixed as to why some countries appear to have reformed their agricultural and trade policies more than others, and that it is therefore unclear as to how policies might develop in the future, should not be surprising. After all, the long history of globalization is full of episodes of sensible policy reforms that for all sorts of reasons get reversed (Findlay and O'Rourke 2007; North, Wallis, and Weingast 2009). If one is to better understand what might happen in the context of continuing economic growth and terms-of-trade volatility, more in-depth analysis of the political economy of past policy behavior is warranted. That is now possible thanks to the new panel set of distortion estimates reported here, and some early findings from such analyses will appear in Anderson (forthcoming). That collection includes a broad range of theoretical and econometric analyses aimed at better understanding the political economy forces that generated the evolving pattern of intersectoral and intrasectoral distortions to farmer and food consumer incentives over recent decades.

To contribute further to policy debate, a second area requires further research—economy-wide modeling of the impacts on agricultural markets, national economic welfare and income distribution of alternative policies. Such research is now easier to do well following the recent development of microsimulation add-ons to such CGE models. How the reform of current policies—both in the country under consideration and in the rest of the world—affects the extent of poverty and inequality is explored in a series of new country case studies in Anderson, Cockburn, and Martin (forthcoming), using global and national economy-wide models that are enhanced with detailed earning and spending information of numerous types of urban and rural households. The impact of rest-of-world policy on each country's terms of trade is informed by the project's agricultural distortions database and generated using the same model as in this book's final chapter (Valenzuela, van der Mensbrugghe, and Anderson 2009). It is hoped that other analysts will make use of the project's agricultural distortions database to explore other policy scenarios, including a continuation of past agricultural protection growth for import-competing farmers as an alternative counterfactual to further freeing of trade.

A third area for further research is growth diagnostics. For example, how much of the long-term divergence in per capita incomes between current high-income countries on the one hand and developing and transition economies on the other can be explained by the faster long-term growth of agricultural NRAs and RRAs up to the mid-1980s in the former? How much can be explained by the domestic market-insulating fluctuations in NRAs around those long-term assistance trends, which have contributed to the volatility of the terms of trade for agricultural-exporting countries? The recent work of Williamson (2008) offers one suggestion as to how such research might proceed. Finally, how much of

growth since the early 1980s in individual developing countries can be attributed to the reduction in domestic agricultural disincentives? Ravallion and Chen (2007) show that the decline in the antiagricultural bias in farm price policies has contributed significantly to China's poverty reduction. Rural growth has been shown to be a key contributor to the reduction in poverty in India, too (Ravallion and Datt 1996). These types of studies can now be revisited using the more comprehensive set of measures of the extent of changes in distortions to agricultural incentives summarized above.

Annex

Table 1.A.1. Export Orientation, Import Dependence, and Self-Sufficiency in Primary Agricultural Production, Focus Countries,[a] 1961–2004

(percent at undistorted prices)

a. Exports as share of production

	1961–64	1970–74	1980–84	1990–94	2000–04
Africa	19	17	12	7	8
Asia	5	4	4	6	5
Latin America	24	27	16	16	27
Western Europe	13	16	27	37	43
United States and Canada	14	14	20	20	21
Australia and New Zealand	41	35	44	43	48
Japan	1	2	1	0	1
All focus countries	**11**	**11**	**13**	**16**	**16**
Developing countries	8	8	7	8	8
High-income countries	14	15	22	26	29

b. Imports as share of apparent consumption

	1961–64	1970–74	1980–84	1990–94	2000–04
Africa	2	2	5	4	4
Asia	4	4	8	16	14
Latin America	2	4	7	10	17
Western Europe	32	28	34	41	46
United States and Canada	4	4	5	9	12
Australia and New Zealand	3	2	3	5	6
Japan	23	24	24	26	27
All focus countries	**11**	**10**	**12**	**19**	**18**
Developing countries	3	4	8	14	13
High-income countries	18	16	20	25	27

(*Table continues on the following page.*)

Table 1.A.1 Export Orientation, Import Dependence, and Self-Sufficiency in Primary Agricultural Production, Focus Countries,[a] 1961–2004 (*continued*)

(percent at undistorted prices)

c. Self-sufficiency ratio

	1961–64	1970–74	1980–84	1990–94	2000–04
Africa	120	117	107	104	105
Asia	102	100	96	89	91
Latin America	129	132	110	107	114
Western Europe	78	85	90	94	94
United States and Canada	111	112	119	114	111
Australia and New Zealand	165	151	174	170	183
Japan	78	78	77	74	74
All focus countries	**100**	**101**	**101**	**96**	**98**
Developing countries	105	104	99	93	95
High-income countries	96	98	103	101	102

Source: Compiled using the project's estimates of total agricultural production valued at undistorted prices and the FAO's total agricultural trade value data, in Anderson and Valenzuela (2008).

a. Includes intra-EU trade. Benin, Burkina Faso, Chad, Iceland, Mali, Togo, and the countries of Europe and Central Asia are not included.

Notes

1. Some of the more transformational policy developments happened quite promptly, such as the end of colonization around 1960; the creation of the Common Agricultural Policy (CAP) in Europe in 1962; the floating of exchange rates and associated liberalization, deregualtion, privatization, and democratization in the mid-1980s; the opening of China's economy from 1979; and the demise of the Soviet Union in 1991.

2. According to the FAOSTAT (http://www.fao.org), fewer than 15 million relatively wealthy farmers in developed countries, with an average of almost 80 hectares per worker, currently are being helped, at the expense of not only consumers and taxpayers in those rich countries but also the majority of the 1.3 billion relatively impoverished farmers and their large families in developing countries who, on average, must earn a living from just 2.5 hectares per worker.

3. In the two decades to 2000-04, the value of global exports as a share of GDP rose from 19 to 26 percent, even though most of GDP is nontradable governmental and other services (World Bank 2007, as summarized in Sandri, Valenzuela, and Anderson 2007).

4. A nine-year update for the Latin American countries in the Krueger, Schiff, and Valdés sample by the same country authors, and a comparable study of seven central and eastern European countries, contain estimates at least of direct agricultural distortions (see Valdés 1996, 2000). The Krueger, Schiff, and Valdés (1991) chapters on Ghana and Sri Lanka have protection estimates back to 1955, as does the study by Anderson and Hayami (1986) for Korea and Taiwan, China (and Japan, and much earlier in the case of rice).

5. See appendix B. The only countries not well represented in the sample are the many small ones and those in the Middle East. In total, however, the omitted countries account for less than 5 percent of the global economy.

6. By way of comparison, the seminal multicountry study of agricultural pricing policy by Krueger, Schiff, and Valdés (1991) covered an average of 23 years to the mid-1980s for 18 focus countries, which collectively accounted for 5–6 percent of global agricultural output. The producer and consumer support estimates of the OECD (2008a) cover 22 years for 30 countries that account for just over one-quarter of the world's agricultural output valued at undistorted prices. Anderson (2009) compares the

direct and total rates of protection estimated by Krueger, Schiff, and Valdés for their sample of countries with the comparable NRAs and RRAs from the present study for the same sample of countries and same years, and finds them to be almost identical. However, the indicators of antiagricultural and antitrade bias are about two-thirds greater when the fuller sample of 41 developing countries in the present study is used. This suggests that, with a fuller sample, Krueger, Schiff, and Valdés could have stressed the key policy implications of their study even more forcefully.

7. Only a brief summary of the methodology is provided here. For details see Anderson et al. (2008a, 2008b) or appendix A.

8. The extent to which a payment is production-neutral (the degree of decoupling) differs depending on the way it is administered and the expectations of the recipient (Thompson, Dewbre, and Martini 2007). No attempt here is made to evaluate the extent of the distortion that might still be present as policies are decoupled from output price and quantity produced. Rather, values of OECD estimates under certain categories of support are included as decoupled. For the years 1979–85, there was just one category, called "direct payments;" from 1986, those payments are specified to comprise the OECD's items C (payments based on area planted/animal numbers), D (payments based on historical entitlements), F (payments based on input constraints), and G (payments based on overall farming income); and for 2005–07, those items are replaced by the similar but newly defined items C to E. This categorization for economic purposes (and that for NPS assistance) should not be confused with the legal allocation of domestic support measures into the WTO colored "boxes" in the context of international commitments.

9. Farmers are affected not just by prices of their own products but also by the incentives nonagricultural producers face. That is, it is *relative* prices and hence *relative* rates of government assistance that affect producer incentives. More than seventy years ago, Lerner (1936) presented his Symmetry Theorem, which proved that in a two-sector economy, an import tax has the same effect as an export tax. This carries over to a model that also includes a third sector producing only nontradables.

10. Data availability also affects the year from which NRAs can be computed. For Europe's transition economies, that starting date is 1992, for Vietnam it is 1986, and for China it is 1981.

11. While the next section summarizes the findings in subsequent chapters, readers should be aware that the emerging economy chapters in Part III of this book are themselves summaries of the findings in a large number of developing-country case studies that are detailed in one of four companion volumes covering Africa (Anderson and Masters 2009), East and South Asia (Anderson and Martin 2009a), Latin America and the Caribbean (Anderson and Valdés 2008) and European and Central Asian transition economies (Anderson and Swinnen 2008).

12. Korea and Taiwan, China are are categorized here as developing rather than high-income because at the beginning of the 50-year period under study they were among the poorest economies in the world.

13. The GSE estimates for 1955–59 are smaller for high-income countries but less negative for developing countries, so the aggregate effect is an empirical issue. Unfortunately, our sample of developing countries for that period is too small to provide a reliable estimate of the net effect.

14. As a reality check, compare this project's regional NRAs for nonagricultural tradables for the 1960s with the spot-year national NRAs from manufacturing import protection (in brackets) for the eight countries reported in Little, Scitovsky, and Scott (1970) and Balassa and associates (1971): 120 percent in South Asia (96 percent in Pakistan); 40 percent in East Asia (8 percent in Malaysia, 29–46 percent in the Philippines, and 30 percent in Taiwan, China); and 30 percent in Latin America (141 percent in Argentina, 89-99 percent in Brazil, 89 percent in Chile, and 20–22 percent in Mexico).

15. The R^2 values improve (to 0.16 and 0.26, respectively) and the slope of each line steepens (coefficients become 0.36 and 0.32, respectively) if the years since 1990 for high-income countries and before 1985 for developing countries are ignored.

16. The drop to US$6,000 per farmer in 2005–07 will likely prove to be temporary if international food prices return to trend levels soon.

17. National WRIs are aggregated across countries using as weights an average of the value of consumption and production at undistorted prices; TRIs use the absolute difference between the values of production and consumption at undistorted prices as weights. This is unlike NRAs and RRAs (or CTEs), which use as weights just the value at undistorted prices of production (or consumption). Like

NRAs, RRAs, and CTEs, national and regional WRIs and TRIs for the five-year periods are unweighted averages of the annual indexes.

18. For a detailed analysis of the buyout option versus the slower and less complete cashout option (moving to direct payments), as well as the uncompensated gradual squeeze-out or sudden cutout options, see Orden and Diaz-Bonilla (2006).

19. On the size of those potential net benefits compared with those from other opportunities that could address the world's most important challenges as conceived by the Copenhagen Consensus project (whose expert panel ranked trade reform as having the second highest payoff among those dozens of opportunities), see http://www.copenhagenconsensus.org, including the prepublication version of the trade paper by Anderson and Winters (2009).

References

Anderson, J. E., and J. P. Neary. 2005. *Measuring the Restrictiveness of International Trade Policy*. Cambridge, MA: MIT Press.

Anderson, K. 1995. "Lobbying Incentives and the Pattern of Protection in Rich and Poor Countries." *Economic Development and Cultural Change* 43 (2): 401–23.

_____. 2009. "Krueger/Schiff/Valdés Revisited: Agricultural Price and Trade Policy Reform in Developing Countries Since the 1980s." School of Economics Working Paper 2009-21, University of Adelaide. Forthcoming in *Applied Economic Perspectives and Policy.*

_____, ed. Forthcoming. *The Political Economy of Agricultural Price Distortions.* Cambridge and New York: Cambridge University Press. Working paper versions of the chapters are available at http://www.worldbank.org/agdistortions.

Anderson, K., J. Cockburn, and W. Martin, eds. Forthcoming. *Agricultural Price Distortions, Inequality and Poverty*. Washington, DC: World Bank. Working paper versions of the chapters are available at http://www.worldbank.org/agdistortions.

Anderson, K., and J. Croser. 2009. *National and Global Agricultural Trade and Welfare Reduction Indexes, 1955 to 2007*. Supplementary database at http://www.worldbank.org/agdistortions.

Anderson, K., and Y. Hayami. 1986. *The Political Economy of Agricultural Protection: East Asia in International Perspective*. London: Allen and Unwin.

Anderson, K., M. Kurzweil, W. Martin, D. Sandri, and E. Valenzuela. 2008a. "Methodology for Measuring Distortions to Agricultural Incentives." Agricultural Distortions Working Paper 02, World Bank, Washington, DC.

_____. 2008b. "Measuring Distortions to Agricultural Incentives, Revisited." *World Trade Review* 7 (4): 1–30.

Anderson, K., P. J. Lloyd, and D. MacLaren. 2007. "Distortions to Agricultural Incentives in Australia since World War II." *The Economic Record* 83 (263): 461–82.

Anderson, K., R. Lattimore, P. J. Lloyd, and D. MacLaren. 2009. "Australia and New Zealand." Chapter 5 in this volume.

Anderson, K., and W. Martin, eds. 2006. *Agricultural Trade Reform and the Doha Development Agenda*, London: Palgrave Macmillan and Washington, DC: World Bank.

_____. 2009a. *Distortions to Agricultural Incentives in Asia,* Washington, DC: World Bank.

_____. 2009b. "China and Southeast Asia." Chapter 9 in this volume.

Anderson, K., W. Martin, and E. Valenzuela. Forthcoming. "Long Run Implications of WTO Accession for Agriculture in China." In *China's Agricultural Trade: Issues and Prospects*, ed. C. Carter and I. Sheldon. St. Paul, MN: International Agricultural Trade Research Consortium.

Anderson, K., W. Martin, and D. van der Mensbrugghe. 2006. "Market and Welfare Implications of Doha Reform Scenarios." In *Agricultural Trade Reform and the Doha Development Agenda*, ed. K. Anderson and W. Martin. London: Palgrave Macmillan and Washington, DC: World Bank.

Anderson, K., and W. Masters, eds. 2009. *Distortions to Agricultural Incentives in Africa*, Washington, DC: World Bank.

Anderson, K., and J. Swinnen, eds. 2008. *Distortions to Agricultural Incentives in Europe's Transition Economies*. Washington, DC: World Bank.

Anderson, K., and R. Tyers. 1992. "Japanese Rice Policy in the Interwar Period: Some Consequences of Imperial Self Sufficiency." *Japan and the World Economy* 4 (2): 103–27.

Anderson, K., and A. Valdés, eds. 2008. *Distortions to Agricultural Incentives in Latin America*. Washington, DC: World Bank.

Anderson, K., and E. Valenzuela. 2008. *Global Estimates of Distortions to Agricultural Incentives, 1955 to 2007*. Core database at http://www.worldbank.org/agdistortions.

Anderson, K., and L. A. Winters. 2009. "The Challenge of Reducing International Trade and Migration Barriers." Policy Research Working Paper 4598, World Bank, Washington DC (also in *Global Crises, Global Solutions* (2nd edition), ed. B. Lomborg. Cambridge and New York: Cambridge University Press, 2009).

Balassa, B., and associates. 1971. *The Structure of Protection in Developing Countries*. Baltimore: Johns Hopkins University Press.

Bates, R. H. 1981. *Markets and States in Tropical Africa: The Political Basis of Agricultural Policies*. Berkeley: University of California Press.

Bhagwati, J. N. 1978. *Foreign Trade Regimes and Economic Development: Anatomy and Consequences of Exchange Control Regimes*. Cambridge, MA: Ballinger.

Chen, S., and M. Ravallion. 2007. "Absolute Poverty Measures for the Developing World, 1981–2004." Policy Research Working Paper 4211, World Bank, Washington, DC.

_____. 2008. "The Developing World Is Poorer Than We Thought, But No Less Successful in the Fight Against Poverty." Policy Research Working Paper 4703, World Bank, Washington, DC.

Findlay, R., and K. O'Rourke. 2007. *Power and Plenty: Trade, War, and the World Economy in the Second Millennium*. Princeton, NJ: Princeton University Press.

Gardner, B. 2009. "United States and Canada." Chapter 4 in this volume.

Haberler, G. 1958. *Trends in International Trade: A Report by a Panel of Experts*, Geneva: GATT.

Herrmann, R., P. Schenck, R. Thiele, and M. Wiebelt. 1992. *Discrimination Against Agriculture in Developing Countries?* Tubingen: J. C. B. Mohr.

Hoekman, B. 2005. "Making the WTO More Supportive of Development." *Finance and Development* 42: 14–18.

Ivanic, M., and W. Martin. 2008. "Implications of Higher Global Food Prices for Poverty in Low-Income Countries." *Agricultural Economics* 39: 405–16.

Johnson, D. G. 1991. *World Agriculture in Disarray*. London: St Martin's Press.

Johnson, H. 1989. *The Story of Wine*. London: Mitchell Beasley.

Kindleberger, C. P. 1975. "The Rise of Free Trade in Western Europe, 1820–1875." *Journal of Economic History* 35 (1): 20–55.

Krueger, A. O. 1978. *Foreign Trade Regimes and Economic Development: Liberalization Attempts and Consequences*. Cambridge, MA: Ballinger.

Krueger, A. O., M. Schiff, and A. Valdés. 1988. "Agricultural Incentives in Developing Countries: Measuring the Effect of Sectoral and Economy-wide Policies." *World Bank Economic Review* 2 (3): 255–72.

_____. 1991. *The Political Economy of Agricultural Pricing Policy, Volume 1: Latin America, Volume 2: Asia,* and *Volume 3: Africa and the Mediterranean*. Baltimore: Johns Hopkins University Press for the World Bank.

Lerner, A. 1936. "The Symmetry Between Import and Export Taxes." *Economica* 3 (11): 306–13.

Lindert, P. 1991. "Historical Patterns of Agricultural Protection." In *Agriculture and the State*, ed. P. Timmer. Ithaca, NY: Cornell University Press.

Little, I. M. D., T. Scitovsky, and M. Scott. 1970. *Industry and Trade in Some Developing Countries: A Comparative Study*. London: Oxford University Press.

Lloyd, P. J., J. Croser, and K. Anderson. 2009a. "Welfare- and Trade-Based Indicators of National Distortions." Chapter 11 in this volume.

_____. 2009b. "Global Distortions to Key Commodity Markets." Chapter 12 in this volume.

Morgan, D. 1979. *Merchants of Grain.* New York: Viking Press.

North, D. C., J. J. Wallis, and B. R. Weingast. 2009. *Violence and Social Orders: A Conceptual Framework for Interpreting Recorded Human History*. Cambridge and New York: Cambridge University Press.

Nye, J. V. C. 2007. *War, Wine, and Taxes: The Political Economy of Anglo-French Trade, 1689–1900.* Princeton, NJ: Princeton University Press.

Orden, D., F. Cheng, H. Nguyen, U. Grote, M. Thomas, K. Mullen, and D. Sun. 2007. "Agricultural Producer Support Estimates for Developing Countries: Measurement Issues and Evidence from India, Indonesia, China and Vietnam." IFPRI Research Report 152, International Food Policy Research Institute, Washington DC.

Orden, D., and E. Diaz-Bonilla. 2006. "Holograms and Ghosts: New and Old Ideas for Reforming Agricultural Policies." In *Agricultural Trade Reform and the Doha Development Agenda*, ed. K. Anderson and W. Martin. London: Palgrave Macmillan and Washington, DC: World Bank.

OECD (Organisation for Economic Co-operation and Development). 2006. *Agricultural Policies, Markets and Trade in the Central and Eastern European Countries and the New Independent States: Monitoring and Outlook*. Paris: OECD.

_____. 2008a. *Producer and Consumer Support Estimates, OECD Database, 1986–2007.* http://www.oecd.org (online database for 1986–2007 estimates; OECD files for estimates using an earlier methodology for 1979–85).

_____. 2008b. *The Role of Farm Households and the Agro-Food Sector in the Economy of Rural Areas: Evidence and Policy Implications*, Paris: OECD.

Otsuka, K., J. P. Estudillo, and Y. Sawada, eds. 2009. *Rural Poverty and Income Dynamics in Asia and Africa*. London and New York: Routledge.

Otsuka, K., and T. Yamano. 2006. "Introduction to the Special Issue on the Role of Nonfarm Income in Poverty Reduction: Evidence from Asia and East Africa." *Agricultural Economics* 35 (supplement): 373–97.

Ravallion, M., and S. Chen. 2007. "China's (Uneven) Progress Against Poverty." *Journal of Development Economics* 82: 1–42.

Ravallion, M., S. Chen, and P. Sangraula. 2007. "New Evidence on the Urbanization of Poverty." Policy Research Working Paper 4199, World Bank, Washington, DC.

Ravallion, M., and G. Datt. 1996. "How Important to India's Poor is the Sectoral Composition of Economic Growth?" *World Bank Economic Review* 10 (1): 1–26.

Ricardo, D. 1817. *On the Principles of Political Economy and Taxation*. London: John Murray.

Sandri, D., E. Valenzuela, and K. Anderson. 2007. "Economic and Trade Indicators, 1960 to 2004." Agricultural Distortions Working Paper 02, World Bank, Washington, DC. http://www.worldbank.org/agdistortions.

Stigler, G. J. 1975. *The Citizen and the State: Essays on Regulation*. Chicago: University of Chicago Press.

Thiele, R. 2004. "The Bias Against Agriculture in Sub-Saharan Africa: Has It Survived 20 Years of Structural Adjustment Programs?" *Quarterly Journal of International Agriculture* 42 (1): 5–20.

Thompson, Sir William (Baron Kelvin of Largs). 1889. *Popular Lectures and Addresses, Volume I*. London: Macmillan.

Thompson, W., J. Dewbre, and R. Martini. 2007. "Is OECD Farm Support Less Decoupled Than It Use to Be?" Paper presented at the Annual Meetings of the American Agricultural Economics Association, Portland, OR, 29–30 July.

Tyers, R., and K. Anderson. 1992. *Disarray in World Food Markets: A Quantitative Assessment*. Cambridge and New York: Cambridge University Press.

Valdés, A. 1996. "Surveillance of Agricultural Price and Trade Policy in Latin America During Major Policy Reforms." World Bank Discussion Paper 349, World Bank, Washington, DC.

Valdés, A., ed. 2000. "Agricultural Support Policies in Transition Economies." World Bank Technical Paper 470, World Bank, Washington, DC.

Valenzuela, E., D. van der Mensbrugghe, and K. Anderson. 2009. "General Equilibrium Effects of Price Distortions on Global Markets, Farm Incomes, and Welfare." Chapter 13 in this volume.

Williamson, J. 2008. "Globalization and the Great Divergence: Terms of Trade Booms and Volatility in the Poor Periphery, 1782 to 1913." NBER Working Paper 13841, Cambridge, MA.

World Bank. 2007. *World Development Indicators*. Washington, DC: World Bank.

WTO, ITC, and UNCTAD (World Trade Organization, International Trade Commission, and United Nations Conference on Trade and Development). 2007. *Tariff Profiles 2006*. Geneva: WTO.

PART II

EVOLUTION OF DISTORTIONS IN ADVANCED ECONOMIES

2

JAPAN, REPUBLIC OF KOREA, AND TAIWAN, CHINA

Masayoshi Honma and Yujiro Hayami[*]

The story of agricultural policy in Northeast Asia over the past 50 years illustrates the dramatic changes that can occur in distortions to agricultural incentives faced by producers and consumers at different stages of economic development. In this study of Japan, the Republic of Korea, and the island of Taiwan, China, the degree of distortions for key agricultural products and for the agricultural sector as a whole over a period when these economies transitioned from low- or middle-income to high-income status (the period from 1955 to 2004 plus, in the case of Japan, some pre-World War II experience) is estimated, a period that encompasses the so-called East Asian economic miracle of dramatic industrial development.

Theodore Schultz (1978) established that as economies advance from low- to high-income status, agricultural policies tend to shift from taxation of to subsidization of agriculture. In this regard, Japan, Korea, and Taiwan, China are clear examples. This chapter compares the policy evolution in these economies and provides information on the effect of policies and underlying economic conditions on changes in agricultural distortions. Our findings shed light on how agricultural distortions may change over different stages of economic development in other countries.

To begin, a succinct summary of core characteristics of the region in terms of the nature of the three economies—including their resource endowments, which

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to some degree determined the course of their modern economic growth and development—is given. The evolution of agricultural policies in the three economies is then reviewed, followed by a discussion of how to measure distortions to agricultural incentives using the methodology from Anderson et al. (2008a, 2008b), the focus of which is on nominal and relative rates of assistance (NRAs and RRAs). Implications of empirical findings of this study for policy reforms in the three economies are discussed in the final section, where lessons for other economies experiencing similar structural transformations in the course of their economic growth are also identified.

The study finds that significant growth in agricultural protection began when Japan, Korea, and Taiwan, China entered the middle-income stage of economic development. Statistical observations are found to be consistent with the hypothesis that the success of rapid industrialization that advanced these economies beyond the middle-income stage resulted in a decline in agriculture's comparative advantage associated with the growing income disparity between farmers and employees in nonagricultural sectors. In several cases, demand from farmers for a reduction of farm-nonfarm income disparity materialized in the form of increased assistance to agriculture. This was manifest predominantly through rapid and sustained growth in border protection of agricultural products.

Economic Development and Structural Change

A government's choice of agricultural policies, particularly price-distorting policies, is closely related to the process of economic development. As identified by Schultz (1978), there are two agricultural problems. One is the "food problem," which underlies policies commonly adopted in low-income countries that exploit or tax agriculture. Those policies contrast with the policies that protect or subsidize agriculture in many high-income countries seeking to solve "the farm problem." Schultz's hypothesis became an established paradigm among agricultural economists, who supported it in several empirical studies (Anderson and Hayami 1986; Hayami 1988; Krueger, Schiff, and Valdés 1991). More recently, Hayami (2005) and Hayami and Godo (2004) have added the "disparity problem" as specific to middle-income economies. They suggest it is important to study how distortions in agricultural incentives change as economies move through different stages of development.

The most distinguishing characteristic of Japan, Korea, and Taiwan, China during the period examined here is their unusually rapid rates of economic growth and industrial development. In describing the so-called East Asian miracle, the World Bank (1993) depicted Japan as the front runner along the development spectrum, with Korea and Taiwan, China, together with Hong Kong, China and

Singapore, as the second group.[1] Mainland China and the various countries of the Association of Southeast Asian Nations (ASEAN)[2] are following behind, though with rapid rates of economic growth. Since the changing nature of distortions of agricultural incentives seems to be closely related to rate of economic growth and structural change, an overview is provided of the development of the three economies examined here and associated changes in economic and agricultural structures.

Initial conditions and development strategies

Weather and topographical conditions in Northeast Asia are characterized by regular monsoon rain, together with mountainous, undulating land in which irrigation water is controlled relatively easily with efforts at the family and community levels. This makes the region well suited to rice production by small family farms organized into village communities. Indeed, the traditional agrarian structure involved smallholder farms of an average size of about one hectare that were predominantly dependent on rice cultivation. It is important to recognize that, unlike in Southeast Asia, large agribusiness plantations dependent on hired labor were almost completely absent not only in Japan and Korea (temperate-zone countries), but also in Taiwan, China, where tropical cash crops such as sugar and bananas comprised a significant share of agriculture. Prior to the land reforms that followed World War II, the rural community was stratified across landlords, land-owning cultivators, and landless tenants. Agricultural laborers subsisting on hired-labor wages were not a significant component of the rural population.

Historically, there is a high degree of similarity in the agrarian structures of Japan, Korea, and Taiwan, China, due in part to the fact that Japan brought its institutions to its colonies—Taiwan, China starting in 1895 and Korea starting in 1910. In all of these places, the most fundamental land-related institution was the fee simple title granted to land owners through cadastral surveys, in return for their payment of land tax. Japanese efforts to develop the colonies concentrated on agriculture, and particularly on rice after Japan experienced a supply shortage after the Rice Riots in 1918. The promotion of rice production through agricultural research and extension systems, irrigation and drainage infrastructure, and import protection (see Anderson and Tyers 1992) was considered a major success from Japan's viewpoint in that rice imports from the two colonies increased from 5 to 20 percent of consumption in Japan between 1915 and 1935.

The increased export of rice and other primary commodities and the corresponding inflow of manufactured commodities meant dependency of the Korean and Taiwanese economies on agriculture remained high. This tendency was especially pronounced in the southern part of Korea, as Japanese industrial development

efforts on the Korean Peninsula were concentrated in the north: the hydroelectric power of the Yalu River fed a complex of chemical industries larger than those that existed in Japan at the time. The heavy dependency on agriculture in the southern part of Korea was furthered by urban destruction during the Korean War (1950–53).

Relative to what is now the Republic of Korea, Taiwan, China had more active commerce and industry, largely because the dominant cash-crop sector there required significant amounts of processing and marketing activities relative to subsistence crops such as rice and barley that were produced in Korea. In fact, the situation in Taiwan, China under colonial rule was somewhat akin to Japan between the mid-19th to the early 20th centuries, when commercial treaties imposed by Western countries deprived Japan of tariff autonomy. Consequently, Japan specialized in labor-intensive manufactured products based on farm-supplied materials such as silk reeling, tea processing, and cotton weaving. This scenario accorded with comparative advantage under virtual free trade, leading to a wide dispersion of small and medium industries in rural areas in Japan. The predominance of small-scale industry in Japan and Taiwan, China contrasts with the concentration of Korean industry in large-scale establishments in urban areas.

The reasons Japan, Korea, and Taiwan, China came out as the forerunners in the East Asian miracle are numerous.[3] Here, suffice it to say that their success was due to pertinent borrowing of technology from advanced economies. Gerschenkron (1962), for example, suggests that the later industrialization of an economy begins, the larger the scope for economic growth through technology borrowing. The question remains, however, as to why Japan, Korea, and Taiwan, China were particularly successful in technology borrowing among the many countries that began late starters. One commonly cited speculation is the fact that these three resource-poor countries were heavily endowed with cheap but relatively well-educated labor, a situation that made initial borrowing of labor-intensive technologies fairly efficient and smoothed the way for borrowing of capital- and knowledge-intensive technologies. Another reason is the great crises faced by these economies—Japan's defeat in World War II, the Korean War, and Taiwan, China's loss of the mainland to the communists—all of which compelled leaders to adopt policies that would lead to economic success for the sake of maintaining their legitimacy, instead of indulging in rent-seeking activities (Hayami and Godo 2005).

Despite much similarity, there were also significant differences in the industrialization strategy adopted by the three, especially between Korea and Taiwan, China. In Japan, despite policies aimed at promoting the development of capital-intensive industries after the recovery of tariff autonomy in 1911, small- and

medium-sized industries survived as a major component of the industrial sector, and many of them located in rural areas. In Taiwan, China, although the Nationalist Party tightly controlled formal sectors, there was little government intervention in the activities of small- and medium-sized companies, which were able to grow through various marketing and financial linkages among themselves and with foreign firms. They became very internationally competitive (Ho 1979, 1982). In contrast, government control in Korea was stronger and more wide-ranging, especially under the military administration of Pak Chong-hui (1961–79). All formal credit issuance was channeled from nationalized banks to large industry, while foreign direct investment was tightly controlled (Cole and Park 1983; Amsden 1989). This strategy underlies the high concentration of industrial production in a small number of large enterprises in Korea.

Economic growth and structural transformation

Quantitative indicators of economic development in Japan, Korea, and Taiwan, China over the past five decades show similarities and differences, as summarized in table 2.1. The first three rows indicate real gross domestic product (GDP) per capita in constant 2000 prices at purchasing power parity (PPP), taken from Heston, Summers, and Aten (2006). In 1955, Japan's GDP per capita was more than US$3,000, whereas it was less than US$1,500 in Taiwan, China. Japan's strong economic growth thereafter pushed the figure to US$4,500 in 1960 and US$5,000 in 1961. In 1960, Korea and Taiwan, China had per capita GDP averages of around US$1,500; by 1978 in Taiwan, China, and 1983 in Korea, both countries were at US$5,000. Japan was the first, in 1970, to surpass US$10,000, a level that Taiwan, China and Korea reached in 1988 and 1991, respectively. Roughly speaking, in terms of growth of per capita GDP, Japan was ahead of Taiwan, China by about two decades and Taiwan, China was ahead of Korea by about half a decade, although these margins decreased over time.

Though the criteria of classification are not universal, it is convenient to classify economic development in the three economies into four stages:[4]

- Low income (US$1,500 or less): pre-1950 for Japan and pre-1960 for Korea and Taiwan, China;
- Lower middle income (US$1,500–5,000): 1950–60 for Japan and 1960–80 for Korea and Taiwan, China;
- Upper middle income (US$5,000–10,000): 1960–70 for Japan and 1980–90 for Korea and Taiwan, China; and
- High income (US$10,000 or more): post-1970 for Japan and post-1990 for Korea and Taiwan, China.

Table 2.1. Economic Growth and Structural Transformation in Japan, Korea, and Taiwan, China, 1955–2004

		1955	1960	1970	1980	1990	2000
Real GDP per capita, constant 2000 $[a]	Japan	3,128	4,509	11,391	15,520	21,703	23,971
	Korea	1,429	1,458	2,552	4,497	9,593	15,702
	Taiwan, China	1,241	1,444	2,846	5,963	11,248	19,184
Share of agriculture in GDP (%)	Japan	17.4	9.0	4.2	2.4	1.7	1.1
	Korea	46.9	39.1	29.2	16.2	8.9	4.9
	Taiwan, China	28.9	28.2	15.3	7.5	4.0	2.0
Share of agricultural workers in economically active population (%)[a]	Japan	33.8	26.8	15.9	9.1	6.2	4.5
	Korea	79.7	60.2	49.1	37.1	18.1	10.0
	Taiwan, China	53.6	50.2	36.7	19.5	12.8	8.9
Share of farm household population in total population (%)	Japan	40.7	36.5	25.1	18.3	14	8.2
	Korea	61.9	58.2	44.7	28.4	15.5	8.6
	Taiwan, China	50.7	49.8	40.9	30.3	21.1	16.5
Agricultural GDP per worker/total GDP per worker (%)	Japan	51.5	33.6	26.4	26.4	27.4	24.4
	Korea	58.8	65.0	59.5	43.7	49.2	49.0
	Taiwan, China	53.9	56.2	41.7	38.5	31.3	22.5

Sources: Heston, Summers, and Aten (2006); Japanese Ministry for Agriculture, Farming and Fisheries (JMAFF), Nogyo Hakusho Fuzoku Tokei-hyo (Statistical Appendix of Agricultural White Paper), various issues; government of Korea, *Major Statistics of Agriculture, Forestry and Fisheries,* various issues; government of Taiwan, China, *Taiwan Agricultural Year Book,* various issues.

a. Shares of agriculture in GDP and labor force include forestry and fisheries.

Changes in other indicators in table 2.1 are closely related to changes in per capita real GDP over the four stages. The GDP share of agriculture in Japan in 1955—the lower-middle-income stage—was 17 percent, substantially less than the share during the low-income stage for Korea and Taiwan, China (47 and 29 percent, respectively). By 1970 in Taiwan, China and 1980 in Korea, the shares had declined to similar levels to that of Japan at the lower-middle-income stage—15 percent and 16 percent, respectively. By the time Japan entered the high-income stage in 1970, its agricultural share of GDP was 4 percent, about the same as that of Korea and Taiwan, China in the 1990s, when they entered the high-income stage.

Although Korea and Taiwan, China experienced similar changes in per capita real GDP over the four stages, significant differences can be observed in their economic structures. The GDP share of agriculture in 1955 in Korea was nearly 50 percent, whereas it was less than 30 percent in Taiwan, China. Similar differences

can be observed with respect to agriculture's share of the labor force, which was as high as 80 percent in Korea, versus less than 55 percent in Taiwan, China. In both countries, the share of agriculture in GDP declined significantly over time—to 3.8 percent in Korea and 1.7 percent in Taiwan, China by 2004—although the share in Korea was still double that of Taiwan, China at that point.

Historical differences can be observed in agriculture's share of the labor force in Korea and Taiwan, China. Interestingly, however, the difference in the labor force share of agriculture disappeared by 2004, with about 7.7 percent of Korean employment in agriculture versus 7.5 percent in Taiwan, China. The relatively faster decline in the labor force share of agriculture in GDP in Korea reflects its concentration of industries in urban areas. In Taiwan, China, characterized by the wide dispersion of industries in rural areas, farmers increased their incomes from off-farm employment while continuing to be classified as farmers. In contrast, a much greater percentage of rural people in Korea had to quit farming and migrate to urban areas to obtain nonfarm employment. These differences are reflected in the much faster decrease in the farm household population as a percentage of the total population in Korea relative to Japan and Taiwan, China.

The last rows in table 2.1 report the ratios of agricultural GDP per worker to total GDP per worker. This can be considered an indicator of the relative labor productivity of agriculture to total labor productivity of the whole economy. It may also be regarded as an indicator of the income gap between the agricultural sector and the whole economy. While the relative labor productivity of agriculture in nominal terms was not substantially different among the three economies in 1955, in Japan it declined sharply, from 52 percent in 1955 to nearly 25 percent in 1970 and thereafter. The ratio did not begin to decline in Korea and Taiwan, China until 1960. In Korea, it reached 44 percent in 1980 (from 65 percent in 1960) and stayed nearly constant thereafter. In Taiwan, China, the ratio continued to decline, to 23 percent in 2000—a rate lower than that of Japan, reflecting the abundance of nonfarm employment opportunities for farmers in Taiwan, China.

These measures should be interpreted with great care, however. At first glance, a faster decline in this ratio of agricultural labor productivity to total labor productivity in Taiwan, China relative to Korea appears to indicate more rapid growth in agricultural labor productivity in Korea. In fact, however, the faster decline ratio in Korea is caused by more rapid out-migration of farm labor to urban occupations in Korea relative to Taiwan, China. Thus, growth in the labor productivity of farmers engaging in agricultural activities relative to that of other workers would not have been slower and could have been even faster in Taiwan, China if the ratio was calculated using output per hour of labor instead of output per worker according to the official sectoral labor force classification.

Changes in the structure of agriculture

How did the structure of agriculture in Japan, Korea, and Taiwan, China change in the course of their economic development? As of 2004, Japan's 2.9 million farm households accounted for 2.6 million workers engaged mainly in agricultural activities, an average of less than one person per household. Japan's Agricultural Census defines a farm household as one that either operates 0.1 hectare or more of farmland or produces annual sales of agricultural products of at least 150,000 yen (US$1,250 at the exchange rate of 120 yen/US$1). Thus, very small units of farm operation in which no full-time worker engages in farm production are classified as farm households. Indeed, full-time farm households having no family member engaged in agricultural employment accounted for 15 percent of total farm households in 2004. However, noncommercial farm households that operate less than 0.3 hectares of farmland or have annual sales of less than 500,000 yen accounted for 26 percent of total farm households. Moreover, part-time farm households whose income from nonagricultural sources exceeds agricultural income accounted for half of total farm households.

Though the number of agricultural workers in Japan declined from 14 million in 1955 to 2.6 million in 2004, the number of farm households declined only from 6 million in 1955 to 2.9 million in 2004. Slow decreases in the number of farm households, together with decreases in agricultural land (from 6.1 to 4.7 million hectares between 1955 and 2004), resulted in a small increase in arable land per farm, from 1.01 hectares in 1955 to 1.61 hectares in 2004 (table 2.2). The average area of agricultural land per farm in Japan is very small by global standards—Europe's are 20 to 45 times larger, and those of the United States are 125 times larger. The slow growth of small-sized operations has been a key constraint to the growth of agricultural productivity, resulting in a continual decline in the comparative advantage of Japanese agriculture, particularly of land-intensive activities, in the course of rapid industrial development.[5]

Table 2.2 shows that in 2004, 2.9 million farm households in Japan contained 9.4 million people, with an average family size of 3.2 persons. In the same year, 1.2 million farm households in Korea represented 3.4 million people and 1.8 million hectares of arable land, with average family and farm sizes of 2.8 persons and 1.5 hectares, respectively. In Taiwan, China, 0.72 million farm households contained 3.2 million people and 0.84 million hectares of arable land, while average family and farm sizes were 4.5 persons and 1.2 hectares, respectively. It is notable that the number of people in farm households in Korea declined at a much faster rate than in Japan and Taiwan, China as a result of faster decreases in both the number of farm households and the number of persons per household in Korea. These observations reflect the scarcity of nonfarm employment opportunities in

Table 2.2. Changes in Agricultural Structure in Japan, Korea, and Taiwan, China, 1955–2004

		1955	1960	1970	1980	1990	2000	2004
Number of farm households (thousands)	Japan	6,043	6,057	5,342	4,661	3,835	3,120	2,934
	Korea	2,218	2,350	2,483	2,155	1,768	1,383	1,240
	Taiwan, China	733	786	880	891	860	721	721
Population in farm households (thousands)	Japan	36,347	34,411	26,282	21,366	17,296	10,467	9,400
	Korea	13,300	14,559	14,422	10,827	6,661	4,031	3,415
	Taiwan, China	4,603	5,373	5,997	5,389	4,289	3,669	3,225
Persons per farm household	Japan	6.01	5.68	4.92	4.58	4.51	3.35	3.20
	Korea	6.00	6.20	5.81	5.02	3.77	2.91	2.75
	Taiwan, China	6.28	6.84	6.81	6.05	4.99	5.09	4.47
Arable land (thousands of hectares)	Japan	6,095	6,071	5,796	5,461	5,243	4,830	4,714
	Korea	1,995	2,025	2,298	2,196	2,109	1,918	1,836
	Taiwan, China	873	869	905	907	890	852	836
Arable land per farm household (hectares)	Japan	1.01	1.00	1.08	1.17	1.37	1.55	1.61
	Korea	0.90	0.86	0.93	1.02	1.19	1.39	1.48
	Taiwan, China	1.19	1.11	1.03	1.02	1.03	1.18	1.16
Share of agricultural income in total farm household income (%)	Japan	70.7	49.5	31.9	17.0	13.8	13.1	14.3
	Korea	—	—	75.8	65.2	56.8	47.2	39.3
	Taiwan, China	—	—	48.7	24.8	20.1	17.6	22.0
Share of rice in value of agricultural production (%)	Japan	—	47.4	37.9	30.0	27.8	25.4	22.8
	Korea	—	59.3	37.3	34.1	36.9	32.9	27.6
	Taiwan, China	—	36.5	25.7	19.8	12.1	9.6	7.1

Sources: JMAFF, *Nogyo Hakusho Fuzoku Tokei-hyo* (Statistical Appendix of Agricultural White Paper); government of Korea, *Major Statistics of Agriculture, Forestry and Fisheries*; government of Taiwan, China, *Taiwan Agricultural Year Book*; various issues.

Note: — = not available.

Korea's rural areas due to its urban-centered industrialization. Indeed, from 1970 to 2004, the share of agricultural income in the total income of farm households declined from 32 to 14 percent in Japan and 49 to 22 percent in Taiwan, China, whereas in Korea it was 76 percent in 1970 and 39 percent in 2004.

Japan has lost 23 percent of its arable land area over the past 50 years, falling from 6.1 million hectares in 1955 to 4.7 million hectares in 2004. The decrease in arable land under cultivation was thus a significant contributor to changes in farm

size in Japan in terms of arable land per farm household. Meanwhile, the arable land area in Korea deceased from 2 million hectares in 1955 to 1.8 million hectares in 2004, and arable land in Taiwan, China remained almost constant (0.87 million hectares in 1955 and 0.84 million hectares in 2004). Farm-size changes in Korea and Taiwan, China were almost exclusively the result of changes in the number of farm households. In Japan and Korea, average farm sizes increased slowly, from 1.0 and 0.9 hectares in 1955 to 1.6 and 1.5 hectares in 2004, respectively, whereas farm size in Taiwan, China remained almost constant during that period. The faster increase in farm size in Korea relative to Taiwan, China was the result, again, of faster out-migration of farm workers and their families to urban areas.

The distinctly urban-centered industrialization of Korea is clearly reflected in its high share of agricultural income in total farm household income. In all three economies, the ratio decreased as off-farm employment for members of farm households increased. In Japan, the ratio decreased from 70 percent in 1955 to 32 percent in 1970 and further to 14 percent in 2004, corresponding to the shift from the lower-middle-income to upper-middle-income and finally high-income stage of development. In Taiwan, China, where the ratio of agricultural income to total farm income was already below 50 percent in 1970 when its economy was in the lower-middle-income stage, it dropped to 22 percent in 2004. In contrast, in Korea the ratio was 76 percent in 1970 and still nearly 40 percent in 2004, higher than in Taiwan, China but also higher than in Japan at comparable development stages.

Major differences in the adjustment of agriculture to economic growth based on industrial development are also reflected in changes in the commodity mix of farm production. Traditionally, rice was the most important crop in all three economies, but its significance declined as per capita income increased. Changes in the relative importance of rice were different. From 1960 to 2004, the share of rice in the total value of agricultural production declined from 47 to 23 percent in Japan and from 59 to 28 percent in Korea. In contrast, the share of rice in Taiwan, China, which was less to begin with, at 37 percent, decreased rapidly, to 7 percent in 2004. The contrast reflects the fact that the agricultural sector of Taiwan, China traditionally depended less on rice because of both its greater opportunity to grow cash crops and its success in achieving greater agricultural diversification toward high-valued commodities such as vegetables, fruits, poultry, and pig meat more efficiently than Japan and Korea in response to the shift in domestic demand for more income-elastic commodities.

Evolution of Agricultural Policy after World War II

Japan[6]

In the decade following World War II, Japan worked hard to recover from the devastation of the war. The primary emphasis of agricultural policy was on increasing domestic food production and delivering food equitably at low costs to consumers. To this end, the government invested heavily in agricultural research and extension and land infrastructure, while upholding many of the rigid controls on rice procurement from farmers and delivery to consumers established under the Food Control Laws enacted during the war.

Immediately following World War II, land reform was carried out in accordance with the strong recommendations of occupying authorities. The urgent need to increase agricultural production through increased production incentives to cultivators was sufficiently strong to overcome the opposition of landlords to strengthening the rights of tenants through government control of rents and land prices. During the four years from 1947 to 1950, the government purchased 1.7 million hectares of farmland from landlords and transferred 1.9 million hectares, including state-owned land, to tenant farmers, which amounted to about 80 percent of the land under tenancy before the land reform.

Although land reform resulted in a considerable change in the distribution of land ownership, the size distribution of operational holdings remained basically the same. As a result, the traditional agrarian structure of Japan, characterized by small-scale family farms with an average size of about l hectare, remained intact, despite the rise and the fall of landlordism (table 2.2). There is no doubt, however, that the land reform promoted more equal asset and income distribution among farmers, and hence contributed to social stability in Japan's rural sector. But the fact that small-scale family farms continued to be the basic unit of agricultural production meant that land reform did not induce changes in the basic direction of technological developments. Though land reform contributed to an increase in standards of living and consumption levels, its contribution to capital formation and productivity growth in agriculture were not significant (Kawano 1969).

As Japan set off on its "miraculous" economic growth path following the end of the Korean War in the 1950s, agriculture began to face serious adjustment problems. The rate of growth in agricultural productivity, rapid by international standards, was not rapid enough to keep up with growth in the industrial sector, and intersectoral terms of trade did not improve during the 1950s. This was partly because of the pressure of surplus agricultural commodities in the United States and other exporting countries, and partly because domestic demand for major

staple cereals (especially rice) approached saturation after the bumper crop of 1955. As a consequence, incomes and living standards of farm households lagged behind those of urban households during the 1950s.

In 1961, real GDP per capita in Japan exceeded US$5,000 pushing Japan into the upper-middle-income stage of economic development. Correspondingly, the major goal of agricultural policy shifted from increased production of food staples to reducing the rural-urban income gap. The need to assist farmers increased during the 1960s, as the rural-urban income gap progressively widened and the out-migration of agricultural labor accelerated. The difficulty of structural adjustment in agriculture as a result of the rapidly growing economy led to the enactment in 1961 of the Agricultural Basic Law, a national charter for agriculture. The law declared that it was the government's responsibility to raise agricultural productivity and thereby to close the gap in income and welfare between farm and nonfarm households.

In order to raise agricultural productivity and improve farming efficiency, it was considered essential to increase the scale of farm operation by eliminating inefficient farm units and by promoting cooperative operations among remaining farms. Despite such efforts at structural adjustment, the rate of agricultural productivity growth was not increased sufficiently to prevent the rural-urban income gap from widening further. The Food Control System, which was originally designed to provide food security to consumers, thus became the chief instrument to protect farmers. Under the system, based on the 1942 Food Control Law, most food items were placed under direct government control. However, as the Japanese economy recovered from World War II, the number of items under control was reduced so that only rice remained under direct control after 1952. Initially, the whole marketing process of rice from producers to consumers was under direct control of the Japanese Food Agency and prices were regulated from the farmgate to the retail level, although the regulations were gradually relaxed.

After Japan entered the upper-middle-income stage of development in the 1960s, the Food Control System became a powerful instrument for rice farmers, and they organized political lobbying to raise rice prices for government purchases. Their pressure resulted in a rice price determination formula in 1960 called the production cost and income compensation formula, established under the Food Control System. This formula was designed to reduce the gap between farm and nonfarm income and wages by raising rice prices. The goal appears to have been achieved: income per agricultural worker compared to income per worker in manufacturing improved after 1960 following a rapid rise in agricultural relative to manufacturing prices. The increase in the price of rice, which constituted about 40 percent of the total value of agricultural output before 1970, was a major factor in improving the domestic terms of trade for agriculture. The rise

in agricultural prices, together with increases in off-farm income, resulted in a marked reduction in the income per capita gap between agricultural and nonagricultural households.

Protecting rice farmers through a price policy was possible in Japan because rice trade was completely controlled by the state-trading system. During the 1960s, the price of rice was raised not only far above the world price but also above the market equilibrium price under autarky. As an upper-middle-income country, Japan was able to let consumers and taxpayers shoulder the costs of agricultural protection.

However, there was a limit on increasing agricultural protection through price policy. The high protected prices of rice resulted in an expansion of rice production in excess of consumption. The accumulated surplus of rice in government storage forced authorities to introduce controls on rice acreage in 1969 (they are still in place today). Further, the dramatic increase in income and wages of industrial workers after 1960 meant that the diet of Japanese people changed. Average consumption per industrial employee (deflated by the consumer price index) doubled over 1955–70, and again in the decade-and-a-half following that. Correspondingly, rice was no longer a major wage good for industrial workers. To cope with the increasing rice surplus, the Food Control System was revised. The direct control on rice distribution was relaxed by introducing nongovernment distribution channels. Finally, in 1995, the Food Control Law was replaced by the Staple Food Law, whereby the role of government was limited to stock holding operations for food security, although state trading of rice is maintained for international trade.

Real GDP per capita in Japan exceeded US$10,000 in 1969, putting it over the high-income threshold. Demand for agricultural protection from the farm bloc increased. Japan's comparative advantage, though, continued to shift from agriculture to industry, while internal resistance to protectionism declined because the nonfarm population became affluent and, hence less resistant to shouldering the cost of agricultural protection in the form of high food prices or subsidies to farm producers. However, though internal resistance weakened, external pressure for liberalization of agricultural imports increased.

Following the replacement of the General Agreement on Tariffs and Trade (GATT) with the World Trade Organization (WTO) in 1995, Japan was required to reform domestic agricultural policy. Under the WTO's Uruguay Round Agreement on Agriculture (URAA), in particular, Japan had to adjust agricultural policies to be more consistent with the globalization of the economy. In 1995, Japan converted nontariff border measures to tariffs for 28 commodities. At the beginning of implementation, rice was exempted from tariffication in compensation of larger minimum access imports of rice, namely 4 percent of domestic consumption in

1995, rising to 8 percent by 2000. In 1999, Japan adopted tarriffication for rice, leaving the minimum access imports at 7.2 percent of domestic consumption.

The Basic Law on Food, Agriculture and Rural Areas, also enacted in 1999, was a replacement for the 1961 Agricultural Basic Law. Four years earlier, the Food Control Law had been abolished to liberalize the domestic rice market. The 1999 Basic Law obliged the government to draft a Basic Plan for Food, Agriculture and Rural Areas for the promotion of the comprehensive and systematic implementation of policies on food, agriculture, and rural areas. The plan is intended to be redrafted every five years. Under the current Basic Plan, released in 2005, a key point of the new agricultural policy is to target government assistance to farmers who satisfy certain conditions, especially on minimum farm size. That is, it compels farmers who want to continue farming under government assistance to expand the size of their farm operation.

Korea[7]

Before 1960, Korea was a low-income country, with per capita income below US$1,500. In the years just before 1960, the economy was struggling to recover from the Korean War. The agricultural policy adopted at this stage aimed to maintain low domestic consumer prices for staple foods, notably rice and barley, as well as for fertilizer. The Grain Management Law, enacted in 1950, gave the government authority to regulate the price of staple foods. But government control was not very effective during the 1950s since the market share of government-controlled rice was less than 10 percent. The government, which was supposed to purchase grain directly from farmers, was unable to purchase sufficient amounts due to budgetary constraints and an inflation-driven spike in grain prices in the mid-1950s. As a creative solution, schemes to collect rice as an in-kind land tax and to barter fertilizer for rice were initiated. Though the former measure was successful, the latter was not because the implicit price of rice in the barter was lower than the market price. In the end, grain imports from the United States under Public Law 480, which accounted for 8 to 12 percent of total domestic grain during 1956–65, helped the Korean government hold down grain prices.

In the 1960s, Korea launched wide-ranging policies to promote industrialization under the development autocracy of Pak Chong-hui. Agricultural policies at this time were designed to keep the price of staple food crops low so as to uphold a low cost of living and stable wage rates for industrial workers, rather than maintaining adequate incomes for farmers. Government purchase prices for staple crops, which were considered necessary for the purpose of increasing industrial profits and capital formation, were below market prices. Over time, the Korean government's price intervention became more intense. The market share of

government-controlled rice was expanded to 20–25 percent during the 1960s; the increase was used mainly to maintain low domestic prices. These agriculture-taxing policies continued during the beginning of Korea's lower-middle-income stage of economic development.

As Korea quickly advanced toward becoming an upper-middle-income country, the direction of agricultural policy gradually moved toward supporting farmers. In the early 1970s, the buffer-stock operation for noncereal products was set in motion to counteract price declines. In addition to chemical fertilizers, pesticides and farm machineries were added to the list of subsidized inputs, alleviating the adverse impact of import protection to manufacturers of those inputs for farmers. Through the 1970s, the government's purchase prices for rice and barley were steadily raised with the aim of both increasing food production and reducing the urban-rural income gap. Although the government raised producer prices for staple food grains, it did so without a comparable rise in the market prices of rice and barley in order to prevent the cost of living and the wage rate of industrial workers from rising. Likewise, it assisted livestock producers in part by using import quotas rather than tariffs to protect them from import competition, with the rent from those quotas being captured by the producer-managed meat import agency.[8]

The implementation of the two-price system, however, conflicted with the need to maintain financial and monetary stability. As the difference between the purchase and sale prices of rice and barley widened, the deficit of the grain management fund increased. Since a large portion of this deficit was financed by long-term overdrafts from the Bank of Korea, the policy contributed heavily to inflationary pressure. Expansion of the government deficit due to the two-price policy became a serious constraint on the policy.

Upon entering the upper-middle-income stage of development in the 1980s, the Korean government moved to reduce both tariff and nontariff protection for manufacturing industries. In contrast, agricultural policies toward protecting farmers were strengthened, and the producer prices of farm products were increased to levels far above border prices by means of quantitative import restrictions on most agricultural commodities.

Significant policy changes followed Korea's transition to a high-income country in the early 1990s. Mostly, these changes were related to the URAA. According to the provisions, Korea's quantitative restrictions were converted to tariffs for all agricultural products except rice. But Korea retained the status of a developing country in the Uruguay Round negotiations, giving it special treatment in implementing commitments to reduce border protection. The agricultural products under tariffication were subject to a protection reduction commitment of 24 percent, on average, within 10 years, with a minimum cut of 10 percent. Tariff rates of Korean agricultural products were over 60 percent on average. Tariffs on products

considered particularly important in Korea were thus cut by the minimum rate of 10 percent.

In addition, imports of many agricultural products were begun under the minimum market access commitment. This commitment required that for all agricultural products, at least 3 percent of consumption must be purchased from overseas in the first year and the import share must increase annually up to 5 percent of consumption within 10 years. Low tariff rates were applied to the in-quota volume so as to guarantee easy market access from exporting countries. Key agricultural products such as rice, barley, oranges, red peppers, garlic, and onions began to be imported under the commitment.

Rice, the most important agricultural product in Korea, was temporarily exempted from tariffication, as provided in annex 5.B of the URAA. Under the exception plan, rice was subject to an import quota, beginning with 1 percent of total consumption and gradually increasing to 4 percent in 2004, the final implementation year. If Korean rice had not been exempted from tariffication, Korea would have complied with the standard market access commitment of 3–5 percent. The temporary exemption from tariffication expired in 2004, but Korea opted to continue invoking a rice exemption from tariffication for another 10 years, to 2014.

Taiwan, China[9]

In the years after World War II, Taiwan, China suffered from high inflation rates, serious shortages of food and other necessities, and a heavy budget burden for its defense systems. The government gave the highest priority to economic stabilization, food production increases, and the repair of war damages. To alleviate the intense population pressure on limited land, it decided to grant incentives to farmers. Together with the land reform program implemented between 1949 and 1953, war-damaged irrigation and drainage facilities were repaired, fertilizers and other farm inputs were made available, and farmers' organizations were strengthened.

During this recovery stage, the Sino-American Joint Commission on Rural Reconstruction (JCRR) was established in Nanking in 1948. That agency played an important role in the postwar rural reconstruction and development of Taiwan, China. From 1951 to 1965, the United States provided a total of US$1.5 billion in aid. Approximately one-third went to agriculture, which was used to build infrastructure and foster human resources for agriculture. Substantial imports of commodities financed by U.S. aid and increases in domestic production, especially of food, helped relieve demand pressures in Taiwan, China.

During its low-income stage of economic development (before 1960), agricultural policy in Taiwan, China was designed mainly to supply rice at low, stable prices to the nonfarm population. In those days, two important taxes were imposed on farmers: the farm land tax and the hidden rice tax. They were levied by means of compulsory rice purchases and the rice-fertilizer barter system. The compulsory purchase of paddy rice from landowners at official prices was another source of government control over rice, such that all rice paddy land was subject to the paddy land tax plus the compulsory procurement of rice. The compulsory procurement was assessed on the basis of tax units determined by land productivity. The difference between the government procurement prices and farmers' market prices constituted a hidden tax on paddy landowners, who were mostly farm operators after the implementation of land reform program. Though the hidden tax was gradually reduced as per capita income in Taiwan, China rose, it was not abolished until 1973.

The government's rice collection by all of these methods during 1950–70 averaged 50 to 60 percent of the total amount of rice produced minus farmers' home consumption. By 1973, this share had declined to 20 percent. In subsequent years, it increased again because of the implementation of the guaranteed rice price policy. The total of this hidden rice tax was larger than the total income tax of Taiwan, China before 1963 and was more than twice the farm land tax before 1961, except in 1954. After 1961, when Taiwan, China moved into the lower-middle-income stage of economic development, the hidden rice tax decreased rapidly: the ratio of the hidden rice tax to the total income tax was only 8.5 percent in 1971 (Kuo 1975).

Agricultural policy geared to exploit agriculture for the sake of supporting industrial development (and military development) largely ended during the 1970s, when the shift to subsidizing agriculture began. This period was when Taiwan, China rapidly expanded its labor-intensive light industries in response to increases in export demand. Because several of these light industries, such as garments and footwear, were located in rural areas, nonfarm incomes became increasingly important to farm households. Farmers in Taiwan, China were able to take advantage of employment in manufacturing without leaving home, and many of them engaged in nonfarm self-employed industrial activities during less-busy farm seasons. The need for farmers to rely on agricultural protection policies was therefore smaller than in Korea.

It was 1978 when GDP per capita exceeded US$5,000 in Taiwan, China, pushing it into the upper-middle-income stage of economic development. Still, to help equalize the income level of farm workers with that of the rapidly expanding industrial sector, the government offered loans and subsidies for promoting farm mechanization, which were designed to raise farmers' labor productivity. The expansion of rice production began to slow down in response to an increased emphasis on livestock and fishery products and high-value export crops. Increases

in industrial employment also drove up the cost of farm labor. Labor productivity in agriculture continued to lag behind that of the industrial sector, and the gap between farm and nonfarm per capita incomes was increased, especially for farmers who relied mainly on rice production. The problems faced by Taiwan, China agriculture were similar to those that many other industrial countries experienced at a comparable development stage, especially Japan in the early 1960s and Korea in the late 1970s.

Per capita consumption of rice in Taiwan, China fell from 140 kilograms per year in 1968 to 74 kilograms in 1988. Correspondingly, an excessive stock of rice accumulated. In order to reduce production, farm extension workers encouraged farmers to plant other crops in rice fields, but their efforts were not successful because no economic incentive was provided. A six-year rice crop substitution plan inaugurated in 1984 gave direct subsidies of 1 metric ton of paddy rice per hectare to farmers who shifted their rice fields to corn or sorghum, or 1.5 metric tons of paddy rice per hectare to farmers who shifted to crops other than corn and sorghum. In addition, corn and sorghum were purchased by the government at guaranteed prices. Under the program, rice production declined to 1.84 million metric tons in 1988, 0.9 million metric tons less than the peak of 1976. In 1988, the paid-in-kind subsidy was changed to a cash payment to improve the efficiency of the program.

Taiwan, China entered the high-income stage of development in 1988, when its real GDP per capita exceeded US$10,000. The most important change in agricultural policy in the years that followed was related to the economy's accession to the WTO on January 1, 2002. In line with its level of economic development, Taiwan, China agreed to bring its tariff rates to a level between those of Japan and Korea—as such, its average nominal tariff rate was reduced from 20 percent to 14 percent in the year following accession and gradually to 12.9 percent by 2004. The plan exempted 137 items covered under tariff rate quotas (TRQs). Of the 41 products that were under import quota restrictions before WTO accession, 18 were moved to tariffication after accession. Rice received a special exemption, and the remaining 22 items are now governed by the tariff rate quota regime.

Similar to the arrangement in Korea, the special treatment of rice in Taiwan, China is based on the rules of annex 5 of the URAA. The quota of rice imports was set in 2002 at 8 percent of the average domestic consumption between 1990 and 1992 (144,720 tons of brown rice). By negotiation, this amount was divided into governmental and private import quotas. The government rice quota (65 percent of rice imports) was subject to the same treatment as rice purchased from local growers. The imported rice cannot be exported for food aid nor can it be used for animal feed. The remaining 35 percent was imported by private firms and allocated on first-come, first-served basis. For both private and government quotas, there is a ceiling on the price mark-up of NT$23.26 per kilogram for rice and

NT$25.59 for rice products when they are sold on the domestic market. If the sale of quota rice is slow, the price mark-up can be cut by NT$3 every two weeks. The mark-up reduction can be continued until all rice is sold.

Measurement of Distortions to Agricultural Incentives

The main focus of the study presented here is the gap between domestic prices and what they would be under free markets. Since it is not possible to understand the characteristics of agricultural development with a sectoral view alone, the project's methodology not only estimates the effects of direct agricultural policy measures (including any distortions in the foreign exchange market), but also generates estimates of distortions in nonagricultural sectors for comparative evaluation. Specifically, the study computes an NRA for farmers including an adjustment for direct interventions on inputs such as border protection on fertilizers. It also generates an NRA for nonagricultural tradables, for comparison with that for agricultural tradables, via the calculation of an RRA (see Anderson et al. 2008a, 2008b).

For Japan and Korea, an NRA is calculated for rice, wheat, barley, soybeans, beef, pig meat, poultry, eggs, and milk. For Taiwan, China, estimates are calculated for rice, wheat, beef, pig meat, poultry, and eggs. Domestic prices are converted to U.S. dollars using market foreign exchange rates except for 1955–64 in Korea and for 1955–61 in Taiwan, China, for which the shadow exchange rates estimated for Korea by Frank, Kim, and Westphal (1975) and for Taiwan, China by Scott (1979) are used in order to take into account the distortions to the foreign exchange market in early years. Aggregate NRAs on output for each county are calculated using weights based on domestic production of commodities valued at undistorted prices.

In addition to the commodities above covered in this study, several other crops are included in the calculation of RRAs for Japan and Korea. These include apples, cabbage, cucumbers, grapes, mandarins, pears, spinach, strawberries, onions, and sugar for Japan and cabbage, red peppers, and garlic for Korea. The estimates for these products come from the Organisation for Economic Co-operation and Development's (OECD's) estimates of producer and consumer support estimates (PSEs and CSEs; see OECD 2008). Data for these crops are available only for years 1986 and later. Distortions of those crops prior to 1986 are assumed to be at the level of 20 percent in Japan and 90 percent in Korea of the NRAs for the available covered products.

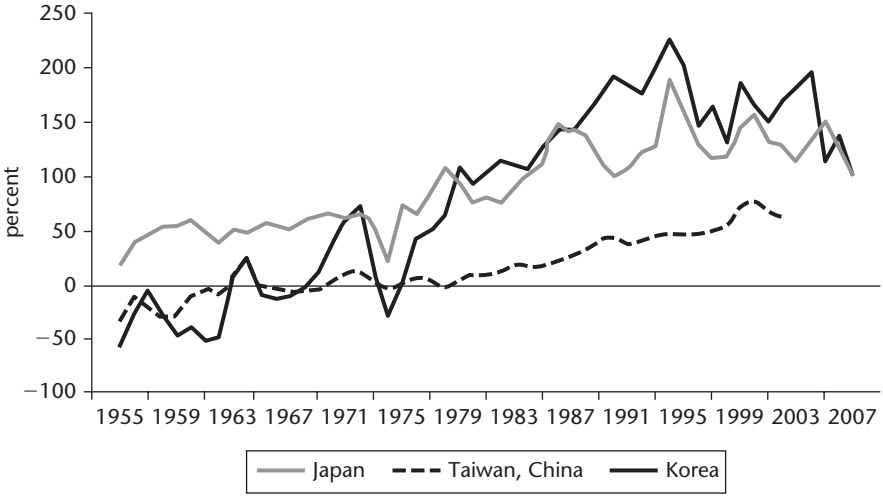
The percentage of agricultural output covered in this study is between 55 and 70 (valued at undistorted prices), though it is difficult to judge the levels of NRAs for the residual products. It is assumed to be made up of the following share trends (at distorted prices) between 1955 and the present: 50 to 80 percent for

import-competing products and 50 to 20 percent for nontradables in Japan and Korea. Distortions of the residual products are assumed to be zero for nontradables, and the same as that of the 11 (Japan) and 4 (Korea) OECD products for import-competing products. For Taiwan, China, distortions of all the noncovered residual products are assumed to be zero, as most of them are nontradable or exportable.

To compute the RRA, the NRA for nonagricultural industries is first estimated. For the latter, weighted tariffs are available only for selected years for Japan, Korea, and Taiwan, China. Data are linearly interpolated for the years for which they are not available. For the early years, tariff rates are estimated as total tariff revenue divided by value of imports. Assuming the exportable industries receive no assistance, the weighted average tariff is multiplied by the share of import-competing industries in the value of all nonagricultural tradables. This procedure is likely to underestimate assistance to nonagricultural industries, especially in Korea, where subsidized credits targeting certain industries were the major form of assistance. The estimation results for nominal and relative rates of assistance (NRAs and RRAs) to selected commodities are summarized in five-year averages in tables 2.3 and 2.4 for Japan, Korea, and Taiwan, China.[10] Annual movements of the RRA are shown in figure 2.1 to compare protection patterns of Japan, Korea, and Taiwan, China.

Japan's RRA was 13 percent in 1955, when the country was still in the lower-middle-income stage of economic development. But it rose quickly as Japan

Figure 2.1. RRA to Agricultural Versus Nonagricultural Tradables,[a] Japan, Korea, and Taiwan, China, 1955–2007



Source: Honma and Hayami (2008)

a. RRA is defined as 100*[(100 + $NRAag^t$)/(100 + $NRAnonag^t$) − 1], where $NRAag^t$ and $NRAnonag^t$ are the percentage NRAs for the tradables parts of the agricultural and nonagricultural sectors, respectively.

Table 2.3. NRAs to Selected Agricultural Products in Japan, Korea, and Taiwan, China, 1955–2007
(percent)

a. Japan

	1955–59	1960–64	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–04	2005–07
Import-competing products	**53.7**	**66.5**	**79.9**	**77.8**	**110.8**	**111.8**	**153.1**	**149.3**	**147.3**	**146.5**	**124.3**
Rice	72.5	91.0	122.9	164.9	210.8	267.2	591.6	656.2	535.4	607.0	362.8
Barley	35.7	38.7	16.5	10.1	63.1	88.6	203.6	141.7	129.0	121.5	197.6
Wheat	36.1	39.1	42.4	25.4	76.2	111.8	170.3	200.4	204.2	128.6	269.5
Beef	27.4	68.3	130.8	106.0	215.3	136.7	208.9	177.0	191.8	149.1	39.3
Pig meat	17.9	59.8	12.4	−3.4	2.9	12.6	0.5	5.7	10.3	5.5	138.0
Poultry	33.1	42.8	33.5	36.7	31.1	16.8	17.6	25.1	41.4	74.0	11.7
Eggs	3.0	−3.3	−5.3	−2.8	−3.3	1.4	19.9	23.2	33.8	27.6	17.1
Milk	44.2	96.2	162.1	165.4	385.7	211.5	365.2	280.3	238.0	273.2	101.0
Apples	—	—	—	—	—	—	32.0	24.1	27.7	31.4	17.3
Cabbage	—	—	—	—	—	—	10.3	31.1	127.5	177.5	204.6
Cucumbers	—	—	—	—	—	—	57.1	17.4	29.8	43.2	31.1
Grapes	—	—	—	—	—	—	87.2	82.2	117.7	177.4	178.6
Mandarins	—	—	—	—	—	—	21.1	44.8	47.3	32.4	46.4
Pears	—	—	—	—	—	—	35.0	24.0	64.2	157.3	128.7
Spinach	—	—	—	—	—	—	89.2	138.0	236.7	134.4	32.3
Strawberries	—	—	—	—	—	—	11.0	25.1	26.5	16.8	7.2
Onions	—	—	—	—	—	—	55.3	80.8	144.4	284.2	294.9
Soybeans	—	—	—	—	—	410.7	259.4	21.3	42.2	67.2	68.5
Sugar	—	—	—	—	—	229.6	198.3	158.4	159.0	154.7	106.6
Exportables	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Total of covered products	53.7	66.5	79.9	77.8	110.8	111.8	153.1	149.3	147.3	146.5	107.4
from domestic measures	−0.4	3.1	10.0	9.2	10.9	9.6	8.0	6.0	4.5	4.5	4.0
from border (import) measures	54.1	63.4	69.9	68.6	99.9	102.1	145.2	143.3	142.8	142.0	102.9
Dispersion of covered products[b]	39.4	40.3	69.4	82.2	156.1	142.6	175.3	161.5	136.1	142.5	116.0
% coverage (at undistorted prices)	*69*	*65*	*59*	*55*	*55*	*56*	*69*	*68*	*67*	*67*	*76*

(*Table continues on the following pages.*)

Table 2.3. NRAs to Selected Agricultural Products in Japan, Korea, and Taiwan, China, 1955–2007 *(continued)*
(percent)

b. Republic of Korea

	1955–59	1960–64	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–04	2005–07
Import-competing products[a]	**−3.9**	**4.4**	**16.6**	**47.6**	**73.8**	**122.8**	**166.7**	**201.9**	**182.9**	**213.6**	**116.4**
Rice	−8.2	−7.0	−5.4	31.3	59.6	118.4	214.4	265.9	294.3	385.9	213.3
Barley	41.2	83.5	72.3	120.3	101.2	165.9	357.0	524.3	543.0	562.8	275.6
Wheat	−43.0	−26.7	−11.2	0.4	26.5	92.2	144.4	216.0	122.8	135.4	—
Beef	38.8	34.4	64.9	73.9	162.6	163.2	126.2	200.8	159.9	167.8	182.3
Pig meat	−15.2	21.7	158.7	204.1	202.9	169.1	124.7	149.3	116.2	134.4	103.1
Poultry	−11.8	6.9	131.4	103.5	161.7	94.2	86.6	155.6	171.7	179.2	55.7
Eggs	−27.1	−24.7	23.0	0.1	−7.5	14.9	19.4	28.0	26.6	54.3	31.6
Milk	—	—	173.3	108.8	189.0	179.8	185.2	203.7	140.7	149.8	137.0
Cabbage	—	—	—	—	—	—	30.0	30.0	29.1	27.6	27.0
Peppers	—	—	—	—	—	—	175.0	245.4	145.5	197.0	235.7
Soybeans	−13.0	18.8	58.8	80.0	122.2	253.0	361.8	508.2	625.6	757.4	729.2
Garlic	—	—	—	—	—	—	250.3	288.8	213.3	122.6	128.1
Exportables[a]	**n.a.**	**n.a.**	**n.a.**	**n.a.**	**n.a.**	**n.a.**	**n.a.**	**n.a.**	**n.a.**	**n.a.**	**n.a.**
Total of covered products	**−3.9**	**4.4**	**16.6**	**47.6**	**73.8**	**122.8**	**166.7**	**201.9**	**182.9**	**213.6**	**147.3**
from domestic measures	−0.2	−0.4	0.9	4.2	7.1	5.3	5.5	5.9	6.1	5.2	4.4
from border (import) measures	−3.7	4.7	15.7	43.4	66.7	117.5	161.2	196.0	176.9	208.5	143.0
Dispersion of covered products[b]	34.1	40.5	85.0	82.5	89.0	80.1	114.8	164.2	200.1	225.4	206.0
% coverage (at undistorted prices)	*48*	*57*	*67*	*65*	*65*	*61*	*60*	*57*	*51*	*46*	*55*

c. Taiwan, China

	1955–59	1960–64	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–02	2003–07
Exportables[a]	**−23.5**	**7.5**	**5.7**	**20.7**	**13.4**	**35.9**	**89.5**	**161.4**	**167.6**	**203.1**	**—**
Rice	−29.6	−6.6	−17.9	−9.4	−7.6	32.5	103.3	161.4	167.6	203.1	—
Pig meat[c]	−8.1	64.0	99.7	98.3	60.6	42.6	64.8	n.a.	n.a.	n.a.	—
Import-competing products[a]	**−33.0**	**5.3**	**21.7**	**26.7**	**32.5**	**49.1**	**55.4**	**93.6**	**126.3**	**160.0**	**—**
Wheat	48.2	36.0	39.4	32.2	57.2	92.3	—	—	—	—	—
Beef	13.7	41.2	28.8	22.0	79.6	77.0	101.3	98.5	82.6	72.8	—
Pig meat[c]	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	107.1	131.3	173.2	—
Poultry	−47.5	−3.7	21.2	27.1	30.0	63.6	84.6	143.0	228.7	279.5	—
Eggs[d]	n.a.	n.a.	n.a.	n.a.	n.a.	0.7	26.8	23.9	17.9	24.7	—
Nontradables[a]	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**n.a.**	**n.a.**	**n.a.**	**n.a.**	**—**
Eggs[d]	0.0	0.0	0.0	0.0	0.0	0.0	n.a.	n.a.	n.a.	n.a.	—
Total of covered products[a]	**−23.2**	**7.2**	**6.2**	**20.0**	**14.0**	**35.1**	**76.1**	**109.5**	**134.0**	**167.8**	**—**
Dispersion of covered products[b]	33.4	35.3	47.5	40.5	40.5	34.5	56.9	66.1	86.9	106.4	—
% coverage (at undistorted prices)	*53*	*49*	*49*	*48*	*50*	*42*	*35*	*34*	*35*	*36*	—

Source: Anderson and Valenzuela (2008), based on authors' spreadsheet.

Note: — = not available; n.a. = not applicable.

a. Weighted averages, with weights based on the unassisted value of production.

b. Dispersion is a simple five-year average of the annual standard deviation around the weighted mean of NRAs of covered products.

c. Pig meat changed trade status in 1989, from import-competing to exportable. The period average reported here corresponds to 1985–88 for the import-competing product, and 1989–94 for the exportable product.

d. Eggs are assumed to be a nontradable product with zero distortions prior to 1983.

Table 2.4. NRAs to Agricultural Relative to Nonagricultural Industries[e] in Japan, Korea, and Taiwan, China, 1955–2007

(percent)

a. Japan

	1955–59	1960–64	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–04	2005–07
NRA, covered products	53.7	66.5	79.9	77.8	110.8	111.8	153.1	149.3	147.3	146.5	107.4
NRA, noncovered products	5.3	6.5	7.7	8.0	12.1	13.0	23.7	26.7	42.0	50.5	18.6
NRA, all agricultural products (excluding NPS)	38.8	45.8	50.4	46.9	65.9	68.3	112.4	110.5	112.8	115.2	70.9
All importables	46.1	55.0	62.1	58.1	81.2	82.1	127.5	124.4	127.6	129.1	124.3
All exportables	—	—	—	—	—	—	—	—	—	—	—
All nontradables	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	40.8
Trade bias index (TBI)	−0.32	−0.35	−0.38	−0.37	−0.45	−0.45	−0.56	−0.55	−0.56	−0.56	−0.55
NRA, non-product-specific (NPS) assistance	—	—	—	—	4.8	4.0	6.4	5.8	6.8	5.1	3.3
Inputs	—	—	—	—	4.8	4.0	6.4	5.8	6.8	5.1	3.3
Other	—	—	—	—	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NRA, all agricultural products (including NPS)	38.8	45.8	50.4	46.9	66.8	72.3	118.8	116.3	119.6	120.4	74.3
NRA, decoupled payments	0.0	0.0	0.0	0.0	3.6	15.1	7.1	2.5	2.7	4.6	5.0
NRA, all agricultural products (including NPS and decoupled assistance)	38.8	45.8	50.4	46.9	70.4	87.4	125.9	118.9	122.3	124.9	79.3
NRA, all agricultral tradables (including NPS)	46.1	55.0	62.1	58.1	87.6	86.1	133.8	130.2	134.4	134.2	127.7
NRA, all nonagricultural tradables	2.5	3.9	3.8	2.8	1.6	1.1	1.3	1.1	0.8	0.7	0.6
RRA[d]	**42.5**	**49.1**	**56.2**	**53.7**	**84.6**	**84.0**	**130.9**	**127.6**	**132.4**	**132.7**	**126.4**

b. Republic of Korea

	1955–59	1960–64	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–04	2005–07
NRA, covered products	−3.9	4.4	16.6	47.6	73.8	122.8	166.7	201.9	182.9	213.6	147.3
NRA, noncovered products	−1.7	−0.2	7.0	15.3	25.3	37.4	64.3	88.0	74.6	71.7	49.3
NRA, all agricultural products (excluding NPS)	−3.2	4.0	13.4	35.7	56.3	89.4	126.1	152.8	129.8	137.3	80.6
All importables	−3.3	4.9	16.3	46.1	71.8	118.6	159.8	197.6	164.8	171.9	116.4
All exportables	—	—	—	—	—	—	—	—	—	—	—
All nontradables	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TBI	0.03	−0.05	−0.14	−0.32	−0.42	−0.54	−0.62	−0.66	−0.62	−0.63	−0.54
NRA, NPS assistance	—	—	—	—	0.6	0.7	2.2	7.1	7.3	4.4	3.9
Inputs	—	—	—	—	0.6	0.7	2.2	7.1	7.3	4.4	3.9
Other	—	—	—	—	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NRA, all agricultural products (including NPS)	−3.2	4.0	13.4	35.7	56.4	90.1	128.1	159.8	137.0	141.7	84.4
NRA, decoupled payments	0.0	0.0	0.0	0.0	0.1	0.4	0.5	5.3	2.7	7.2	12.3
NRA, all agricultural products (including NPS and decoupled assistance)	−3.2	4.0	13.4	35.7	56.4	90.5	128.6	165.2	139.7	148.8	96.8
NRA, all agricultural tradables (including NPS)	−3.3	4.9	16.3	46.1	71.9	119.3	161.7	204.7	171.9	176.3	120.3
NRA, all nonagricultural tradables	45.6	37.1	22.3	11.4	11.7	6.8	5.7	3.3	2.3	1.7	1.5
RRA[d]	**−32.6**	**−21.4**	**−4.8**	**30.5**	**54.0**	**105.4**	**147.8**	**195.0**	**165.8**	**171.6**	**117.0**

(*Table continues on the following page.*)

Table 2.4. NRAs to Agricultural Relative to Nonagricultural Industries[e] in Japan, Korea, and Taiwan, China, 1955–2007 *(continued)*

(percent)

c. Taiwan, China

	1955–59	1960–64	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–02	2003–07
NRA, covered products[a]	−23.2	7.2	6.2	20.0	14.0	35.1	76.1	109.5	134.0	167.8	—
NRA, noncovered products	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	—
NRA, all agricultural products[a]	−11.8	3.5	3.0	9.2	7.0	14.6	26.4	37.2	45.5	60.0	—
NRA, NPS assistance	—	—	—	—	—	—	—	—.	—	—	—
Total agricultural NRA (including NPS)[b]	**−11.8**	**3.5**	**3.0**	**9.2**	**7.0**	**14.6**	**26.4**	**37.2**	**45.5**	**60.0**	**—**
TBI[c]	−0.15	0.05	0.02	0.12	0.05	0.15	0.27	0.11	0.02	0.00	—
NRA, all agricultural tradables	−15.8	4.7	3.9	12.0	8.9	18.5	32.7	45.0	53.6	69.2	—
NRA, all nonagricultural tradables	8.8	9.3	8.8	7.5	7.0	5.2	4.5	2.6	1.8	1.1	—
RRA[d]	**−22.5**	**−4.2**	**−4.5**	**4.2**	**1.7**	**12.7**	**27.0**	**41.3**	**51.0**	**67.3**	**—**

Source: Anderson and Valenzuela (2008), based on authors' spreadsheet.

Note: — = not available.

a. NRAs including product-specific input subsidies.

b. NRAs including product-specific input subsidies and non-product-specific (NPS) assistance. Total of assistance to primary factors and intermediate inputs divided by total value of primary agriculture production at undistorted prices (percent).

c. TBI = $(1 + NRAag_x/100)/(1 + NRAag_m/100) - 1$, where $NRAag_m$ and $NRAag_x$ are the average percentage NRAs for the import-competing and exportable parts of the agricultural sector.

d. RRA is defined as $100*[(100 + NRAag^t)/(100 + NRAnonag^t) - 1]$, where $NRAag^t$ and $NRAnonag^t$ are the percentage NRAs for the tradables parts of the agricultural and nonagricultural sectors, respectively.

became an upper-middle-income country in the 1960s, to 30–40 percent. The RRAs of Korea and Taiwan, China, meanwhile, both in the low-income stage of development in the 1950s and the lower-middle-income stage in the 1960s, were at very low levels, involving negative rates for some years before the mid-1970s. Following Japan's entry into the high-income stage of development in the 1970s, it increased its RRA steadily, except during the global food crises in 1973–74. The RRA reached a peak in 1994, although this year followed a bad rice harvest (one-quarter below average). Japan's RRA was within the 100–150 percent range after the mid-1980s, except in 1994.

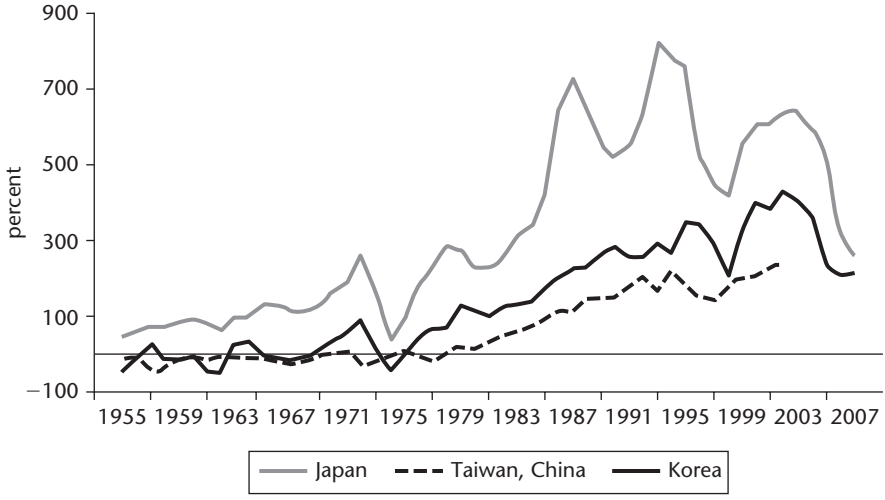
In Korea, the rapid rise of agricultural assistance began in the late 1970s when the country moved from the lower- to the upper-middle-income stage of development. Taiwan, China followed Korea with an increase in RRA, though the difference in the level of the RRA between the two economies continued to be significant during the upper-middle-income stage in both countries. It is interesting to see that Taiwan, China was behind Korea in terms of the RRA level until the mid-1990s. After this time, however, Korea's RRA fell. After Korea and Taiwan, China entered the high-income stage of development in the 1990s, a relatively high RRA was maintained in both economies, albeit with some fluctuations.

The wide fluctuations in RRA in the late 1990s were caused by the currency crises in East Asia that began in 1997. This resulted in a sharp decline in the RRA in Korea in 1997 and 1998. Sharp increases in the RRA in Taiwan, China in 1999 and 2000 were caused by shortages of livestock products because of the September 1999 earthquake and reduced production of pig meat resulting from the spread of foot-and-mouth disease in 1997. Although the paths of the RRAs were different during the middle-income stage of development, both Korea and Taiwan, China started at slightly negative protection levels in the low-income stage in the 1960s and reached very high RRAs (about 120 percent in Korea and 70 percent in Taiwan, China) by 2000.

Movements of the NRAs for covered farm products were similar to those of the RRAs in all three economies until the late 1970s, when the growth of the NRAs for nonagricultural products was much faster, particularly in Taiwan, China. In contrast to the path of the RRA, Taiwan, China kept pace with Korea in terms of the growth of the NRA for agriculture, albeit at the level of about 10 years behind that of Korea. Taiwan, China then caught up with Japan and Korea at a 150–180 percent NRA in the late 1990s. The three economies all maintained policies to protect covered agricultural products that were considered politically important and sensitive. However, the importance of these covered products declined over time with a smaller share of those commodities in the value of production. Thus, the growth in the RRA was less than that in the NRA because the RRA takes into account the nondistorted uncovered products whose share in value of production increased.

Fluctuations in the RRA and NRA consist mainly of changes in the NRA of individual commodities and changes in the weight of each commodity. Because

Figure 2.2. NRA to Rice, Japan, Korea, and Taiwan, China, 1955–2007



Source: Honma and Hayami (2008)

rice is the most important agricultural product in Japan, Korea, and Taiwan, China, its protection had a large influence on the RRA. A clear upward trend in the NRA of rice was present in all three economies (figure 2.2). In Japan, the NRA for rice was as high as nearly 100 percent in the 1960s, when Japan had already entered the upper-middle-income stage of development, whereas it was nearly zero in Korea and Taiwan, China in the lower-middle-income stage. From the late 1970s, when Korea and Taiwan, China approached the upper-middle-income stage, the NRA for rice began to rise sharply and continued to rise thereafter.

The fastest increase in the NRA for rice occurred in Japan from the late 1970s. It peaked in the late-1980s. The rapid increase was caused, to a large extent, by a rapid appreciation of the Japanese yen relative to the U.S. dollar. Though the border price of rice declined sharply, there was no transmission to domestic market prices because of the control of rice imports by the government. In 1993, a temporary interruption in the peak of the rice NRA in Japan, caused by a bad harvest, resulted in a shortage of Japonica rice on world markets. This raised border prices, while domestic prices were kept relatively stable under the Food Control System. Thereafter, further increases in the NRA for rice were counteracted by yen depreciation and also by the acceptance of minimum access obligations in the URAA in 1995 and the later shift to tariffication in 1999.

In Korea and Taiwan, China, the upward trend in the rice NRA continued after the 1970s. Such increases were a major factor underlying rapid increases in the

RRA in Korea during the upper-middle-income stage of development, because the weight of rice in agricultural production continued to be high. Korea's exemption from tariffication in the URAA allowed the NRA for rice to grow even under the implementation of WTO commitments. Similar to the NRA for covered products in figure 2.1, Taiwan, China followed Korea in the growth of the NRA for rice. Taiwan, China mimicked the situation in Korea, though with a 5- to 8-year lag between the 1970s and the mid-1990s. In more recent years, the gap in NRAs for rice between Taiwan, China and Korea has increased, but the protection level of rice in the former appears to be maintaining a rising trend.

Consumer tax equivalents on food

Though support provided to farmers in Japan, Korea, and Taiwan, China has come mostly via food import restrictions, there have been additional schemes whereby crop producer prices were supported at levels above those charged to grain and soybean consumers (including feedmixers providing livestock producers with animal feedstuffs). Thus, the consumer tax equivalent (CTE) is below the NRA for some crop products. As a result, together with the different weights of various products in consumption as compared with production, the average NRA for covered products was approximately 50 percent above the CTE for both Japan and Korea in 2000–04 (compare tables 2.3 and 2.5). In this way, consumers were spared some of the implicit tax that otherwise would have been imposed on them had border measures alone been used to raise producer prices above international levels.

Sources of Growth in Agricultural Protection Measures

The experiences of Japan, Korea, and Taiwan, China are good examples of policy switching from exploitation to protection of agriculture when economies grow through industrial development. This shift is most clearly illustrated by the cases of Korea and Taiwan, China, whose agricultural protection levels were negative in the 1950s and the 1960s and began the rise sharply in the 1970s with the success of industrial development.

The growth of agricultural protection in Japan, Korea, and Taiwan, China is empirically documented in Anderson, Hayami, and Honma (1986), which draws attention to three characteristics of the East Asian growth of agricultural protection, based on the nominal rates of protection for agricultural products, in comparison with other advanced economies: first, the rapid rise over time in protection rates in the three economies in East Asia; second, the faster increase in agricultural protection in the three East Asian economies than in other industrial economies for the period of 1955 to 1980; and third, the fact that the highest level of agricultural protection reached by the three economies as of 1980 was rivaled

Table 2.5. CTEs for Selected Agricultural Products in Japan, Korea, and Taiwan, China, 1955–2007
(percent)

a. Japan

	1955–59	1960–64	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–04	2005–07
Apples	—	—	—	—	—	—	30.8	23.8	27.5	31.0	17.0
Barley	34.9	32.6	10.2	5.8	20.3	29.1	158.1	131.9	118.9	105.9	114.3
Beef	27.4	68.3	130.8	106.0	215.3	136.7	208.9	177.0	191.8	149.1	38.5
Cabbage	—	—	—	—	—	—	9.2	30.8	127.0	176.6	204.0
Cucumbers	—	—	—	—	—	—	56.4	17.2	29.7	42.9	30.9
Eggs	3.0	−3.3	−5.3	−2.8	−3.3	1.4	19.7	22.9	33.6	27.2	17.0
Grapes	—	—	—	—	—	—	85.3	81.6	117.2	176.3	177.8
Mandarins	—	—	—	—	—	—	20.0	44.5	47.0	32.0	46.0
Milk	44.2	96.2	162.1	165.4	385.7	211.5	365.2	280.3	238.0	273.2	93.5
Onions	—	—	—	—	—	—	54.0	80.4	143.9	282.9	294.0
Pears	—	—	—	—	—	—	35.0	24.0	64.2	157.3	103.4
Pig meat	17.9	59.8	12.4	−3.4	2.9	12.6	0.5	5.7	10.3	5.5	138.0
Poultry	33.1	42.8	33.5	36.7	31.1	16.8	17.6	25.1	41.4	74.0	11.7
Rice	73.1	85.7	103.9	137.3	179.6	232.6	548.5	613.2	506.4	574.6	348.6
Soybeans	—	—	—	—	—	0.0	0.0	0.0	0.0	0.0	0.0
Spinach	—	—	—	—	—	—	89.2	138.0	236.7	134.4	32.3
Strawberries	—	—	—	—	—	—	10.0	24.8	26.2	16.4	7.0
Sugar	—	—	—	—	—	167.0	185.9	154.8	155.4	151.6	119.6
Wheat	35.9	33.0	27.4	14.1	26.7	37.2	136.1	108.4	73.4	68.7	73.6
All covered products	**53.0**	**62.2**	**66.8**	**67.6**	**93.2**	**98.8**	**134.9**	**119.3**	**116.1**	**106.6**	**81.0**
Import-competing	53.0	62.2	66.8	67.6	93.2	98.8	134.9	119.3	116.1	106.6	86.9
Exportables	—	—	—	—	—	—	—	—	—	—	—
Dispersion, covered products[b]	39.1	39.6	66.5	75.0	144.0	97.2	154.5	149.3	130.0	141.8	108.3

b. Republic of Korea

	1955–59	1960–64	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–04	2005–07
Wheat	−46.2	−22.5	−11.1	1.1	16.2	46.0	132.8	167.4	80.5	80.6	—
Barley	40.8	77.8	64.9	96.6	57.3	119.6	325.6	411.5	341.2	327.5	174.4
Rice	−7.7	−5.5	−5.0	29.1	54.5	113.4	211.5	261.7	290.8	385.3	213.3
Beef	38.8	34.4	64.9	73.9	162.6	163.2	122.1	200.7	153.9	167.7	182.3
Pig meat	−15.2	21.7	158.7	204.1	202.9	169.1	124.7	149.3	116.2	134.4	103.1
Poultry	−11.8	6.9	131.4	103.5	161.7	94.2	86.6	155.6	171.7	179.2	55.7
Eggs	−27.1	−24.7	23.0	0.1	−7.5	14.9	19.4	28.0	26.6	54.3	31.6
Milk	—	—	173.3	108.8	189.0	179.8	185.2	203.7	140.7	149.8	137.0
Cabbage	—	—	—	—	—	—	30.0	30.0	29.1	27.6	27.0
Peppers	—	—	—	—	—	—	175.0	245.4	145.5	197.0	235.7
Soybeans	−19.8	8.2	51.6	63.2	95.2	245.4	112.2	75.5	63.6	66.8	91.9
Garlic	—	—	—	—	—	—	250.3	288.8	213.3	122.6	128.1
All covered products	**−5.0**	**5.4**	**14.5**	**39.7**	**63.9**	**114.3**	**148.5**	**176.4**	**144.9**	**154.1**	**135.1**
Import-competing	−5.0	5.4	14.5	39.7	63.9	114.3	148.5	176.4	144.9	154.1	115.7
Exportables	—	—	—	—	—	—	—	—	—	—	—
Dispersion, covered products[b]	34.7	37.6	85.3	81.1	92.3	82.3	95.1	118.1	107.3	116.2	81.7

(*Table continues on the following pages.*)

Table 2.5. CTEs for Selected Agricultural Products in Japan, Korea, and Taiwan, China, 1955–2007 *(continued)*
(percent)

c. Taiwan, China

	1955–59	1960–64	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–02	2003–07
Rice	−29.6	−6.6	−17.9	−9.4	−7.6	32.5	103.3	161.4	167.6	203.1	—
Wheat	38.3	16.4	29.6	14.6	−1.6	−0.3	—	—	—	—	—
Beef	13.7	41.2	28.8	22.0	79.6	77.0	101.3	98.5	82.6	72.8	—
Pig meat	−8.1	64.0	99.7	98.3	60.6	42.6	76.5	103.9	131.3	173.2	—
Poultry	−47.5	−3.7	21.2	27.1	30.0	63.6	84.6	143.0	228.7	279.5	—
Eggs	0.0	0.0	0.0	0.0	0.0	0.7	26.8	23.9	17.9	24.7	—
All covered products[a]	**−21.1**	**7.7**	**6.9**	**19.0**	**15.2**	**38.4**	**82.7**	**116.5**	**136.8**	**166.5**	**—**
Import-competing	−6.1	13.2	26.0	23.3	27.3	49.0	74.7	102.1	129.1	159.5	—
Exportables	−23.7	7.0	5.2	19.1	13.7	36.2	89.6	161.4	167.6	203.1	—
Dispersion, covered products[b]	33.3	35.9	47.2	40.6	40.2	32.2	34.1	56.2	87.1	106.0	—

Source: Anderson and Valenzuela (2008), based on authors' spreadsheet.

Note: — = data not available.

a. Weighted averages, with weights based on the unassisted value of consumption, where consumption is derived using the value of production and self-sufficiency ratios (derived from the FAOSTAT Database) as production/consumption.

b. Dispersion is a simple five-year average of the annual standard deviation around the weighted mean of CTEs of covered products.

only by Switzerland. Anderson, Hayami, and Honma also note that the growth of agricultural protection in these economies during the three decades to 1980 was exceptionally rapid compared with Western countries that started down the path of industrialization earlier. That is, East Asia was not exceptional in having increasing levels of agricultural protection, but it was exceptional in the speed at which it reached the world's highest level. Figures 2.1 and 2.2 indicate that the protection growth in terms of RRA and NRA continued at the same speed for about 20 years after the previous study period.

The rapid growth of agricultural protection in industrializing economies can be explained largely by the shift in comparative advantage away from agriculture to industry as the result of successful industrialization. The decline in agriculture's comparative advantage increased the intersectoral resource adjustment costs that would have been shouldered by farmers if they were left to the competitive market mechanism. Instead, the increase in costs boosted farmers' demand for agricultural protection. This problem typically applies when industrial growth has been so rapid that intersectoral adjustments are not fast enough under free markets to prevent a widening rural-urban income disparity.[11]

The association between the rise in agricultural protection and the decline in agriculture's comparative advantage was tested in Honma and Hayami (1986) using multiple regression analysis and a pooled data set for 15 countries at six points in time ending in 1980. A strong correlation was found between the level of aggregate NRP[12] and the index of agriculture's labor productivity relative to the total economy's labor productivity. Honma and Hayami conclude that the high level of agricultural protection in East Asia resulted not so much from factors unique to East Asia but mainly from factors common to all industrial countries. It should be noted, however, that there are differences in the process of intersectoral resource adjustment between Japan and the other two economies. In 1955, the first year of the analysis presented here, Japan was already in the middle-income stage of economic development and about to enter the so-called high-growth era characterized by extremely rapid industrialization and a widening income gap between rural and urban households.[13] Soon after shifting from the middle-income to the high-income stage of development, a process that took less than two decades, Japan increased its level of agricultural protection. Protection measures were raised to a level comparable with that of the European Economic Community during the 1960s.

Meanwhile, Korea and Taiwan, China were still in the low-income stage of economic development in the 1950s. As both economies entered the middle-income stage in the 1960s, productivity growth in agriculture lagged behind that of nonagriculture as a result of successful industrialization. With delays in labor outmigration from farming, farmers' income levels tended to decline relative to those of nonfarmers. Nevertheless, because agriculture was such a large sector in terms

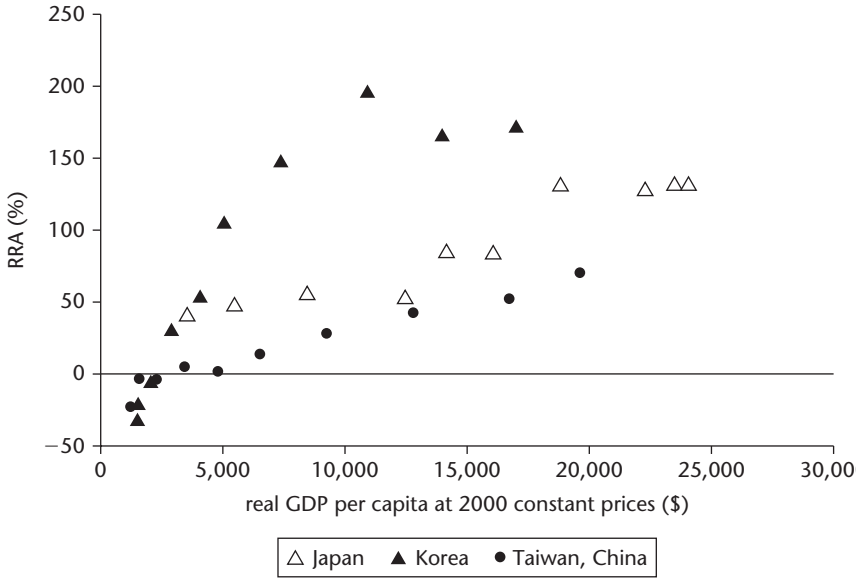
of both national income and labor force, it was impossible during the middle-income stage of development for governments to secure sufficient finance from nonagricultural sectors to raise support for farmers to the extent needed to close the income gap. Thus, despite the growing rural-urban income disparity, Korea and Taiwan, China retained low levels of agricultural protection until the late 1970s and early 1980s, respectively.

The agricultural problem confronted by middle-income economies like Korea and Taiwan, China in the 1960s and 1970s has been called the "disparity problem" by Hayami (2005) and Hayami and Godo (2004), referring to the income disparity between farm and nonfarm households. The problem is a lag in productivity growth in agriculture relative to nonagriculture, brought about by insufficient labor out-migration from farming in response to the successful industrialization that raised these economies to the middle-income stage. Farmers, who observe nonfarm workers' rapid escape from poverty, begin to realize how relatively poor they are, even if their income level did not decrease from the previous stage. The resulting dissatisfaction among farmers often becomes a significant source of social instability. Once an economy reaches the middle-income stage, that dissatisfaction becomes a prime concern of policy makers, who might adopt agricultural protection measures to appease farmers and prevent the dissatisfaction from elevating into serious antigovernmental sentiment.

Such protection may not be strong enough to close the income gap between farmers and urban workers until an economy graduates from the lower-middle-income stage, however. Because the share of agriculture in both national income and the labor force is still large, it is difficult to either raise sufficient revenue from the nonfarm sectors to close the growing farm-nonfarm income gap with direct support payments or to pass on the cost of agricultural protection to consumers by raising food import barriers, as increases in food prices erode real wages paid by the large number of small-scale enterprises that rely heavily on cheap labor. Faced with the disparity problem, policy makers in middle-income countries are forced to search for ways to protect farmers within the constraint of the food problem that is still binding because a large number of urban workers are still poor and thus still dedicate a large share of household expenditure to food.

In the early 1990s, during which all three Northeast Asian economies were in the high-income stage, the decline in relative agricultural income (in terms of agricultural GDP per worker divided by total GDP per worker) stopped in Japan and Korea. In Taiwan, China, the relative agricultural income continued to decline until recently (table 2.1), despite the high level of agricultural protection. The reason relative agricultural income continued to decline in Taiwan, China was that the total economy's labor productivity increased more rapidly than agriculture's labor productivity even after 1990.

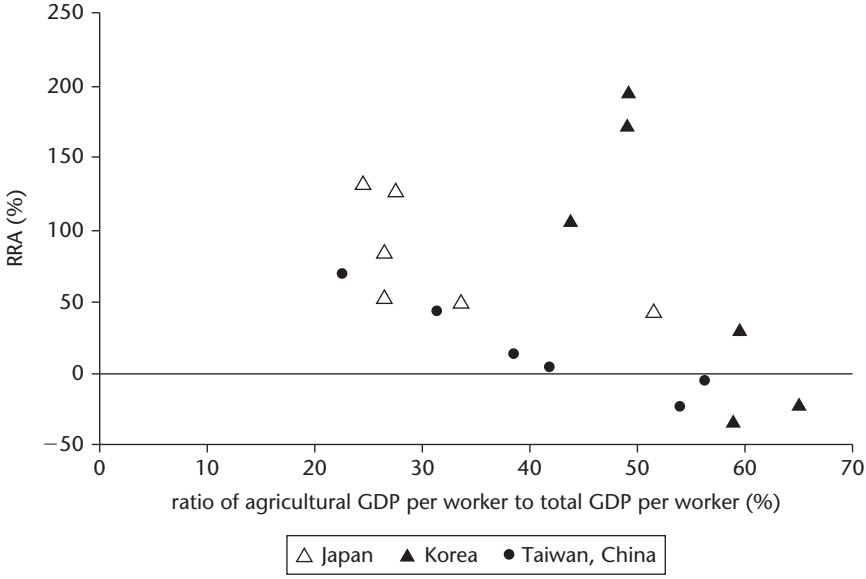
Figure 2.3. RRA to Agriculture and Real GDP Per Capita, Japan, Korea, and Taiwan, China, 1955–2004



Source: Authors' computations.

Agricultural protection in Korea rose faster and to a higher level during its upper-middle-income stage of development than in Taiwan, China or Japan during theirs. RRAs in Korea, for example, significantly exceeded those of Taiwan, China and Japan for the same levels of per capita income throughout their upper-middle-income stage (figure 2.3). The difference could reflect the different costs of intersectoral adjustment (corresponding to changes in comparative advantage) that farmers had to bear. In Korea, the shift of labor from agriculture to nonagriculture involved the migration of workers from rural to urban areas, whereas in Japan and Taiwan, China farmers increased their nonfarm activities while continuing to live in their home villages and towns and farming part-time. Correspondingly, both the pecuniary and psychological costs of intersectoral labor reallocation were much higher for farmers in Korea. In Japan, the decline in relative agricultural income ceased in the 1970s when the country reached the high-income mark. This was due to a deceleration in the growth of labor productivity in the total economy after reaching the high-income stage. The Korean experience after 1990, meanwhile, is likely the result of fast increases in agricultural labor productivity resulting from the rapid out-migration of agricultural labor to urban activities (table 2.1).

Figure 2.4. RRA to Agriculture and Relative GDP Per Agricultural Worker, Japan, Korea, and Taiwan, China, 1955–2004



Source: Authors' computations.

The relationship between relative agricultural income and the RRA in Japan, Korea, and Taiwan, China for 1955–2004 is shown in figure 2.4.[14] Except for Korea in 1990 and 2000, there is a negative correlation for all countries and all periods. The correlation is weak, however, when relative agricultural income is more than about 40 percent (a rate that corresponds to the low-income and lower-middle-income stages of economic development).

Upon reaching the upper-middle-income stage of development in the 1980s, Korea and Taiwan, China strengthened their agricultural protection policies. This followed Japan's protection pattern in the 1960s, when the income gap was widening and protection measures were deemed necessary to close it. Under such circumstances, politicians were not able to resist pressure from the farm lobby to institute policies to prevent farmers' incomes from lagging behind those of non-farm workers. In the case of Korea, policy makers may have had a specific reason for strengthening agricultural protection, particularly at the farmgate level—the constant threat of communist aggression from the North. The imminent hostility prompted commercial and industrial interests to support farmers and thereby maintain political stability.

If the income gap had been adequately dealt with during the middle-income stage of development, problems caused by agricultural protection in the upper-middle-income stage might have been avoided. Yet the disparity problem in the

middle-income stage has received relatively little attention in academic and policy debate, despite the fact that there are many economies attempting to reach the upper-middle-income and high-income stage through industrialization. The growing income disparity between farm and nonfarm populations could become a major source of social and political instability elsewhere in Asia, from ASEAN countries to China and eventually to South Asia, particularly India.

In analysis by Honma and Hayami (1986), it was found that political power in the agricultural sector is maximized when the share of agriculture declines to 4 to 5 percent of GDP or 5 to 8 percent of the labor force. Japan has passed this range, and Korea recently entered this peak zone in terms of both GDP and labor force, as did Taiwan, China in terms of the labor share (having passed over this zone in 1990 in terms of GDP share). Political economy factors may well underlie the rise of agricultural protectionism in Korea at the high-income stage after 1990, as observed in terms of the NRA at the farmgate level despite no apparent further increase in its agricultural comparative disadvantage.[15]

Japan's Pre-World War II Experience

The pattern of growth of agricultural protection in Japan, Korea, and Taiwan, China in the era of East Asian economic miracle, as outlined in the previous section, was consistent with the hypothesis that rapid growth in protection occurred when these economies were in the middle-income stage under the dictate of the "disparity problem" described earlier. Under the disparity problem, when farmers' income levels decline relative to those of nonfarmers, the economy is often characterized by a dual structure: a formal sector consisting of large, modern enterprises and government agencies, and an informal sector consisting of agriculture and other small and medium enterprises. That was the case for Japan in the half-century before World War II, during which Japan advanced from the low-income to the middle-income stage of economic development.

Japan set upon a modern economic growth path with the transformation in political structure that occurred under the Meiji restoration of 1868. In short, Japan went from a union of feudal fiefs under the hegemony of Tokugawa shogun (tycoon) to a modern nation state in the form of the constitutional monarchy under an emperor who was a symbol of national unification without actual ruling power. The immediate impetus for this political reorganization was the threat of colonization by Western powers that became obvious through the gunboat diplomacy of the United States and the use of Admiral Perry's fleet. The national slogan of the Meiji state was to establish *fukoku kyouhei* (a wealthy nation and strong army) for the sake of preserving national independence. To achieve this goal, economic policies in Meiji Japan were aimed at the promotion of modern industries

to catch up to the economic power of Western nations. At the time, Japan did not have the freedom to set import and export duties above 5 percent ad valorem levels, as per commercial treaties signed by the Tokugawa tycoon with Western powers in the mid-19th century. Thus, industrial promotion policy relied mainly on subsidies in areas such as the import of machines and factories and the purchase of their designs, the employment of engineers and skilled workers, and the collection and dissemination of information on overseas technologies and markets. It was mainly through taxation of agriculture—through the newly established land tax system—that subsidies for industrial promotion and other modernization measures were financed.

As the data in table 2.6 show, in the early Meiji period (before 1900), the agricultural sector shouldered about 90 percent of the total direct tax burden, which amounted to about 15 percent of agricultural GDP. Agriculture's share of the government's subsidies at the time, however, amounted to less than one-quarter, or less than 5 percent of agricultural GDP. Evidently, at the beginning of its modern economic growth period, Japan promoted its modern sectors through the exploitation of the traditional sectors, a strategy commonly practiced by developing economies upon becoming independent of colonial powers in the 1960s. Taxation and subsidization imbalanced between agriculture and nonagriculture was even greater than the data of table 2.6 reveal, as a disproportionately high share of the population educated at publicly financed schools were from nonfarm households. Under strong promotion by the government, industrialization progressed rapidly in Japan, especially in labor-intensive manufacturing. Comparative advantage in this sector was unhampered owing to a virtual free trade scenario created by the absence of tariff autonomy in Japan.

Changes in the position of agriculture in the total economy over the course of modern economic development under the Meiji restoration are summarized in table 2.7. The real GDP per capita series shows that the Japanese economy moved from the low-income to the middle-income stage by the beginning of the 20th century, with the share of agriculture in GDP at about 40 percent. This is roughly comparable to the share of agriculture in GDP in Korea and Taiwan, China when they advanced to the middle-income stage. Meanwhile, the growth of labor productivity in agriculture lagged behind that of industry, resulting in a continual decline in the ratio of labor productivity in agriculture to labor productivity in industry (table 2.7, column 6). This decline reflects successful industrial development, as in Korea and Taiwan, China during the era of East Asia's economic miracle. Nevertheless, because the terms of trade did not improve for agriculture throughout the inter-war period (table 2.7, column 7), income per capita in farm households continued to decline relative to that of nonfarm employees' households, parallel to the decline in agriculture/industry real productivity ratio (table 2.7, column 8).

Table 2.6. Changes in Direct Tax Burdens and the Allocations of National Government Subsidies to Agricultural and Nonagricultural Sectors, Japan, 1878–1937

a. Tax burdens

	Direct tax burden[a]				Direct tax rate[b]	
	Agriculture		Nonagriculture		Agriculture	Nonagriculture
	(yen millions)	(% of total)	(yen millions)	(% of total)	(%)	(%)
1878–82	63.6	91	6.3	9	—	—
1888–92	58.5	86	9.8	14	14.9	2.0
1898–02	99.1	74	35.4	26	11.7	2.7
1908–12	153.4	54	132.2	46	11.2	5.5
1918–22	295.7	41	431.1	59	7.5	4.8
1928–32	205.5	33	421.3	67	8.1	3.8
1933–37	197.3	26	559.2	74	6.5	4.0

b. Subsidy allocations

	Subsidy receipt[c]				Subsidy rate[d]	
	Agriculture		Nonagriculture		Agriculture	Nonagriculture
	(yen millions)	(% of total)	(yen millions)	(% of total)	(%)	(%)
1881	0	0	0.7	100	—	—
1891	0	0	2.5	100	0	0.49
1901	0.4	2	18.7	98	0.05	1.41
1911	0.3	1	27.8	99	0.02	1.09
1921	0.6	1	51.8	99	0.02	0.55
1931	21.4	17	101.5	83	1.17	1.11
1934	28.3	28	71.0	72	1.14	0.58

Source: Tobata and Ohkawa (1956) for tax and subsidy data; Ohkawa and Shinohara (1979) for sectoral net domestic product (NDP) data.

Note: — = not available.
a. Includes both national tax and local rates.
b. Direct tax burden divided by sectoral NDP.
c. National government subsidies.
d. Subsidy receipt divided by sectoral NDP.

Growing dissatisfaction among farmers in Japan gave rise to strong political lobbying—organized by the politically powerful landlords—for reduced tax burdens and increased support to agriculture. The result was a significant reduction in the tax burden and a greater allocation of government subsidies to agriculture

Table 2.7. Farm-Nonfarm Income Disparity in Japan's Economic Development, 1885–2000

	GDP per capita (2000 US$, PPP)[a]	Share of agriculture in GDP (%)[b]	Nominal rate of protection for rice (%)[c]	Tariff rate on rice (%)[d]	Average tariff rate, all products (%)[e]	Agriculture/ industry labor productivity ratio (%)[f]	Agriculture/ manufacturing terms of trade (1885=100)[g]	Farm/nonfarm household Income ratio (%)[h]
1885	1,092	45	15	—	—	75	100	76
1890	1,285	48	34	—	—	67	115	87
1900	1,498	39	21	—	3.7	49	102	52
1910	1,656	32	35	14	16.2	37	98	47
1920	2,154	30	16	10	10.7	50	99	48
1930	2,350	18	57	14	22.6	31	104	32
1935	2,693	18	134	41	23.8	24	136	38
1955	3,519	21	49	—	3.5	55	163	77
1960	5,063	13	98	—	6.5	39	169	70
1970	12,337	6	150	—	6.9	25	303	94
1980	17,056	4	205	—	2.5	25	342	116
1990	23,580	2	481	—	2.7	26	379	115
2000	26,220	1	560	778	2.1	22	347	101

Source: See notes below.

a. GDP per capita at PPP for 2000 from World Bank (2006), linked with the series from OECD (2003).

b. The share of agriculture in nominal GDP for 1885–1935 and share in NNP for 1885–1935 are from Ohkawa and Shinohara (1979). Data for 1960–2000 are from World Bank (2006).

c. Nominal rates of protection for rice for 1885–1960 are calculated by the difference between the domestic wholesale price of rice and the unit value of imported rice as percentage of the latter. For 1970–2000, it is calculated by the difference between the domestic wholesale price of rice and unit value of world rice imports multiplied by 1.18, expressed as a percentage of the latter. Data are from Kayo (1977) and Bank of Japan, *Yearbook of Wholesale Price Indexes*, various years for domestic wholesale price of rice, and Nihon Boeki Seiran, Toyo Keizai Shinposha, 1935, *Yearbook of Japan Foreign Trade Statistics*, Japan Tariff Association, and FAOSTAT, FAO for border prices.

d. Tariffs for 1910, 1920, 1930 and 1935 are tariffs in 1908, 1918, 1928 and 1933, respectively, from Ohkawa, Shinohara and Umenura (1967). Tariff rate for 2000 is ad valorem tariff equivalent of specific duty, 341 yen per kilogram, which was reported to the WTO by the government of Japan.

e. Tariffs for 1900, 1910, 1920, 1930, and 1935 are tariffs in 1898, 1908, 1918, 1928, and 1933, respectively, from Ohkawa, Shinohara, and Umenura (1967). Tariffs for 1955–2000 are average tariffs calculated by total tariff revenue as percentage of total import cif value in the Ministry of Finance, *Monthly Report of Financial Statistics*, various issues.

f. The ratio of real GDP per worker in agriculture (including forestry and fishery) to real GDP per worker in industry (including mining). 1885–1970 from Hayami (1986). 1980–2000 values are extended from 1970 using real GDP and the numbers of employed persons from the *Annual Reports of National Accounts.*

g. For 1985–1960, the ratio between the price index of agricultural products and the price index of manufacturing products in Ohkawa, Shinohara, and Umenura (1967). Values for 1970–80 are extended from 1960 using the Ministry of Agriculture, Forestry and Fishery's price index of agricultural products and the Bank of Japan's domestic corporate goods price index for manufacturing industry products.

h. For 1885–1935, the ratio in household income per household member between farm and nonfarm households in Otsuki and Takamatsu (1982). Values for 1955–2000 are the ratio in per capita income between farm households and employees' households based on the Ministry of Agriculture's *Farm Household Economy Survey* and the Ministry of Internal Affairs' *National Survey of Family Income and Expenditure.* Farm households in 1990–2000 exclude noncommercial farm households.

in the first half of the 20th century. Before the beginning of the 20th century, landlords were largely satisfied by the government's support to agricultural research and extension services and land infrastructure improvements such as irrigation and drainage systems, which proved to be highly effective in raising rice yields per hectare and thereby raising land prices and land rents for the benefits of landlords (Hayami and Yamada 1991). However, as rapid industrial development contributed to a continued decline in the comparative advantage in agriculture, landlords' demands began to shift toward border protection on agricultural commodities, especially rice. Their strong lobbying achieved the implementation of a rice tariff at 15 percent ad valorem in the first year of the Russo-Japanese War (1904–05), a tariff that was justified as a way to raise government revenue to finance the war. Despite the initial intention to terminate the tariff at the end of the war, landed interests lobbied extensively to make it permanent in the form of a specific duty. Thereafter, the rice tariff became an issue of a major public controversy in Japan, similar to the controversy caused by the Corn Laws in the United Kingdom a century earlier and German grain tariffs half a century later. The imperial Agricultural Society, representing the landed interests, and the Tokyo Chamber of Commerce, representing the interests of manufacturers and traders of export commodities, lobbied strongly for opposite ends. The battle ended with a victory for the landed interests and the successful imposition of a specific duty on rice at 1 yen per 60 kilograms.

This outcome contrasts with the victory of the bourgeoisie in the United Kingdom and the repeal of the Corn Laws in 1846, and resembles the situation in Germany in which tariff protection was installed on food grains (wheat and rye) in 1879 under Bismarck. But unlike the United Kingdom, which was able to establish itself as the workshop of the world, the comparative advantage of industry was less certain in Germany, so that industrialists found it advantageous to seek protection on their products while approving some protection on agriculture. In addition, the rapid growth of the Social Democratic Party in Germany, a labor party initially based on orthodox Marxist doctrine, was considered a common menace by the Junkers (landed nobility in Prussia and Eastern Germany) and the industrialists in Western Germany. In fact, the simultaneous implementation of grain tariffs and iron and steel tariffs in Germany was the result of a united campaign of landlords in Eastern Germany and Western Germany (Gerschenkron 1943). This experience was repeated in other countries that came late to industrialization, such as France and Italy, in their attempts to match the United Kingdom in industrial strength (Kindleberger 1951). Japan's protectionist policies were similar: after tariff autonomy was recovered in 1911, Japanese industrialists actively lobbied for industrial protection, especially in heavy and chemical industries. They also

campaigned for reductions in tariffs on imports of industrial raw materials such as raw cotton and iron ore (Little, Scitovsky, and Scott 1970; Yamazawa 1984).

As a result, Japan saw the emergence of tariff escalation, with lower rates applied to materials for industrial processing and higher rates applied to its imports of processed final products. Although agricultural production was raised by means of increases in food tariff rates, this was largely paralleled by increases in industrial tariff rates, which can be inferred from the movements in the average tariff rate for all products compared with the movements in just the rice tariff rate (table 2.7, columns 4 and 5). However, tariffs were largely exempt on the imports of raw materials for industrial production, so effective rates of industrial protection were much higher than the nominal rates implied by the tariff rates. In particular, a zero tariff on raw cotton was instrumental in making the cotton spinning industry the top foreign exchange earner in Japan and, at the same time, completely eradicated domestic cotton farming.

Although the rice tariff was raised successively from 14 percent ad valorem in 1910 to 41 percent in 1935, which with quantitative import restrictions increased the nominal rate of protection on rice from 21 percent in 1900 to 134 percent in 1935, improvement in the terms of trade for agriculture was slower than the decline in the agriculture/industry labor productivity ratio. This resulted in the continual decline of farmers' household income per capita relative to that of nonfarmers' throughout the interwar period (table 2.7). Although agricultural protection began to increase significantly during this period, it was evidently insufficient to counteract the loss of agriculture's comparative advantage owing to rapid industrial development. To undertake agricultural protection at a scale sufficient to close the widening income disparity, Japan waited until after World War II, when the Japanese economy advanced to the upper-middle-income and the high-income stages of development, so that nonagricultural sectors could bear the cost of agricultural protection. In the early 20th century, the share of food in household consumption expenditure (the Engel coefficient) was higher than 60 percent. This implies that the elevation of food prices had a large effect on the cost of living and, hence, on the wage rate of workers, which caused serious damage to labor-intensive industries, which were then at the center of the Japanese economy. Indeed, as mentioned earlier, the fear that high food prices would damage industrial development was a major motive in the Japanese government's decision to launch rice development programs in Korea and Taiwan, China following the Rice Riots in 1918. These programs were launched despite opposition from landlords in Japan to policies fostering competition to Japanese rice farming. The importation of Japonica rice free of tariffs from the two colonies became a major factor aggravating agricultural depression in Japan during the 1930s.

The situation changed dramatically after Japan advanced to the upper-middle-income stage of development in the 1960s. Although supports on agricultural product prices were raised rapidly, industrial wage rates were raised even faster, so that the Engel coefficient fell from 52 percent in 1955 to 31 percent in 1980 and further to 17 percent in 1995 (Hayami and Godo 2002). Meanwhile, the center of gravity in Japanese industry moved from labor-intensive manufacturing to capital- and knowledge-intensive activities. In this environment, Japanese industrialists were able to tolerate increases in food prices so as to prevent farm-nonfarm income disparity from widening. Industrialists found it was to their advantage to support farmers and to keep them as allies against organized labor and left-wing activities under the Cold War regime (similar to the attitude of German industrialists toward the grain tariff campaign a century earlier). The major surge of Japan's agricultural protectionism continued until it was counteracted by the serious trade frictions with food-exporting countries, particularly the United States.

What Have We Learned?

This chapter's estimates of the NRAs for selected individual commodities and the RRA between agricultural and industry show that the growth of agricultural protection in Northeast Asia, together with the decline of industrial protection rates, caused the RRA to rise in the three economies over the five postwar decades under investigation. The experience in Japan, Korea, and Taiwan, China can be explained by factors common to rapidly industrializing economies, especially the high cost of industrial adjustment shouldered by farm producers in the process of rapid industrial development. However, the agricultural protection level continued to grow even after 1980 in all the three economies despite apparently decreased need for agricultural support to prevent widening rural-urban income disparity.

All three economies suffered a problem common in the high-income stage of economic development, notably a widening income gap between agricultural and nonagricultural sectors upon reaching middle-income status. If the income gap had been dealt with more appropriately at the middle-income stage, problems caused by agricultural protection in the high-income stage could have been significantly less.

All of this suggests that greater attention needs to be paid to the agricultural problem in the middle-income stage, the so-called "disparity problem." The challenge at that stage of development is to find a compromise between the conflicting need, on one hand, to reduce the farm-nonfarm income gap, and on the other, to supply low-cost food to a large number of workers in urban areas when the government's capacity to raise sufficient revenue from nonagricultural sectors is weak and when food import restrictions effectively tax net buyers of food. The

somewhat contrasting patterns of agricultural and industrial growth between Korea and Taiwan, China led to different solutions to that challenge, which may provide insights for some later-developing economies.

Notes

1. On the dramatic transformation of Korea and Taiwan, China from slow, inward-looking economic growth to rapid, export-led economic growth, see, for example, Mason et al. (1980) and Tsiang (1980).

2. ASEAN countries include Brunei Darussalam, Cambodia, Indonesia, the Lao People's Democratic Republic, Malaysia, Myanmar, the Philippines, Singapore, Thailand, and Vietnam.

3. For the perspective presented here on such a question, see Hayami (2005, section 8.4) and Aoki and Hayami (1998).

4. In terms of real GDP per capita in 2000 constant prices, for example, China exceeded US$1,500 in 1990 and US$5,000 in 2004, whereas Thailand passed the US$1,500 level in 1968 and the US$5,000 level in 1991. Among high-income countries, the United Kingdom and France exceeded US$10,000 per capita in 1960 and 1964, respectively, whereas the United States had surpassed US$10,000 in 1950.

5. For an explanation as to why farm size has remained so small in Japan, see Godo (2007), who argues that farmers have far less interest in selling to neighboring farmers than in keeping their farmland in the hope of making huge capital gains when the opportunity arises for their farmland to be converted to nonagricultural uses such as shopping centers. While in principle there are strict regulations on farmland use, in practice those laws can be manipulated to increase the probability of conversion, by pressuring local authorities and politicians.

6. This section draws heavily on Hayami (1988).

7. This section draws heavily on Moon and Kang (1989).

8. This drove a small wedge between the NRA for producers and the consumer tax equivalent for beef (Anderson 1986), similar to what occurred under the scheme operating in Japan in the 1970s. On why the government chose that scheme rather than a more efficient equally protective tariff plus a consumer subsidy funded by the tariff revenue, see Hayami (1979) and Anderson (1983).

9. This section draws heavily on Mao and Schive (1995).

10. The NRAs for commodities are different from those estimated by OECD. Major differences between the NRA study presented here and the OECD study for PSE are twofold: (1) domestic prices in the present study are wholesale prices, whereas the OECD uses farmgate prices for PSE and prices paid by consumers at the farmgate level for CSE; and (2) border prices in the calculations presented here are based on the study in Anderson and Hayami (1986), whereas the OECD uses a different set of reference prices. The fact that the producer price was often above the wholesale (consumer) price in the case of grains and soybeans in Japan and Korea is captured by setting the NRA equal to the measured CTE times the ratio NRA/CTE in Anderson, Hayami, et al. (1986) and Anderson (1989) for the period to 1985 and times the negative of the ratio PSE/CSE in OECD (2007) for the period from 1986. Most differences in NRA between the measures in the OECD and the present studies come from the differences in border prices. For example, the border price of rice is common for Japan and Korea as the world import unit value adjusted by a quality coefficient. But the OECD's border price of rice in Japan is based on the price of rice imports by Japan, while the price in Korea is China's export price of rice adjusted by transportation costs and, from 2001, average import prices of rice from China, Thailand, and the United States. The methodology in the present study makes the series of NRAs for rice more stable than that of the OECD for recent years. The discrepancy also explains the stability of the NRA for Korean rice presented here compared with the NRA in the OECD study. The border prices are also different for meat products. In the estimation of NRAs for beef, pork, and chicken, the OECD basically uses the meat data of Canada or the United States for border prices, while the study here uses Japan's import price for beef and unit values for pork and chicken (or Hong Kong, China import

prices for the 1950s). Our approach is preferred for estimating NRAs consistently for longer time periods, particularly for the period when Korean imports were absent or negligible. Also, the approach here is preferred for comparing the NRAs of Korea and Taiwan, China for border prices.

11. For more on agricultural policies in the process of economic development, see Hayami (2005) and Hayami and Godo (2004).

12. Actual data used for the level of agricultural protection in the regression analysis are the nominal protection coefficients (NPC = 1+ NRP/100).

13. Indeed, Japan's tariff protection for rice began in 1904; after 1918, it includes its colonies of Korea and Taiwan, China in what became an imperial rice self-sufficiency policy. An earlier set of estimates of the nominal rate of rice protection suggests it grew from 9 percent in 1903–07 to 21 percent in 1908–12, and to 27 percent in 1913–17. It then fell to an average of 13 percent in 1918–27 with the greater inflow of rice from the colonies before rising again to 26 percent in 1928–32, 45 percent in 1933-37, and 84 percent in 1938, according to Anderson, Hayami, and Honma (1986). See table 2.7 for new estimates for an even longer period.

14. The average RRA for 1955–59 is paired with agricultural GDP per worker relative to total GDP per worker in 1955 and so on.

15. The shares of Korean agriculture in GDP and the labor force were 3.8 percent and 7.7 percent, respectively, in 2004, while agriculture represented 1.7 percent of GDP and 7.5 percent of the labor force for the same year in Taiwan, China (table 2.1, rows 2 and 3).

References

Amsden, A. 1989. *Asia's Next Giant: South Korea and Late Industrialization*. New York: Oxford University Press.

Anderson, K. 1983. "The Peculiar Rationality of Beef Import Quotas in Japan." *American Journal of Agricultural Economics* 65 (1): 108–12, February.

———. 1986. "The Peculiar Rationality of Beef Import Quotas in Japan and Korea." In *The Political Economy of Agricultural Protection: East Asia in International Perspective*, ed. K. Anderson and Y. Hayami. Boston, London, and Sydney: Allen and Unwin.

———. 1989. "Korea: A Case of Agricultural Protection." In *Food Price Policies in Asia*, ed. T. Sicular. Ithaca: Cornell University Press.

Anderson, K., Y. Hayami, et al. 1986. *The Political Economy of Agricultural Protection: East Asia in International Perspective*. Boston, London, and Sydney: Allen and Unwin.

Anderson, K., Y. Hayami, and M. Honma. 1986. "The Growth of Agricultural Protection." In *The Political Economy of Agricultural Protection: East Asia in International Perspective*, ed. K. Anderson and Y. Hayami. Boston, London and Sydney: Allen and Unwin.

Anderson, K., M. Kurzweil, W. Martin, D. Sandri, and E. Valenzuela. 2008a. "Methodology for Measuring Distortions to Agricultural Incentives." Agricultural Distortions Working Paper 02, World Bank, Washington, DC (and appendix A of this volume).

———. 2008b. "Measuring Distortions to Agricultural Incentives, Revisited." *World Trade Review* 7 (4): 1–30.

Anderson, K., and W. Martin, eds. 2009. *Distortions to Agricultural Incentives in Asia*. World Bank, Washington, DC.

Anderson, K., and R. Tyers. 1992. "Japanese Rice Policy in the Interwar Period: Some Consequences of Imperial Self Sufficiency." *Japan and the World Economy* 4 (2): 103–27.

Anderson, K., and E. Valenzuela. 2008. *Global Estimates of Distortions to Agricultural Incentives, 1955 to 2007*. Core database at http://www.worldbank.org/agdistortions.

Aoki, M., and Y. Hayami, eds. 1998. *The Institutional Foundation of East Asian Economic Development*. London: Macmillan.

Cole, D. C., and Y. C. Park. 1983. *Financial Development in Korea, 1945–1978*. Cambridge, MA: Harvard University Press.

Frank, C. R., K. S. Kim, and K. Westphal. 1975. *Foreign Trade Regimes and Economic Development: South Korea*. New York: Columbia University Press.

Gerschenkron, A. 1943. *Bread and Democracy in Germany*. Berkeley: University of California Press.

———. 1962. *Economic Backwardness in Historical Perspective*. Cambridge, MA: Harvard University Press.

Godo, Y. 2007. "The Puzzle of Small Farming in Japan." Pacific Economic Papers 365, Australia-Japan Research Centre, Australian National University, Canberra. http://www.crawford.anu.edu.au/pdf/pep/pep-365.pdf

Hayami, Y. 1979. "Trade Benefits to All: A Design of the Beef Import Liberalization in Japan." *American Journal of Agricultural Economics* 62 (2): 342–47.

———. 1986. *Nogyo Keizairon* [Agricultural Economics]. Tokyo: Iwanami.

———. 1988. *Japanese Agriculture under Siege: The Political Economy of Agricultural Policies*. London: Macmillan.

———. 2005. "Emerging Agricultural Problem in High-Performing Economies in Asia." Presidential Address at the 5th Conference of the Asian Society of Agricultural Economists, Zahedan, Iran, August 29–31.

Hayami, Y., and Y. Godo. 2002. *Nogyo Keizairon* [Agricultural Economics] Tokyo: Iwanami.

———. 2004. "The Three Agricultural Problems in the Disequilibrium of World Agriculture," *Journal of Agriculture and Development* 1: 3–16.

———. 2005. *Development Economics: From the Poverty to the Wealth of Nations*. London: Oxford University Press.

Hayami, Y., and S. Yamada, eds. 1991. *The Agricultural Development of Japan: A Century's Perspective*. Tokyo: University of Tokyo Press.

Heston, A., R. Summers, and B. Aten. 2006. "Penn World Table Version 6.2." Center for International Comparisons of Production, Income and Prices, University of Pennsylvania

Ho, S. P. S. 1979. "Decentralized Industrialization and Rural Development in South Korea and Taiwan." *Economic Development and Cultural Change* 28: 77–96.

———. 1982. "Economic Development and Rural Industry in South Korea and Taiwan." *World Development* 10: 973–90.

Honma, M., and Y. Hayami. 1986. "Determinants of Agricultural Protection Levels: An Econometric Approach." In *The Political Economy of Agricultural Protection: East Asia in International Perspective*, ed. K. Anderson and Y. Hayami et al. Boston, London, and Sydney: Allen and Unwin.

———. 2008. "Distortions to Agricultural Incentives in Japan, Korea and Taiwan, China." Agricultural Distortions Working Paper 35, World Bank, Washington, DC.

Kawano, S. 1969. "Effects of the Land Reform on Consumption and Investment of Farmers." In *Agriculture and Economic Growth: Japan's Experience*, ed. K. Ohkawa, B. F. Johnston, and H. Kaneda, 374–97. Tokyo: University of Tokyo Press.

Kayo, N., ed. 1977. *Basic Statistics for Japanese Agriculture*. Tokyo: Norin Tokei Kyokai.

Kindleberger, C. P. 1951. "Group Behavior and International Trade." *Journal of Political Economy* 59: 30–46.

Krueger, A. O., M. Schiff, and A. Valdés, eds. 1991. *Political Economy of Agricultural Pricing Policies*. Baltimore: Johns Hopkins University Press.

Kuo, S. W. Y. 1975. "Effects of Land Reform, Agricultural Pricing Policy, and Economic Growth on Multiple Crop Diversification in Taiwan." *Philippine Economic Journal* 14 (1 and 2).

Little, I. M. D., T. Scitovsky, and M. Scott. 1970. *Industry and Trade in Some Developing Countries*. London: Oxford University Press.

Mao, Y.-K., ,and C. Schive. 1995. "Agricultural and Industrial Development in Taiwan." In *Agriculture on the Road to Industrialization,* ed. J. Mellor. Baltimore: Johns Hopkins University Press.

Mason, E. S., M. J. Kim, D. H. Perkins, K. S. Kim, and D. C. Cole. 1980. *The Economic and Social Modernization of the Republic of Korea*. Cambridge, MA: Harvard University Press.

Moon, P. Y., and B. S. Kang. 1989. "Trade, Exchange Rate, and Agricultural Pricing Policies in the Republic of Korea." World Bank Comparative Studies on the Political Economy of Agricultural Pricing Policy, World Bank, Washington, DC.

OECD (Organisation for Economic Co-operation and Development). 2003. *The World Economy: Historical Statistics*. Paris: OECD Development Centre.

———. 2008. *Producer and Consumer Support Estimates, OECD Database 1986–2007*. http://www.oecd.org

Ohkawa, K., and M. Shinohara. 1979. *Patterns of Japanese Economic Development: A Quantitative Appraisal*. New Haven: Yale University Press.

Ohkawa, K., M. Shinohara, and M. Umenura, eds. 1967. *Long-Term Economic Statistics in Japan since 1868*. Tokyo: Toyo Keizai Shimposha.

Otsuki, T., and N. Takamatsu. 1982. *On the Measurement of Income Inequality in Prewar Japan*. Tokyo: International Development Center of Japan.

Schultz, T. W., ed. 1978. *Distortions of Agricultural Incentives*. Bloomington: Indiana University Press.

Scott, M. 1979. "Foreign Trade." In *Economic Growth and Structural Change in Taiwan: The Postwar Experience of the Republic of China*, ed. J. Galenson. Ithaca: Cornell University Press.

Tobata, S., and K. Ohkawa, eds. 1956. *Nihon no Keizai to Nogyo* [Economy and Agriculture in Japan]. Tokyo: Iwanami.

Tsiang, S. C. 1980. "Foreign Trade and Investment as Boosters for Take-Off: The Experience of Taiwan, China." In *Export-Oriented Development Strategies,* ed. V. Corbo, A. O. Krueger, and F. Ossa. Boulder, CO: Westview Press.

World Bank. 1993. *The East Asian Miracle: Economic Growth and Public Policy*. London: Oxford University Press.

———. 2006. *World Development Indicators 2006*. Washington, DC: World Bank.

Yamazawa, I. 1984. *Nihin no Keizai Hatten to Kokusai Bungyo* [Economic Development and International Division of Labor in Japan]. Tokyo: Iwanami.

3

WESTERN EUROPE

*Tim Josling**

European agricultural policy, in particular the Common Agricultural Policy (CAP) of the European Union (EU), has long been a matter of international interest. Overseas producers view agricultural policy in Europe as a major impediment to the opening up of international trade in farm products. Internally, the policy has been no less controversial, with several member states seeking to reform the CAP and others regarding it as a foundation for economic integration. The overall perception, both within and outside the European Union (EU), is of a highly protective policy that shelters a high-cost agricultural sector from the winds of competition blowing from the Americas, Australia, New Zealand, and North Africa. Supporters of the CAP claim social and political benefits from such protection, arguing that reduction of border protection and cutting of domestic support would lead to the depopulation of rural Europe and the destruction of social stability. Detractors see a policy that encourages overproduction, with surpluses dumped on world markets and misallocation of scarce resources away from more profitable uses—in short, they view the CAP as a poster child for agricultural distortion.

Some facts are undisputed. Western Europe has transformed from a place of devastated infrastructure and productive capacity in the aftermath of World War II to the home of some of the world's most sophisticated economies. Economic integration, the development of a single market within the EU, and a common approach toward external trade are widely agreed to have contributed

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to that success.[1] Simultaneously, the agricultural sector has gone through a dramatic transformation, from isolated national markets and traditional production methods to an integrated EU-wide market and technologically advanced farms. Transforming agriculture in this way within two generations is a remarkable feat. The transformation, though, has had positive and negative impacts. On one hand, it has encouraged investment in agriculture and sheltered producers from foreign competition. On the other hand, it has encouraged the production of high-cost commodities that have shrinking markets.

This chapter focuses on agricultural policy developments in Western Europe and their consequent distortions to the economies within the region. It attempts to answer four related questions.

- Has the level of protection, and the consequent distortion in resource use and consumer purchases, been increasing or decreasing over the five decades from 1955–2007?
- How has the formation and subsequent enlargement of the EU influenced patterns and trends in agricultural protection?
- What have been the main drivers of agricultural policy and to what extent have external influences impacted those forces?
- What can one say about the future trends and protection levels in Western Europe?

The chapter differs in some respects from the others in this book in several ways. First, Western Europe, besides encompassing a large number of countries, also contains different agricultural capacities, climatic conditions, economic structures, and political views. The differences among these countries are often as important as the similarities, and therefore generalizations are difficult to make. Inevitably, much of the focus is on the EU as an aggregate unit, rather than on each individual member country, though this misses some of the richness of the diversity of conditions. But from the viewpoint of the rest of the world, it is instructive to assess the aggregate impact of policies implemented in the EU and more broadly in Western Europe.

Second, the process of economic integration in Western Europe has been more intense and comprehensive than in any other region, developed or developing. Though agriculture has been incorporated into the process of integration more fully than in most other regions, there are still differences in this regard within European countries. This means that the process of integration plays a much greater role in Western Europe than in other regions in explaining the pattern and trends in distortions. And as membership of the European Community (later the EU) grew, countries that previously had autonomous policies adopted the CAP.

The number of agricultural policies in Western Europe has thus declined over the 50-year period considered by this study.

Third, the external aspects of agricultural policy have played a more significant role in developing domestic policy in Western Europe than in most other regions. This is in spite of the fact that the CAP has often appeared resistant to pressures from abroad. The narrative of the past 50 years of agricultural policy in Western Europe is closely linked to the development of trade rules for agricultural products in the General Agreement on Tariffs and Trade (GATT) and the subsequent obligations undertaken as a result of the Uruguay Round and the resulting transformation of the GATT into the World Trade Organization (WTO). Other trade agreements, notably the obligations to former colonies through successive Lomé Agreements, have played a significant role in driving some commodity policies within the CAP. In the EU, the separation between domestic and foreign policy in the area of agriculture has always been blurred. Western European countries that are not members of the EU have been influenced by many of the same influences.

Agriculture in Western Europe, 1955–2007: An Overview

Agriculture in Western Europe enjoys a degree of diversity that reflects a wide variety of soils and climatic conditions, the latter of which range from arid Mediterranean regions to the Arctic Circle. Superimposed on this natural diversity is the complexity of different social, economic, and political conditions in the 18 countries that are the subject of this chapter.[2] History has played a major part in creating this patchwork, particularly the different paths that countries took from feudalism to independent farming units and the inheritance laws that influenced the extent to which land ownership was transmitted from generation to generation. Average farm size varies considerably in the countries of Western Europe, in turn reflecting the relative political and social importance of landowners and small farmers. By the late 19th century, these various factors had determined the structure of farming in the Western European region that is still visible today.

The total utilized farm area in the 15 members of the EU in 2004 (EU-15) was 129 million hectares, distributed over 6.3 million holdings with an average size of 20.2 hectares.[3] The sector employed 6.2 million persons, representing 3.8 percent of civilian employment in the EU (Eurostat 2006, table 2.0.1.2). Including the three countries not in the EU in 2004 (Iceland, Norway, and Switzerland), agriculture represented 4.9 percent of the labor force, down from 30.0 percent in 1950. The value of output from these farms was €300 billion and gross value added was €155 billion (at distorted prices), or 1.6 percent of total gross domestic product (GDP) for those countries.[4]

Total Western European agricultural output has increased over the past 50 years by about 2.2 percent each year, a slower rate than for other sectors of the economy.[5] As a result, the share of agriculture in GDP declined from 13.6 percent in 1955 to 2.9 percent in 2004. Only in Greece and Iceland is the share of agricultural output in GDP above 5 percent. Spain, Portugal, and Finland have agricultural sectors that contribute between 3 and 4 percent of GDP, while in Germany and the United Kingdom the share is now less than 1 percent. Participation in agricultural activities is highest in Greece and Portugal, with shares in excess of 12 percent of the active labor force. In Finland, Ireland, and Spain more than 5 percent of the labor force works in agriculture. By contrast, only about 1 percent of the United Kingdom's labor force participates in agricultural pursuits.

In the immediate postwar period, 1949 to 1959, productivity growth in Western Europe's agricultural sector compared favorably with that in the manufacturing, with output per worker in agriculture increasing by more than that in manufacturing in most countries. Productivity growth came from a combination of output increases as a result of mechanization and modernization, and the outflow of labor as other sectors absorbed rural workers.

Though the productivity increase slowed somewhat in subsequent decades, it remained a key component in the development of the agricultural sector and the sector's role in postwar reconstruction. The strong farm productivity increase and accompanying farm labor force decrease is striking, and the decline in the share of agricultural workers in the labor force continues to the present day. The number of full-time equivalent "annual work units" employed in agriculture in the EU-15, as calculated by Eurostat, fell from 8.6 million to 5.9 million beteween 1991 and 2004 (Eurostat 2006). Structural change has also been rapid in European agriculture. The rate of consolidation of farms has risen over the past five decades, but the average size of farms still varies widely among countries, with the United Kingdom and Denmark having the largest farms, at 57 and 55 hectares per farm, respectively, and Italy and Greece having the smallest farms, at 7 and 5 hectares, respectively (Eurostat 2006).

The countries of Western Europe also differ dramatically in terms of importance of agriculture to international trade. In 2004, agricultural exports accounted for more than 10 percent of total merchandise exports in three countries: Denmark (18.7 percent), Greece (19.9 percent), and Ireland (11.6 percent). By contrast, they accounted for only 2.5 percent of German exports, 3.0 percent of Swedish exports, 2.8 percent of Finnish exports, and 4 percent of exports from the United Kingdom. Agricultural products, meanwhile, accounted for 6.1 percent of all imports to and 6.0 percent of all exports from the EU-15 as a whole. The EU-15 region ran a net deficit of 3.4 billion with respect to the rest of the world in foodstuffs and other agricultural products in 2004.

In Western Europe, as elsewhere, agriculture has had to compete with nonfarm sectors for labor and capital. Growth rates of the manufacturing and service sectors therefore have been major influences on the economic health of the farming sector. In general, agriculture has provided an outflow of labor—both directly, as farmers and farmworkers become part of the industrial workforce (either by migration or by devoting more of their time each year to nonagricultural employment), and indirectly, by offering less attractive employment to young people in rural areas. Though the outflow has been in progress for decades, the postwar period has been remarkable in the magnitude of the exodus. Obtaining capital within the agricultural sector, on the other hand, has been less problematic, as farmers typically have been able to raise funds in the financial markets, particularly through dedicated rural lenders and retained earnings. Though rates of return have not been high, nonpecuniary satisfaction and a lingering feeling on society's part that domestic agricultural activity enhances food security have encouraged rural investment. Sustained capital flows into the agricultural sector have resulted in significant transformation and modernization throughout Western Europe in the six decades since World War II. While the continent still has pockets of traditional farming, particularly in the south, in general, it now has a high level of technical expertise and moderate-sized farms. The transition has allowed Europe to become more internationally competitive in the second half of the postwar period compared to the first half.

One major link between the agricultural and nonfarm sectors is through currencies. Strong export performance by the industrial sector tends to appreciate the exchange rate and reduce the domestic cost of commodities, the prices of which are set in international markets. Thus, agriculture in countries with strong currencies tends to be under pressure from reduced price levels as a result of export success in the nonfarm sector. For countries with weak currencies, exchange rate developments tend to raise the price levels of imports and exports, so the agricultural sector faces less competition from abroad—although governments may take action to lower domestic food prices. Foreign exchange market developments have had major impacts on the competitiveness of the agricultural sector in some countries, and have played a significant role in policy making in the EU.

Agricultural Policy Prior to the Mid-1950s

Current Western European agricultural policy reflects economic and social conditions of rural areas and political realities of the day, but many of the underlying factors are deeply rooted in experience and history. While some of this experience is shared among the countries of Western Europe, much of it is specific to the ways in which the countries concerned reacted to historical trends and events.

Many of these events were a product of the broad economic and political developments in the 19th century, during which the pattern of land ownership was established and transportation and education systems extended into rural areas. But policy also influenced the reaction to these developments and led to significant disparities among neighboring countries.

In addition to the social and political conditions that governed past agricultural policy in Western Europe, two other factors have been pervasive: the colonial experience of the countries concerned, and the reaction of those countries to the Industrial Revolution.[6] The United Kingdom, with an extensive empire from which it could import both tropical and temperate agricultural products, was in a good position to benefit from trade. As the leader in both the technological revolution in agriculture and the industrialization of manufacturing processes, a policy of low-priced food played to the strengths of the economy. By contrast, Germany (and the numerous small states that preceded the creation of the unified Germany) had few overseas territories and lagged the United Kingdom in manufacturing technology. As a result, German agriculture remained a protected sector. Political ideas reinforced these differences. In the United Kingdom, the free trade movement won widespread following by promising better living conditions for the urban workforce. Though landowners resisted, they lost ground over time to manufacturing interests. German intellectuals, however, pushed an infant industry strategy, which large landowners found to be in line with their own interests. By the end of the 19th century, significant differences between the United Kingdom and Germany had emerged in the prevailing economic paradigm and the agricultural policies that supported it.

All of European agriculture was impacted by the growth of trade in temperate agricultural products from the New World in the 1870s, made possible by the opening up of new territory and falling rail and ocean transport costs. The introduction of refrigeration was important in that it began to make the transport of livestock products and grains from the Americas, Asia, and Australia profitable. In the case of the United Kingdom, the high tariffs that had been embodied in the Corn Laws had already been repealed in 1846. As a result, the political climate was such that manufacturing interests prevailed over agrarian pressures, and agriculture shrank in the face of overseas competition. Much of the cereals and meat came from colonies, and could be paid for in pounds, so import substitution was not a priority. In addition, the structure of farming in the United Kingdom was generally more able than in other countries to withstand the low prices.[7] As a result, pressure for protection was less than in many other European countries.

Other countries followed the lead of the United Kingdom and reluctantly accepted the benefits of cheap grain from the New World. Denmark stands out as the country that embraced the new relative price structure most completely, and

the Netherlands reacted in a similar way. Livestock farming received a boost from the lower feed costs, in particular the rearing of cereal-fed livestock such as pigs and chickens. In addition, Denmark inherited an efficient farm structure from the early 19th century, and developed a cooperative system that fit well into the livestock economy that flourished on the cheap grain of the 1890s.[8] French agricultural markets, which were also relatively open to trade in the middle of the 19th century, increased protectionism sharply with the tariff of 1881, which imposed high duties on livestock imports (Tracy 1989). The level of protection peaked with the Meline tariff of 1892 and remained high until World War I. However, industrial tariffs were also increased over that time, masking the distortive impact of agricultural protection.

German farming benefited significantly from higher protection in the last quarter of the 19th century. As livestock from the United States and grain from Russia threatened to depress domestic prices, tariffs were introduced in 1879, initially at a moderate level, though they increased over the next decade. Chancellor Otto von Bismarck was adamant that farm imports be controlled, and he presided over a bitter trade dispute with the United States over the sanitary conditions under which U.S. pork was produced for export to Germany (Snyder 1945). Upon Bismarck's ouster in 1890, Germany briefly returned to more open agricultural trade, albeit in the face of opposition by Prussian landowners (Tracy 1989). For the next 20 years, liberal and protectionist economic paradigms clashed, while disparate views on the desirability of industrialization kept the issue of agricultural polices at the political forefront. Such 19th-century differences between the "adjusters" and the "protectors" remained through the first half of the 20th century. The prime factors that played a role in the development of agriculture during that period include the economic impact of World War I and the Great Depression.

After World War I, the United Kingdom attempted to expand production by granting farmers subsidies to supplement their market earnings. These deficiency payments, introduced in 1917, were accompanied by a liberal import regime for farm products (except sugar). An attempt to introduce price guarantees in 1920 was repealed the following year. Though protection emerged in the 1930s as a result of depressed world prices, the effect was mitigated by imperial preferences that allowed agricultural products in from the Dominions (Australia, Canada, New Zealand, and South Africa) and the colonies. Domestic marketing became the focus of farm policy, and was institutionalized through the introduction of marketing boards in 1931, several of which remained in place until the 1970s.

French agriculture was badly damaged during World War I, with both infrastructure and productive capacity destroyed. Agriculture did not get much assistance from trade protection in the 1920s, as protection in the nonfarm sector was

higher than that in agriculture. However, the reaction to the Great Depression was to introduce quotas on agricultural imports and intervene in the domestic market. State marketing was established through institutions such as the Office National Interprofessionel du Blé, founded in 1936.

Germany, meanwhile, instituted the Ministry of Agriculture in the wake of the war, and the Weimar Republic attempted to take over responsibility for agricultural policy from the states. Rapid industrialization, however, reduced the significance of the farming sector, and low prices during the Depression took a heavy toll on farm incomes (Roesener 2000).[9] The Third Reich attempted to capitalize on the decline of agriculture by promising state protection and higher social standing for the rural population, introducing policies designed to promote self-sufficiency and increase the control of the state over marketing and trade of agricultural products. Production, however, did not reach planned targets, and at the outbreak of World War II in 1939, the level of farm output was no higher than in 1935. Labor shortages and the need to keep urban prices down undermined attempts by the National Socialist German Workers' Party to return Germany to its rural past.

Denmark, which remained neutral in World War I, expanded its agricultural sales to both the United Kingdom and to Germany in the postwar period (Tracy 1989), despite the increase in German tariffs in 1925. The Depression, however, hit Danish livestock production by 1931. Efforts to improve trade relations with the United Kingdom (to offset the preferences granted to competitors such as New Zealand) and with Germany were partly successful, and Denmark eventually had to compromise on its traditional liberal trade policy and introduce tariffs on grain. Later in the decade it began subsidizing producers of livestock products and restricting production by means of marketing quotas. Eventually, in 1938, grain imports were discouraged by compulsory mixing requirements for millers. Along with that of the Netherlands, Denmark's agricultural experiment of trading at world prices appeared to be at an end.

The influence of all these political and economic trends in Western European agriculture in the early 20th century was disrupted by World War II. To an extent probably not experienced in any other region, World War II had a significant impact on the agricultural sector. Not only did the war itself cause havoc to infrastructure and destroy productive land, but the sector was drawn in to the war effort to provide food and industrial raw materials.

The United Kingdom, with its vulnerability to blockades of imports, began to mobilize the civilian population to grow more food. In the postwar period, production rebounded rapidly to its pre-Depression levels, assisted by the introduction of guaranteed prices in the 1947 Agriculture Act. The need for additional domestic production was premised in part on the chronic shortage of foreign exchange in the early postwar period, as exports failed to finance the imports

needed for reconstruction and to service the debt that had been accumulated during the war. The fact that the pound was a global currency led policy makers to reject any efforts toward devaluation. Successive governments thus pursued a policy of high domestic prices as a way of discouraging agricultural imports.

Occupied France, under the Vichy Regime, attempted to restore the country's agricultural "destiny."[10] However, devasted infrastructure delayed the restoration of the sector in the immediate postwar period. France began a period of national planning, which included goals for the agricultural sector. The first agricultural plan (1948–52) called for an expansion of exports, while the second plan (1954–57) established a fund for market intervention. As economic integration became a reality, the opening up of markets in Europe to French farm products became an important goal. The salvation of rural France was to be in exporting products to the industrial heartland of Europe, assisted by some protection against overseas suppliers.

Though Germany's agricultural sector maintained production levels through most of World War II, food shortages emerged in 1944. By the end of the war, nutritional deprivation was an acute problem and hunger relief became an international issue. Wartime controls over trade were maintained and the new government in West Germany (established in 1949) encouraged domestic production by price incentives linked to production costs, with little regard to competitiveness. By the time Germany faced the prospect of opening its agricultural market to French and Dutch farm products, the predominance of inefficient small-scale German farms was a highly contentious political issue.

Policy Distortions 1955–2004: A Chronology

The current map of agricultural protection was drawn in the early postwar period, as the countries of Western Europe struggled to rebuild their economies and restore commercial and political relationships. The defining moment in the development of agricultural policy was undoubtedly the formation of the European Economic Community (EEC) in 1957. Indeed, no analysis of the distortions caused by agricultural policy in Western Europe can avoid a detailed examination of the development of the CAP and the enlargement of the EEC from the original six countries (Belgium, France, West Germany, Italy, Luxembourg, and the Netherlands) to the 15 that were members of the EU in 2004.[11] The stages in the enlargement of the EEC/EU provide the backdrop to any timeline of the description and tabulation of the changing pattern of direct and indirect distortions to farm incentives. Not only did each enlargement cause an examination of the EEC/EU policy toward agriculture, but it changed the reach of that policy by including more farms under its umbrella. Thus, the nature and magnitude of the

incentives faced by domestic producers and consumers of primary agricultural and processed food products in Western Europe were affected as much by the adoption of the CAP as through more traditional agricultural policy processes.

The other side of this coin is that the number of countries in Western Europe that remain outside the EU has steadily declined.[12] Three of these countries—Norway, Iceland, and Switzerland—still have autonomous agricultural policy despite being members of the European Free Trade Association (EFTA) since 1960. Though these EFTA members represent a declining share of total agriculture in Western Europe, their policy decisions are of particular interest. While it would be too simplistic to say that they represent the "control group" in the experiment of designing and implementing a common policy for agriculture, they certainly offer important lessons.

In this section, agricultural policy distortions are discussed in the context of each of the five decades from 1955 to 2004. The discussion relates this timeline to the evolution of the EU as it expanded membership and of the CAP as the dominant vehicle of support for Western European agriculture. Emphasis is placed on the levels of support and key policy prices in the prospective member countries relative to that of the EU as a whole. As each new group of countries gained access to the EU, so the geographical reach of the CAP changed. In turn, the CAP became the focus of much of the external pressure that faced the EU as it grew in significance in world trade. But the macroeconomic conditions, including inflation, exchange-rate fluctuations, and nonfarm growth in Western Europe, were a vital backdrop to the agricultural policy decisions and need to be considered in parallel with the more specifically agricultural aspects of the development of the CAP.[13]

1955–64: Agriculture in a period of rapid economic growth

The period of postwar reconstruction was followed by a rapid expansion of economic activity during the 1950s and into the 1960s. This was the period of the German and Italian "miracles," as both these economies grew at rates far above those of the United Kingdom and France. In turn, this growth provided the demand for consumer goods that allowed neighboring countries to expand their own economies. Trade within the newly created EEC expanded rapidly as trade barriers in manufactured goods were removed over the period 1957–64.

The formation of the EEC in 1957 set the scene for the integration of Western European agricultural markets.[14] For this to happen, agricultural trade had to be included in the move toward the free flow of goods among the original six countries.[15] Though this was eventually incorporated, such an agreement on free internal trade was possible only by erecting a protective border around the EEC to

shelter agriculture from foreign competition. The development of a CAP was therefore the result of a compromise between those who wanted agriculture to be a full part of the free internal market and those who preferred a more interventionist system. A common market organization (CMO) was developed for each of the main commodities. Administered prices were related to a "target" price level for each commodity. Imports were allowed in at "threshold" price, calculated on the basis of the target price and transport costs. A "variable levy" was charged on the basis of the gap between offer prices on the world prices and the threshold price. Excess production could be taken off the market by national agencies at "intervention" prices—again, fixed relative to the target price.[16] Prices were set each year by the Council of Ministers upon the recommendation of the European Commission.

The period 1955–64 was one of policy initiatives for agricultural integration as well as the restoration of trade flows across Europe. National farm prices differed considerably across the six countries of the EEC and also between the six countries and neighboring countries that had chosen not to join in the integration experiment. The path toward more integrated internal markets for agricultural goods proved rocky. Different farm structures, commodity balances, and historical protection levels created a minefield for those advocating a free internal agricultural market and common prices. Eventually, in 1962, common rules for agricultural markets were agreed upon. A transition period was instituted until 1967, when all prices were supposed to have been harmonized.

A look at selected Western European countries illustrates the wide differences in circumstances over this period, and illustrates the difficulties of achieving a common policy. West Germany, upon its creation in 1949, found itself with a structure of small farms because the most productive and largest farms were now in East Germany. Meanwhile, German industry was being encouraged to expand into other markets in the region and overseas, and its success added to the strains on agriculture. Tight controls over imports of cereals and the use of marketing boards to regulate the domestic market kept agricultural prices high, while production was encouraged from every small farm. The choice of a common price for wheat (and other grains) in 1961 was a major political issue in Germany: soft wheat prices were about US$110 per ton at that time, a level matched only by Italy among the six EEC members.[17] In the end, the German government resisted calls for the common price to be set at a lower level, thus setting the stage for the development of surplus production in the EEC within the decade.

Though France had farms larger than Germany's in the Paris Basin, it was hampered by the remnants of feudal strip farming in Normandy and Brittany and low productivity in the Massif Central and the Midi. Cereal farming in particular had recovered from the wartime disruption and by the 1960s had surpluses to

send to the deficit areas of Europe, including Germany. Soft wheat prices in France averaged only US$81 per ton at the start of the CAP transition period, and thus had to rise sharply to reach the agreed price levels in the young CAP.

The Netherlands, along with Denmark, had an efficient farming structure based on milk, poultry, and eggs. While the Netherlands was already trading agricultural products with Germany, it sought increased market access. The fact that Denmark stayed out of the EEC, preferring to maintain its connection to the British market, gave Dutch farmers a welcome degree of preference. The Netherlands and Belgium, where the soft wheat price level in the early 1960s was between the high in Germany and the low in France, experienced some significant increases in the cost of animal feed in the movement to common prices.

Italy shared with Germany some significant structural problems, with small farms dominating the southern part of the country and relatively high-cost cereal production in the center and the northern part. However, expansion of the livestock sector in the north, based on imported grains, linked Italy's agricultural interests with those of the Netherlands. In fact, in the move to standardize prices, Italy was allowed to maintain imports of feedstuffs at a lower tariff than countries in Northern Europe.

The Western European agricultural market was in effect split by the decision to push for a CAP for the six members of the EEC. The United Kingdom chose to stay outside the EEC, concerned about the element of "supranationality" introduced in the Treaty of Rome, and the CAP was negotiated without the input of the major Western European food import market. In any case, the EEC was not entirely in agreement over the prospect of the United Kingdom joining.[18] The United Kingdom had its own troubles, with macroeconomic imbalances proving difficult to control. The balance of payments was chronically in deficit, and remained a problem until the devaluation of 1967. The 1957 Agriculture Act, which introduced deficiency payments as a way of maintaining high producer prices while keeping consumer prices close to world market levels, was an important aspect of U.K. foreign policy, because much of the imported food came from former colonies. Import patterns were so significant from a policy perspective that they contributed to the United Kingdom's decision not to join the EEC. However, in an attempt to show leadership among other countries that chose not to participate in the EEC, the United Kingdom sponsored the EFTA in 1960. Seven countries signed up to this "integration-lite" experiment, which differed from the EEC both in terms of its lack of a common tariff and supranational institutions and because it excluded agricultural (and fisheries) trade from its provisions.

Facing the prospect of having to phase out preferential access from Dominions and former colonies, as well as the recurrent balance of payments problems and the fear of food-price-led inflation, led to significant debate on the costs of

agricultural protection. Sparked by a paper by Nash (1955), there were several attempts to calculate the value of British farm output at world prices and compare the result with actual farm values. Several years later, Nash and Attwood (1961) repeated the same calculation using Danish prices, where distortions were noticeably less, to value British production. McCrone (1962) elaborated these studies into a comparison of 13 countries in 1955–56. Howarth (1971) followed the same method and added an estimate for 1966. According to Howarth's estimates, agricultural protection levels increased markedly from 1956 to 1966, at a time when trade in nonagricultural goods was being liberalized.[19]

More evidence of the increase in protection was found in a study by Anderson and Hayami (1986). The level of protection (as measured by the nominal protection coefficient) was calculated for eight Western European countries for the period 1955–1980. Switzerland stood out as having the highest level of protection, albeit a level that did not increase over the first decade of the period, 1955 to 1965. By contrast, estimated protection did increase in Italy, Sweden, Germany, and the Netherlands over this decade. In France and the United Kingdom, protection actually decreased in the decade up to 1965.

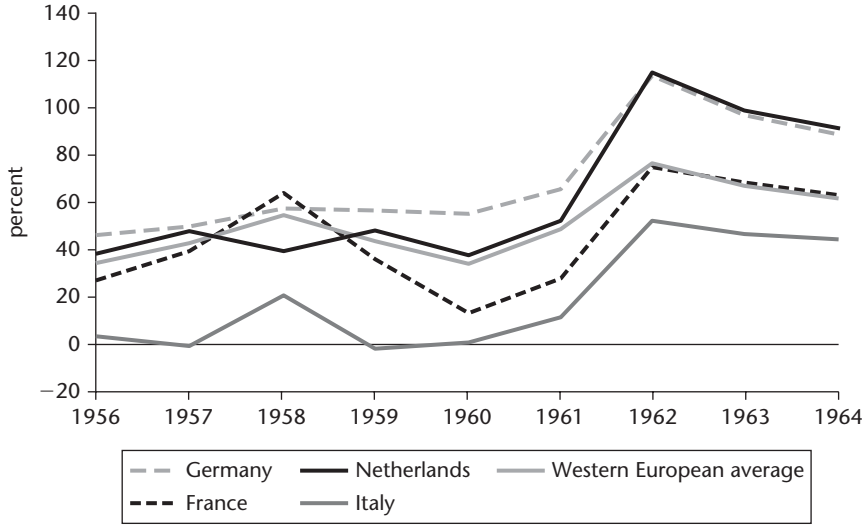
The estimates made for the present study broadly confirm the conclusions of the Howarth and the Anderson and Hayami studies.[20] Figure 3.1a shows the nominal rate of assistance (NRA), the percentage by which a product's domestic price exceeds the price at a country's border), including non-product-specific (NPS) support and aggregated over all commodities, for four of the original six members of the EEC.[21] At the time when the Treaty of Rome was being discussed, assistance levels were modest (by later standards) and not too widely dispersed.[22] The CAP was "launched" in 1962, with prices that reflected political compromise rather than economic foresight, and by the time the common price regime was in place European agriculture was operating on a price plateau for the major products that was well above world market levels.

The corresponding calculations of the NRA for the EFTA countries (those that chose the path of less institutional integration and no free trade in agriculture) are shown in figure 3.1b. Austria, Denmark, and the United Kingdom had NRA levels in the same range as in the EEC. Portugal was in effect taxing its agricultural sector by holding prices below their full market value—a stance that reflected both its own political structure and its level of development.[23] Sweden increased its assistance to agriculture over the decade, and gave incentives to its agricultural sector to an even greater extent than the countries that formed the EEC. But the countries with the highest level of support by far were Norway and Switzerland, where domestic prices were around twice as high as in other EFTA countries.[24]

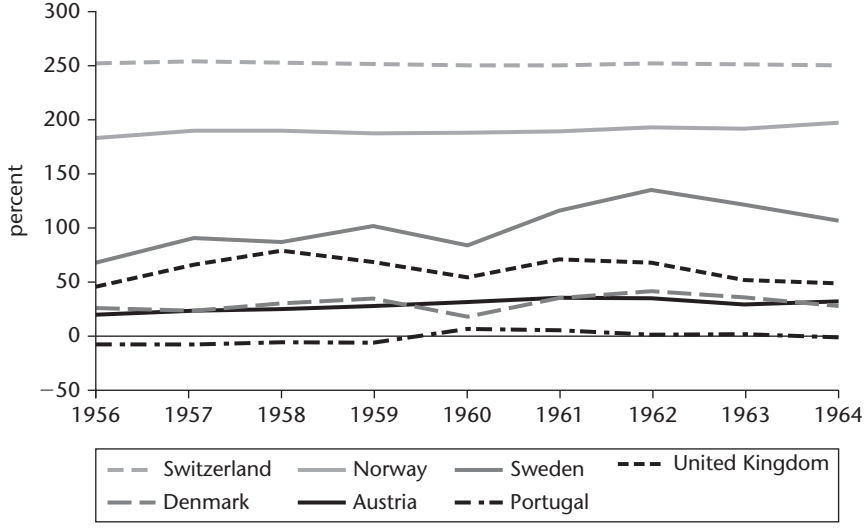
The pattern for these countries is what one would expect from their experience in the prewar period. The United Kingdom, the Netherlands, and Denmark had

Figure 3.1. NRAs to Agriculture, EU-6 and Western European Average, 1956–64

a. EU-6 members



b. Other European countries



Source: Anderson and Valenzuela (2008), based on authors' spreadsheet, which draws heavily on OECD (2008).

lower levels of protection, reflecting their history of imports of grains, and France emerged in the decade leading up to World War II as an exporting country with lower production costs and less opportunities for protection at the border. Indeed, one of the main attractions of the EU for France was the opportunity it presented to sell French products abroad without having to bear the costs of subsidies. Switzerland, Norway, Sweden, and Germany have higher levels of protection, as one might expect from predominantly importing countries attempting to generate acceptable incomes for farmers. The countries that made up the EEC increased their protection on average over the decade from 1956–64, explaining in large part the chorus of complaints from overseas suppliers about the protectionist nature of the emerging CAP.[25]

If the United Kingdom stayed out of the EEC in part because the grouping was more protectionist in terms of agriculture than itself, the same could not be said of all the other EFTA members.[26] Protection levels in Norway and Sweden, both of which joined the EFTA in 1965, were high, as they were in Finland (Gulbrandsen and Lindbeck 1973). In fact, the prospect of joining the EEC was seen as a threat to agriculture in these countries, as they would have had to reduce prices and face competition from the grains produced by France and the livestock produced by the Netherlands. Only Denmark looked favorably on the prospect of expanding its sales to the EEC countries, but in the end it chose to remain aligned with the United Kingdom, its traditional market for farm products.

Another country that was among the "charter members" of the EFTA, reflecting its historic trade ties with the United Kingdom, was Portugal. The country had been under a dictatorship since 1928, when the military suspended democratic processes, and the economy was being run on a corporatist model with strong central control. Though Portugal's African colonies provided an income and Brazil remained a source of capital and a link with Latin America, Portugal was outside the mainstream of Western Europe and remained a relative backwater until its return to democracy in 1974 (Avillez, Finan, and Josling 1988; Corkhill 1995).

Spain, also shunned by many European governments in the postwar years, was additionally hampered by a rigid corporatist economic policy. Innovation and social mobility were discouraged and central and southern landed interests dominated political life well into the 1960s. The Franco regime controlled wages, prices, and trade, and large state corporations were prefered over smaller urban enterprises. Spain was excluded from the Marshall Plan in 1948, and it was not until 1958 that agricultural output regained the level of 1929, just prior to the Great Depression and before the Spanish Civil War. Farm structure, however, was better in Spain than in many parts of Western Europe, and by the 1970s investment in fruit and vegetable production had begun to increase output. The transition to democracy in starting in 1974 offered hope that accession to the EU was possible,

though economic growth stalled for much of the period from the death of Franco to accession to the EU (Lieberman 1995). For both Spain and Portugal, the oil price shocks of 1973 and 1975 had a major detrimental effect on their economies.

Between the mid-1950s and 1964, Iceland was predominantly an agricultural and fisheries economy, with meager amouts of arable land and extensive imports of cereals. Dairy and sheep production was able to fulfill domestic and export needs of wool and meat. Though an agricultural development plan for 1951–60 tried to increase farm size (to ensure that every farm had at least ten hectares), it did not succeed (OECD 1967). A law passed in 1960 instituted fixed wholesale and retail prices for major food items and offered export subsidies to dispose of surpluses. Consumer subsidies were also used in this period. Under a revised agricultural plan of 1963–66, however, public investment in agriculture decreased as the burden of supporting high-cost production became apparent.

In the 1950s, Greece was still a largely agricultural country, where cotton and tobacco represented a major portion of exports. Most temperate-zone foods were imported, and domestic production was hampered by low productivity and a fragmented farm structure that was in part the result of prewar land reform. Association with the EEC in 1961 promised to expand exports, and the government began to increase incentives for producers and institute minimum prices for domestic output (OECD 1967). But this program was carried out in the context of an economic strategy that supported manufacturing sector as the engine of growth (Pepelasis et al. 1980).

1965–74: Agriculture in a period of macroeconomic instability

Price levels set under the CAP were at the high end of the range of existing prices in EEC members states, while strong upward convergence was evident over the period from 1962 to 1967. Price differences within the EEC reflected the gradient of prices from surplus to deficit areas, though this was modified by setting intervention prices in the surplus areas that did not always reflect transport costs. Achievement of a single support price in 1967, set in units of account with a value equal to the U.S. dollar, was a major political success, but the uniformity of the CAP was short-lived. Currency instability undermined the realization of an open internal market for agricultural products and a common price support scheme.

The devaluation of the British pound sterling in 1967 heralded a period of financial instability in Europe. The revaluation of the Deutsche mark in 1968 and the devaluation of the French franc the same year caused havoc in the operation of the CAP, leading to the introduction of artificial "green" exchange rates for the conversion of prices decided in Brussels by the Council of Ministers into local

currencies (Josling 1970; Josling and Harris 1976). The currency changes in 1968 also exposed the problems of administering regional price differentials. Earlier in the year, grain from France was flooded into the German market as a form of arbitrage (the relative intervention prices were different from the relative values of the Deutsche mark and the French franc on money markets), causing serious storage problems. When the currency changes took place, compensation for what would have been price declines in Germany was granted by ad hoc tax relief for German farmers, and a system of border taxes and subsidies was introduced to offset the exchange rate changes. This process was extended to other EEC members by converting common prices through "green rates" that lagged the developments in the market rates. The border tax/subsidy regime, known as monetary compensatory amounts (MCAs), was imposed on both internal and international trade. The effect was to undermine the central concept of free trade within the EEC, to challenge the notion of common price levels, and in essence give some control over price policy back to the member states (Heidhues et al. 1978).

The level of protection in the United Kingdom remained low over the second half of the 1960s relative to major European countries (FAO 1973). Nevertheless, the protectionism debate heated up over the desirability of expansion of U.K. agriculture to help offset the balance of payments shortfall. Though the 1967 devaluation helped to correct a misalignment of the exchange rate, inflation reduced the competitive advantage of British exports. Agriculture was caught up in a wave of "buy British" sentiment in the late 1960s, and price supports were increased in the Annual Price Reviews. The debate on "import saving" exposed the economic costs of agricultural protection and led to a reevaluation of the role of the relatively small agricultural sector in the U.K. economy. The government moved to stabilize the costs of the "deficiency payment" program employed since 1947 by negotiating minimum import prices for cereals with exporting countries. Later, the policy of allowing relatively free import access was replaced by a system of variable levies, to generate some revenue from imports. But it was the prospect of entry into the EEC that dominated the agricultural policy debate in the United Kingdom in the late 1960s.

The first enlargement of the EEC took place in 1973, with the accession of Denmark, Ireland, and the United Kingdom. The CAP, however, was a major problem in the negotiations. On one hand, the United Kingdom was under pressure to accept the CAP as part of the "acquis communautaire," the accumulated regulations and directives of the existing EEC, and the enlargement process was supposed to focus merely on changing the language of regulations so as to reflect the new membership. Any change in the policy itself was to be deferred until the new countries joined. On the other hand, at the political level, the United Kingdom was determined to protect the preferential access of its former Dominions and colonies,

though this was unacceptable to the European suppliers for whom the prospect of free access to the United Kingdom, a large importer, was attractive. In the end, the compromise was to negotiate some assurances for traditional suppliers (New Zealand for specific quantities of meat and dairy goods, for example) and to incorporate the former colonies into the arrangements that had already been set up for those of Belgium, France, and the Netherlands.

EEC negotiations with Ireland and Denmark were of a different nature. For those two countries, traditional exporters of livestock products to the United Kingdom, the opportunity to diversify to the European market was a welcome prospect. The higher farm support prices in the EEC were not a major hurdle, and tilted the balance of economic advantage in favor of accession. Norway also participated in the negotiations, and an agreement was reached among the governments. But when the question of Norwegian accession was put to a popular vote, the concerns of Norwegian farmers and fishermen prevailed. The vote went against membership, and the government withdrew from the tentative accession agreement.

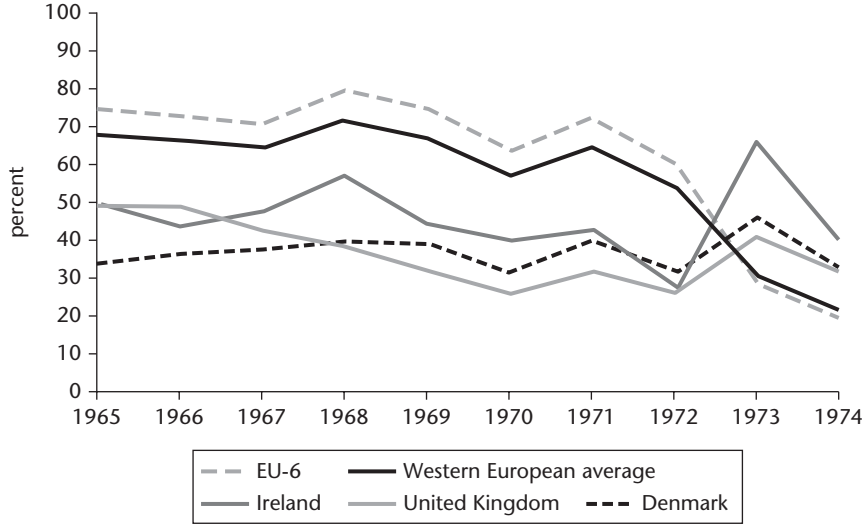
Internal debates about accession to the EU often have been focused on the impact of price changes, particularly for farmers and consumers, as EU prices for most farm products had been considerably higher during the 1960s than in the applicant countries (except Norway). But the aspiring members had agricultural support systems that were more in touch with the conditions on world markets. So the high world prices in 1973–75 for many commodities masked the full impact of the price increases expected from accession. As a result, the additional distortions due to the CAP were relatively small over the first two years of the EU-9.

The countries that remained in the EFTA made hurried bilateral arrangements to preserve at least some of their access to the United Kingdom and Denmark. However, these agreements did not cover agricultural products, which had been excluded from EFTA trade liberalization. In the case of Portugal, some concessions were agreed: in 1972, a trade agreement was signed between the EEC and Portugal to allow for continued access of Portuguese exports into the bloc. But the domestic farm policies of Sweden, Switzerland, and Norway, along with Finland and Austria, continued to be determined largely on a national basis.

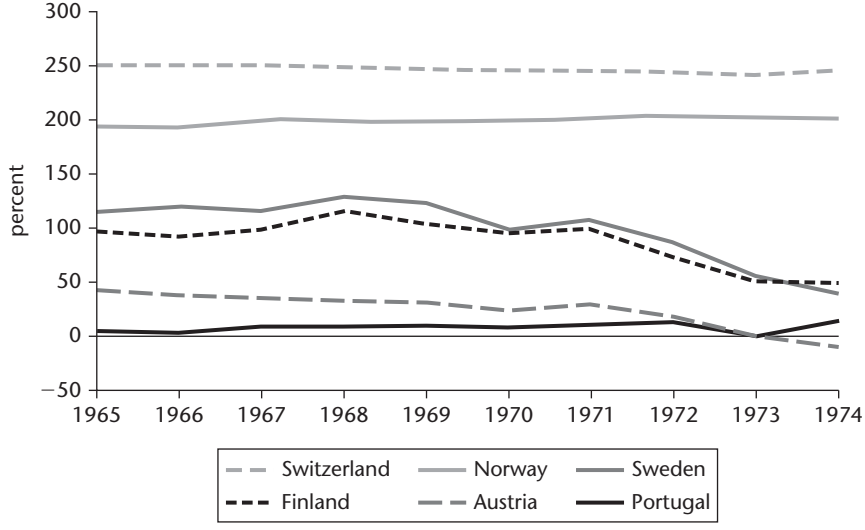
These developments in rates of assistance are shown in figure 3.2. The NRA for the EU-6 (and the Western Europe average, heavily weighted by the EU countries) hovered at a little less than 80 percent over the decade 1965–74, plunging at the end of that period as world prices rose in 1973–74.[27] The entry of the three new members did not cause this drop, even though it brought some new constraints to the development of the CAP. Meanwhile, the EFTA countries that chose to stay outside continued with their own policy trajectories (figure 3.2b). Switzerland and Norway kept domestic prices at more than twice the level of those on world

Figure 3.2. NRAs to Agriculture, EU-9 and Western European Average, 1965–74

a. EU-9 members



b. Other Western European countries



Source: Anderson and Valenzuela (2008), based on authors' spreadsheet, which draws heavily on OECD (2008).

markets, while Portugal continued to tax its farmers whatever the price levels on world markets. Rates of assistance to farmers in Sweden, Finland, and Austria were reduced somewhat in the early 1970s as the high world prices substituted for some of the protection given by policy interventions.

1975–84: Agriculture out of control

The macroeconomic instability that followed the first global oil shock, in October 1973, had a significant impact on the level of policy prices set under the CAP. Farm input costs rose sharply and the real value of price supports declined. Politicians responded by increasing prices sharply to keep up with costs. In addition, the fear of worldwide food shortages made price restraint less attractive as a political argument. When commodity prices declined, the EU was left seriously uncompetitive in many temperate-zone agricultural products.

The United Kingdom, which became a member of the EEC in 1973, was expected to assert a moderating influence on agricultural policy. Indeed, much of the opposition to the U.K. accession from countries such as France stemmed from the feeling that it would attempt to force its tradition of low market prices and high payments from the exchequer onto CAP policy. But these fears proved unfounded. The United Kingdom found a convenient way of keeping its own prices down through the medium of the "green money" system mentioned above, and turned its attention to limiting the budget cost of membership through a budget "rebate."

The impact on agricultural distortions of the first enlargement of the EEC was therefore somewhat mixed. Protection levels went up in the United Kingdom and in Denmark and Ireland. But as a result of the transition arrangements, the United Kingdom was able for a time to avoid the impact of high EU prices. The accession period negiotiated for the United Kingdom (seven years) called for import subsidies paid by the EEC on farm products entering the United Kingdom. Coupled with the subsidies to offset the depreciation of the pound in the mid-1970s, the price of food rose by less that had been feared at the time of the entry debate. Denmark and Ireland made good use of their expanded opportunities for livestock exports, selling to Europe and the United Kingdom.

The green money system continued to add to the level of internal distortion in the late 1970s. In February 1979, a common price of 100 ECU[28] by the Council of Ministers was equal to 110.8 ECU in Germany and 71.8 ECU in the United Kingdom. Thus, support prices were maintained in Germany at a level of 54 percent higher than that in the United Kingdom. Only Denmark eschewed the political convenience of masking exchange rates by the use of fictional green rates. The ECU system remained in place for another decade, undergoing modification as

part of the single market of 1992, and was finally eliminated by the launch of the euro in 1999.

Countries that remained outside the EFTA had the liberty of being able to run their agricultural policy without the need to comply with the CAP. EFTA had no direct impact on agriculture over this period. Switzerland maintained high prices in the late 1970s, with a support price for wheat of US$398 per metric ton, compared to US$200 in Germany and US$190 in the United Kingdom (Hallett 1981, based on numbers from the International Wheat Council). Any form of opening up of trade in grains between the EEC and Switzerland, therefore, would have been difficult to implement.

Norway, which chose not to join the EEC in 1973, was able to pursue an autonomous policy based on the perceived need to retain population in the northern areas of the country. Protection levels were almost as high as in Switzerland, though Sweden resisted the temptation to farm the cold northern regions as a matter of national security. The experience of Finland fell somewhere in between that of its Scandinavian neighbors. Though it had an extensive area of high cost agriculture in the northern parts of the country, rural interests were not able to maintain such high levels of protection against imports as were granted in Norway.

The EEC did welcome one new member over this period. Greece, long an associate member, was welcomed into full membership in 1981, following reestablishment of political freedoms. In agricultural terms, Greece posed no problems with respect to the temperate-zone products, as it was likely to increase its imports of them from the EEC as its own protection was withdrawn. But exports of Greek fruits and olives posed a problem for the region, and southern members argued (successfully) for extensive transition periods before opening up to Greek competition. This set the scene for similar arrangements when Spain and Portugal followed Greece into the EEC five years later.

In other regards, the experience of Spain and Portugal was different, as neither had negotiated associate membership status in the 1960s. Both countries had moved from dictatorships to democracy in the mid-1970s, but their agricultural policy was still focused on domestic concerns, including structural issues. Land reform, for example, was a serious concern in Portugal, following the 1974 revolution. The breakup of the large farms caused a significant drop in output of grains, a situation made worse by successive droughts. Prices, which were increased in an attempt to generate adequate income for the new class of small farmers created by land reform efforts, rose above those in Spain and the EEC. Dairy production was encouraged in the north and in the Azores. Though tomato processing became a significant export industry in the 1960s, other Mediterranean products were less advanced (Avillez, Finan, and Josling 1991).

By the mid-1980s, Portugal was not in a position to compete in Europe, and ended up needing a significant transition period to develop the institutional capacity to administer the CAP.

In Spain, the period before accession also was one of economic stress and relative stagnation. Cereal and livestock production lagged behind that of the rest of the continent, and marketing systems required modernization. Imports of feed grains and oilseeds, mostly from the United States, faced little in the way of trade barriers. Prices for other commodities—wheat, for example—did not differ greatly from those in the rest of Europe. But the fruit and vegetable sector in Spain, with support from the state, was undergoing a structural change—specifically, it had accelerated and wine and olive production. As a result, the prospect of substantial exports of these products loomed over the accession negotiations. The issue of the entry of Spanish farm products into the EEC took on particular political significance in Italy, France, and several countries in North Africa.

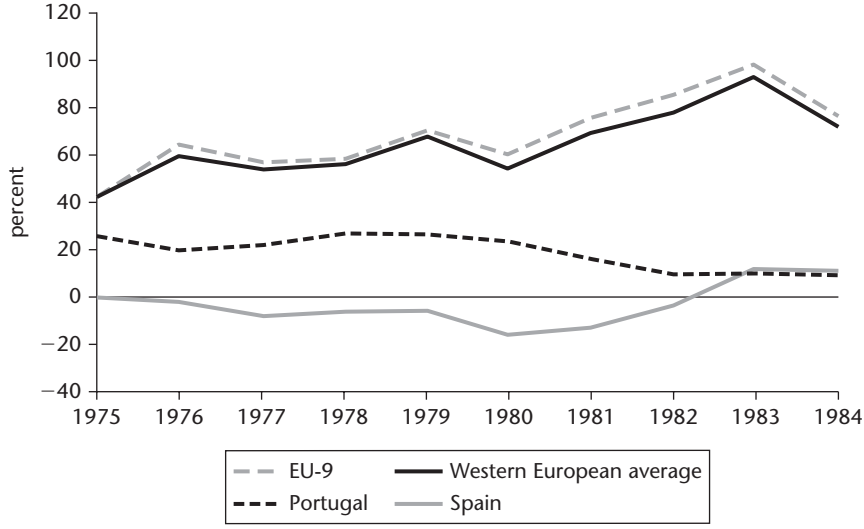
Changes in the level of agricultural assistance in Western Europe over the period 1975–84 reflect these developments (figure 3.3). In the EU-9 as a whole, NRA levels increased steadily over the decade as a result of cost-based price decisions made under in an environment of rising inflation and lack of effective budget constraints. From a level of about 40 percent in 1975, the NRA increased to more than 80 percent in 1983. Overall support levels were very low for the applicant countries of Southern Europe, leading to political tensions over the adoption of the CAP by these countries. A transition period was needed both to cushion domestic consumers and to grant the producers in the EU-9 time to gear up for competition from Spain and Portugal. Of the EFTA countries, Switzerland, Norway, and Iceland continued to provide a high level of support to farmers, while Sweden, Finland, and Austria assisted their farmers at similar rates to those in the EEC.

1985–94: Agriculture as an international concern

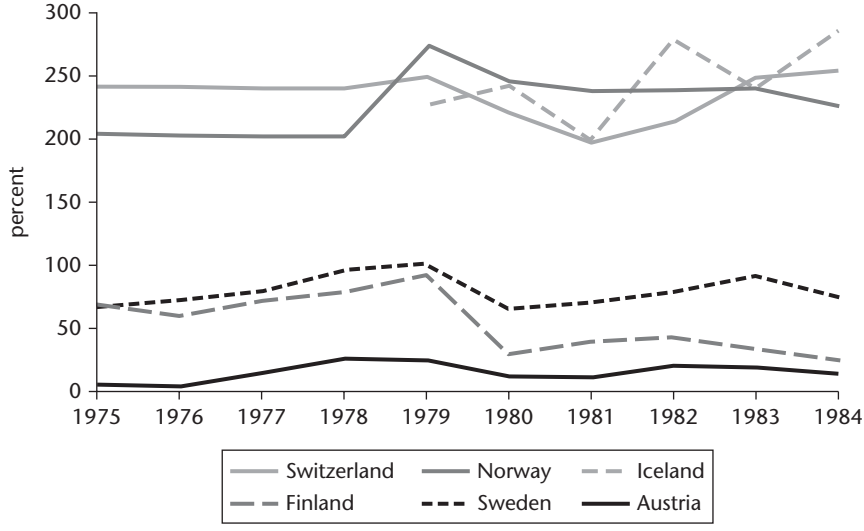
By the mid-1980s, the issue of domestic agricultural policy in Western Europe had become a central topic of concern in the multilateral trade system, for two reasons. First, high levels of border protection were retained to give a broad umbrella of protection against overseas competition under which the market orders could continue. Second, surpluses of cereals, meat, dairy products, and sugar, all of which other Organisation for Economic Co-operation and Development (OECD) countries produced for export, were growing. As a result, the CAP came under criticism abroad as a major cause of low world prices and at home for high support costs and (at least in the United Kingdom) for high consumer prices (Tyers and Anderson 1992).

Figure 3.3. NRAs to Agriculture, EU-12 and Western European Average, 1975–84

a. EU-12 members



b. Other Western European countries



Source: Anderson and Valenzuela (2008), based on authors' spreadsheet, which draws heavily on OECD (2008).

In 1984, the GATT began to discuss and the OECD to measure the extent of the distortions generated by domestic agricultural policy and by border instruments. The consensus was that for several markets, the impact of domestic policies spilled over to the world market in a way that caused a reaction by other countries, either to subsidize exports or to increase protection against imports. A common solution seemed to be the answer. If all domestic policies could be brought under control, and if the nature of border measures could be disciplined, then the situation would be ameliorated. But the CAP was singled out as the policy that needed to change the most, and so the policy was firmly on the international agenda. Attempts to argue that U.S. support per farmer was significantly greater than in the EEC (as a result of larger farm size) garnered little sympathy. So long as the focus was on the impact on world markets, rather than the impact on domestic incomes, the CAP was subject to skepticism. Hence, the attitude of the European Union (EU)[29] during the Uruguay Round was largely defensive. Eventually, in 1992, the MacSharry reforms forced the CAP to adjust from within and allowed the EU to agree to the negotiated strictures of the Uruguay Round Agreement on Agriculture (URAA) on export subsidies and domestic support payments.

The 1992 CAP reforms marked a change in instrumentalities as well as price levels. In compensation for a price drop, farmers received a direct payment based on historical hectareage for cereals and oilseeds and a regional yield. The lower price for cereal-based animal feed led to an increase in the use of barley, wheat and corn, and helped to reduce cereal stocks. In addition, headage payments were introduced for beef and sheep, and the incentive to produce was reduced, as marginal output increases were effectively sold at lower prices.[30] The milk and sugar regimes, however, were not included in 1992 reforms.

The adoption of the CAP reforms by the Southern countries (Portugal and Spain joined the EEC in 1986) posed few problems for the major crop and livestock product producers, and did not raise the level of distortion overall. The main impact in those two countries was on the Mediterranean products—particularly olive oil, wine, citrus, and tobacco. For those products, the stimulus increased pressure on markets and hence calls for policy review.

Several changes with respect to the position of the EFTA countries occurred between 1985 and 1994. They had been offered, and negotiated, an industrial free trade area (the European Economic Area, or EEA) with the EU. The EEA allowed free trade in manufactured goods and cooperation in regulatory issues: in effect, it extended previous bilateral agreements to include several aspects of trade that had been incorporated in the 1992 European single market. Though some quotas on agricultural goods were expanded, there was no progress toward the incorporation of the rural sector in economic integration. The EFTA countries, which still did not have a say in EU decisions, were thus unable to influence regulations that

would apply to them. Meanwhile, the politically neutral stance that previously prevented several EFTA countries from having close ties with the EEC became less important with the end of the Cold War. So, before the ink was dry on the EEA, Sweden made the decision to apply for full EU membership, and three other EFTA countries followed suit.

Though the path toward EU accession was attractive to many countries of Western Europe, some ultimately did not make the journey. Norway, once again, chose to stay out. Switzerland also found that membership was problematic; even membership in the EEA was rejected in a referendum, particularly by the rural German-speaking Swiss cantons. In Austria and Finland, rural and agricultural concerns made negotiations complex, but both countries joined. A subsidy system, paid for in part by the new entrants themselves, was implemented to allow marginal farms in disadvantaged areas in both countries to continue to operate.

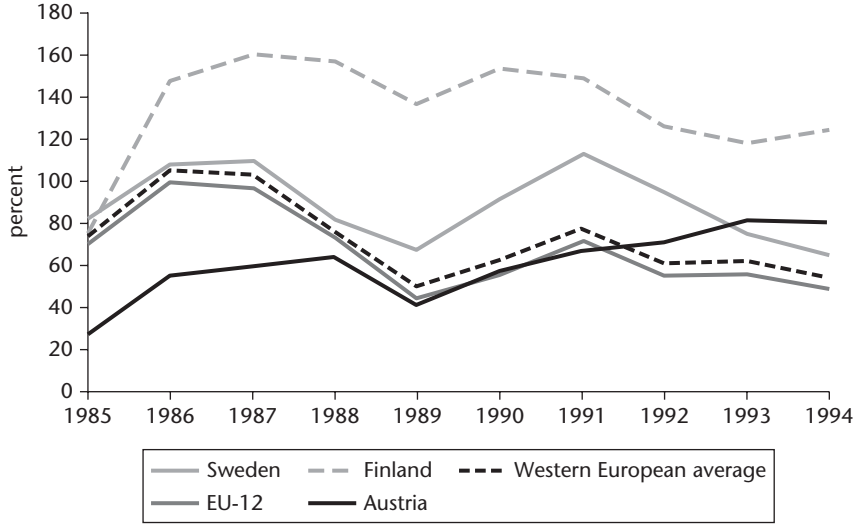
Sweden faced a different dilemma: that it would have to reverse an agricultural policy reform that was generally in the direction that the EU wished to go. Until the late 1980s, Sweden maintained a policy much like that of other Nordic countries. Suffering from overproduction, Sweden tried voluntary milk quotas and cereal set-asides, but to no avail. In June 1990, the parliament passed a bill that dramatically altered Swedish farm and food policy, abolishing agricultural support and export refunds. In return, the government issued direct annual payments and an early retirement scheme to farmers. When export subsidies were reinstated upon Sweden's joining the EU, prices rose somewhat.

One impact of joining the EU can be gauged by comparing cereal prices in the acceding countries and the EU. Finland, in particular, had to weigh the burden of reduced prices on the farm sector against the potential benefits of better manufacturing-sector access to the rest of Europe. Nevertheless, the accession of Austria, Finland, and Sweden proceeded, a process smoothed by the fact that these countries were able to pay for schemes that temporarily sheltered their farmers. These countries have not used their membership to press for higher agricultural prices at the EU level.

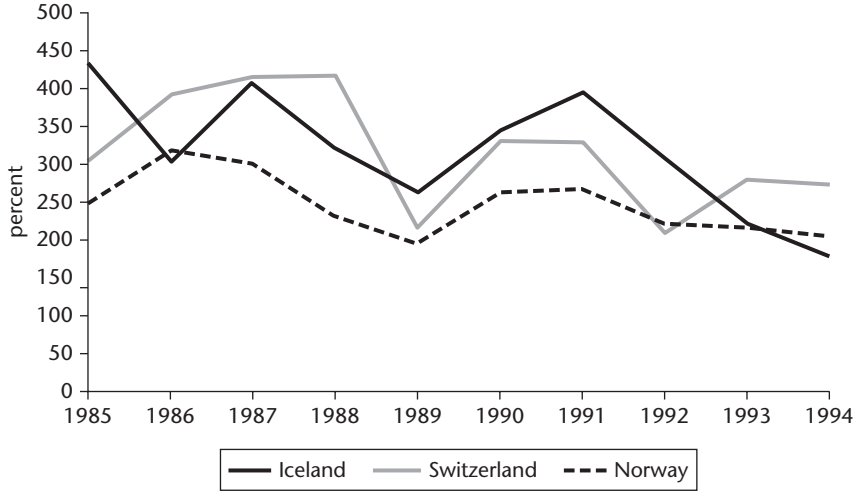
The pattern of protectionism is illustrated in the calculated NRA for the EU and EFTA. Figure 3.4 shows the level of NRA for the EU-12 peaking at close to 100 percent in 1986, when world prices were at historical lows, and generally declining thereafter. By 1994, the NRA for the EU was down to 40 percent. Among the three countries that acceded in the 1985–94 period, Finland had the highest rate of assistance, and thus had the most adjustments to make upon accession. In the case of Austria, protection levels increased in the five years leading up to membership, causing concern that the agricultural sector would be adversely effected after joining the EU. But the new EU members were not among the strongest supporters of agriculture in the EFTA countries, and so the tensions were manageable

Figure 3.4. NRAs to Agriculture, EU-15 and Western European Average, 1985–94

a. EU-15 members



b. Other Western European countries



Source: Anderson and Valenzuela (2008), based on authors' spreadsheet, which draws heavily on OECD (2008).

by means of transitional arrangements. As a result, there was very little impact on the EU from the enlargement from 12 to 15 members, in terms of either reducing or increasing the level of agricultural protection.[31]

The EFTA members that chose not to join the EU, meanwhile, maintained their high protection levels for agriculture. NRAs in Switzerland fell somewhat in 1989 but rebounded by 1990. Though there was a slight downward trend in Iceland and Norway over 1985–94, the rate of assistance remained well above the average for Western Europe.[32] In any case, the bipolar nature of support in the region, as between nonmembers and members of the EU, was by that time firmly established.

1995–2007: Agriculture restrained

The coming into force of the URAA in 1995 brought significant changes in the instrumentalities of the CAP. First, the agreement obliged the EU to convert its variable levy to a fixed tariff. Thus the threshold price from which the variable levy was calculated ceased to be the central determinant of protection levels. However, as a result of the careful choice of reference prices to calculate the tariff equivalent (known as "dirty tariffication") and the convenience of using an unweighted average for tariff reductions, the impact on the price levels of sensitive goods such as sugar, beef, and dairy products was not great. For cereals, the creation of a special category of domestic support that was associated with output controls (the blue box) and hence deemed to be less distorting to trade meant that the new MacSharry payments were not required to be reduced. Moreover, a remnant of the "variable levy" was retained (at the insistence of the United States), because the tariff-inclusive import price was not allowed to rise above 150 percent of the intervention price.

The time horizon of the URAA tariff and support reductions, 1995 through 2000, partially overlapped with that of the application of the MacSharry CAP reforms, which ran 1994–96. Though it became clear that though the 1992 CAP reform may have allowed the EU to agree to the URAA, the reform process would need to be continued if the WTO constraints were to be respected over the decade. Even more significant was the prospect of eastward expansion, where 10 countries already had an explicit promise of membership. While these countries were not large agricultural exporters, they did have significant farming populations. Farmers in the EU were focused on additional competition in certain commodities, but the European Commission was concerned about the potential burden of paying subsidies to farmers in the prospective entrant countries. In either case, it was clear that the enlargement would have significant effects on the viability of the CAP.

In 1995, Franz Fischler took over as commisioneer for agriculture for the EU. He articulated a vision of a competitive, market-oriented (and simultaneously environmentally sustainable and socially acceptable) agricultural sector. The path chosen under his leadership was to continue down the path of the MacSharry reforms by reducing support prices and substituting direct payments tied by "cross-compliance" obligations to environmental goals. The Commission's proposals for agricultural reform, included in the Agenda 2000 document, also dealt with budget and regional policy challenges facing the EU (Moyer and Josling 2002). The primary focus of Agenda 2000, though, was the enlargement of the EU to include the Central and Eastern European countries. Ten of these countries had already negotiated "Europe" agreements that would lead to bilateral free trade (including most of agriculture) over 10 years. As pressure mounted to fulfill the political pledge to allow for the reuniting of East and West Europe, concern about the impact on both agricultural markets in the EU and the financial cost of extending the CAP to the new members was also rising. Agenda 2000 was the Commission's suggestion for how the budget and agricultural challenges could be met.

The agricultural reform component of Agenda 2000 was presented to the Council of (Agriculture) Ministers in 1997 and eventually endorsed with much of the Commission's ideas intact in 1999. Though the Agriculture Ministers' plan was modified by the European Council (a regular meeting of heads of state or government), the agreement that emerged was a major step in the evolution of the CAP.[33]

One important concession was won by those who favored even more reform of the CAP: there would be a midterm review of the effectiveness of the Agenda 2000 reforms in 2003 (the halfway point of the 2000–06 fiscal horizon). Fischler was able to convert what could have been a routine review of progress into a further step along the path set by the MacSharry and Agenda 2000 reforms by shepherding through the Council of Ministers a proposal for consolidating the direct payments associated with the compensation for price decreases in particular crops into the Single Farm Payment Scheme, a system that decreased links between farmers' production decisions and market prices on one hand and direct payments on the other (Swinnen 2008b). The 2003 reform package also began to tackle the difficult issue of reform of the dairy sector.

Following on the heels of the 2003 reform, the European Commission proposed changes in the regimes for the Mediterranean crops—specifically, cotton, tobacco, rice, and hops. The thrust of reforms surrounding these products was to blend them with the Single Farm Payment Scheme while reducing distortions in the market. New proposals for fruits and vegetables were adopted in 2004, with subsidies for processing being converted into producer payments and those for

the withdrawal of fresh produce from the market being chaneled through producer organizations. Wine and sugar reform proposals were introduced in 2005 and the sugar reform was agreed in 2006. This new regime aimed to eliminate the production quota system, paying compensation to the adversely impacted segments of the wine market—producers, crushers and refiners, and overseas producers that rely on sales to the EU market—and cutting support prices. The wine reforms were adopted in 2008 with the aim of cutting capacity to meet shifting demand.

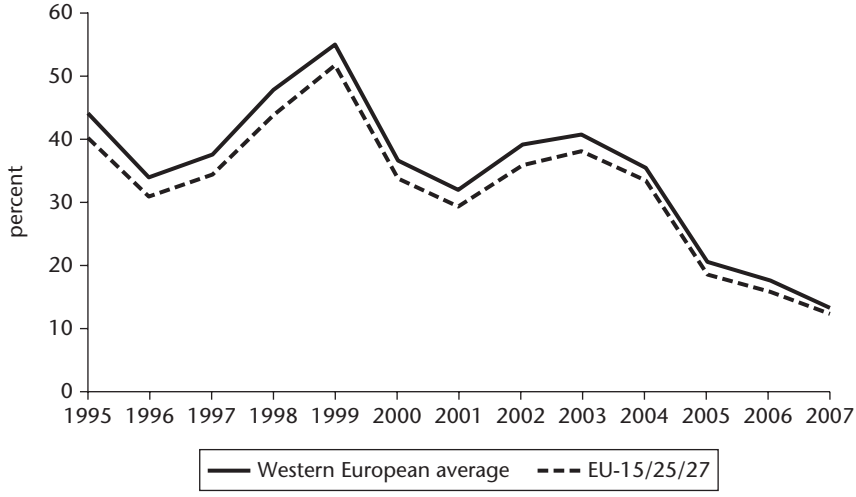
The aggregated impact of these various policy changes is shown in figure 3.5. The EU-15 exhibited an NRA of around 40 percent following its absorbtion of three new members (and the introduction of the disciplines of the URAA) in 1995. By 2004, this had declined to approximately 30 percent. The reforms, combined with higher world prices, lowered the distortion to about 13 percent by 2007. The same trend is seen in the calculation of NRAs for the EFTA countries that have retained their agricultural policy autonomy. For example, Norway and Switzerland have reduced distortions, as measured by the NRA, to about half the levels seen in the late 1990s. Iceland seems to be the EFTA country where the tendency toward more moderate levels of assistance has been resisted most.

Detailed Estimates of Nominal Assistance, 1955–2007

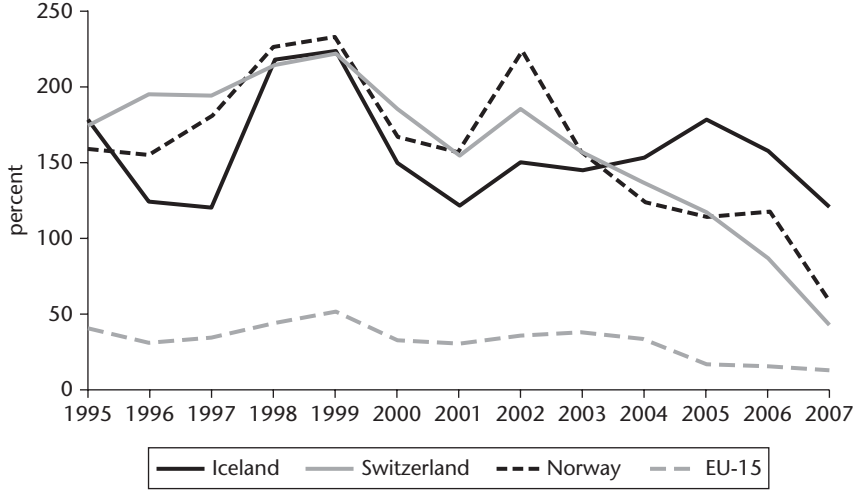
Having calculated the NRAs to inform the above description of the evolution of agricultural policies in Western Europe, it is possible to use the database to illustrate several additional points. First, the NRA calculations need to be qualified by the change in the nature of the policy instruments adopted.[34] In the latter 1980s, direct payments were limited to such products as olive oil and durum wheat, with market price support making up the bulk of assistance given to agriculture. From 1992, the total support (including direct payments and NPS support) and the market price support (limited to price support for individual commodities) began to diverge. By 2004, almost one-half of the 100 billion in assistance to agriculture came in the form of income payments and provision of services of an NPS nature (OECD 2006). There is no doubt that such payments benefit agriculture and keep resources that might otherwise leave in the sector, but the direct distortionary impact on commodity output, consumption, and trade is less, and arguably a much smaller source of the programs' economic cost.[35] If the assistance from these somewhat decoupled measures had been included in the calculation of support for Western European farmers, their NRAs would have declined much less after 1992 (see figure 3.6).

Figure 3.5. NRAs to Agriculture, EU and Western European Average, 1995–2007

a. EU-15 to 2004, EU-25 for 2005–06, and EU-27 for 2007

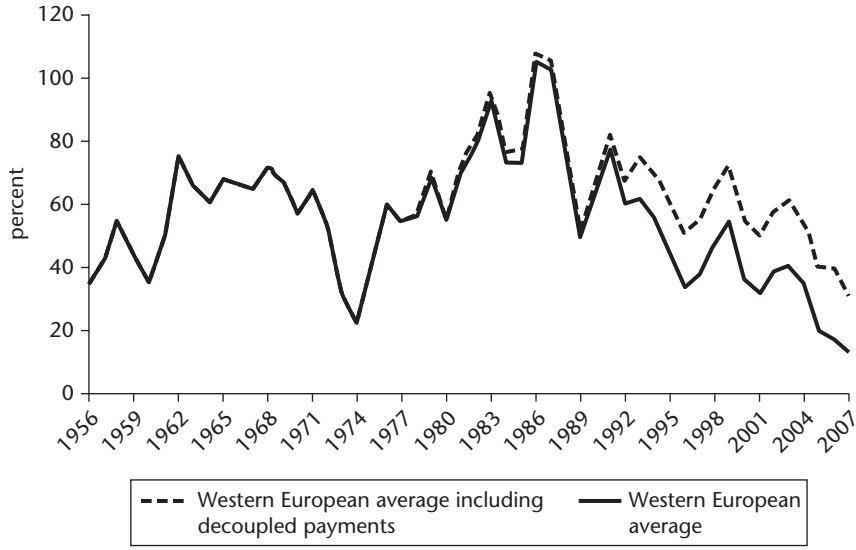


b. Other Western European countries



Source: Anderson and Valenzuela (2008), based on authors' spreadsheet, which draws heavily on OECD (2008).

Figure 3.6. NRAs to Agriculture with and without Decoupled Payments, Western Europe, 1956–2007



Source: Anderson and Valenzuela (2008), based on authors' spreadsheet, which draws heavily on OECD (2008).

Second, when products are classified as exportables, importables, and nontradables, it becomes clear that exportables are assisted far less than import-competing farm industries in the case of the EU—though exporters are assisted only slightly less in the case of non-EU countries of the region (figure 3.7).

Third, the rate of assistance to Western Europe's farmers dwarfs the small and declining NRAs for producers of nonagricultural tradable products, and so the relative rate of assistance (RRA) is almost the same as the NRA for agriculture (table 3.1).

Fourth, the NRA varies greatly across the range of covered farm commodities (which account for more than 75 percent of the region's agricultural production when valued at undistorted prices). The extent of dispersion in NRAs for the EU, which increased up to the 1980s before starting to decline, has nevertheless continued to increase in non-EU countries (see second-to-last row of tables 3.2 and 3.3). This suggests there is great scope to improve the efficiency of resource use within each country's farm sector.

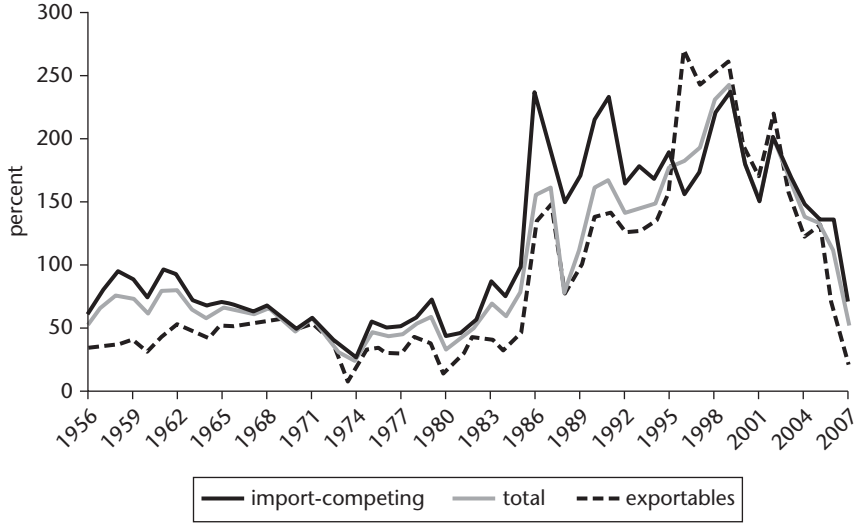
Fifth, leaving aside NPS and decoupled support, most of the assistance to farmers for covered products has come from border measures rather than domestic price supports (see near bottom of tables 3.2 and 3.3). This aspect of European

Figure 3.7. NRAs to Exportable, Import-Competing, and All[a] Agricultural Industries, EEC/EU and Other Western European Countries,[a] 1956–2007

a. EEC/EU



b. Other Western European countries



Source: Anderson and Valenzuela (2008), based on authors' spreadsheet, which draws heavily on OECD (2008).

a. All NPS assistance is apportioned to tradables. The EU is the original 6 countries to 1972, 9 countries to 1985, 12 to 1994, 15 to 2004, 25 to 2006, and 27 thereafter. The other Western European countries in our study comprise the original 7 EFTA members (Austria, Denmark, Norway, Portugal, Sweden, Switzerland, and the United Kingdom) plus Finland, Iceland, Ireland, and Spain to 1970; then without Denmark, Ireland, and the United Kingdom from 1973 (when they joined the EEC-6); then without Portugal and Spain from 1986 (when they joined the EC); and without Austria, Finland, and Sweden from 1995 (when they joined the EU).

Table 3.1. NRAs to Agricultural Industries Relative to Nonagricultural Industries, EU-15 and EFTA-3, 1956–2007

a. EU-15 member countries *(weighted average, percent)*

	1956–59	1960–64	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–04	2005–07
NRA, covered products	49.0	61.9	72.4	47.3	56.3	69.9	79.8	60.8	39.8	32.9	14.7
NRA, noncovered products	14.1	28.2	38.4	26.0	33.3	39.1	45.8	32.7	23.3	19.3	—
NRA, all agricultural products (excluding NPS)	39.8	53.6	64.4	42.5	51.3	62.7	72.6	54.6	36.2	30.0	11.2
All importables	56.0	74.3	80.2	52.9	58.8	76.5	84.0	63.8	50.4	48.2	28.6
All exportables	3.9	13.0	27.4	18.5	30.0	27.3	44.5	33.3	12.0	6.0	0.5
NRA, all agricultural products (including NPS)	39.8	53.6	64.4	42.5	53.3	71.0	76.8	59.2	40.4	34.2	15.4
NRA, decoupled payments	0.0	0.0	0.0	0.0	0.2	1.7	2.3	8.1	16.7	17.9	19.5
NRA, all agricultural products (including NPS and decoupled assistance)	39.8	53.6	64.4	42.5	53.5	72.6	79.1	67.3	57.0	52.1	35.0
NRA, all agricultural tradables (including NPS)	39.8	53.6	64.4	42.5	53.3	71.0	76.8	59.1	40.4	34.2	15.4
NRA, all nonagricultural tradables	8.2	7.4	5.7	3.8	2.5	1.4	1.7	1.3	1.4	1.4	1.1
RRA[a]	29.2	43.1	55.5	37.3	49.7	68.5	73.9	57.1	38.4	32.4	14.1

(*Table continues on the following page.*)

Table 3.1. NRAs to Agricultural Industries Relative to Nonagricultural Industries, EU-15 and EFTA-3, 1956–2007 (*continued*)

b. Iceland, Norway, and Switzerland *(weighted average, percent)*

	1956–59	1960–64	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–04	2005–07
NRA, covered products	256	257	255	252	256	232	339	295	204	171	99
NRA, noncovered products	169	172	173	179	166	169	150	111	78	64	141
NRA, all agricultural products (excluding NPS)	228	230	230	230	230	218	282	236	165	137	79
All importables	220	221	221	220	227	211	262	234	169	149	114
All exportables	247	249	249	255	239	240	334	242	159	119	70
NRA, all agricultural products (including NPS)	228	230	230	230	233	233	313	266	197	164	90
NRA, decoupled payments	0	0	0	0	11	56	31	32	48	68	68
NRA, all agricultural products (including NPS and decoupled assistance)	228	230	230	230	244	289	344	298	245	233	158
NRA, all agricultural tradables (including NPS)	228	230	230	230	233	233	313	266	197	164	90
NRA, all nonagricultural tradables	4.0	4.3	4.2	3.0	2.5	2.1	1.8	1.9	2.1	2.1	1.6
RRA[a]	216	216	217	220	225	226	306	259	191	159	87

Source: Anderson and Valenzuela (2008), drawing on authors' spreadsheet.

Note: — = not available.

a. The RRA is defined as $100*[(100 + NRAag^t)/(100 + NRAnonag^t) - 1]$, where $NRAag^t$ and $NRAnonag^t$ are the percentage NRAs for the tradables parts of the agricultural and nonagricultural sectors, respectively.

Table 3.2. NRAs to Covered Farm Products, EU,[a] 1956–2007
(percent)

	1956–59	1960–64	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–04	2005–07
Exportables	−17	−12	4	7	17	11	8	10	6	2	1
Barley	n.a.	n.a.	n.a.	35	45	14	n.a.	n.a.	n.a.	1	0
Rapeseeds	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	0	0	0
Rice	−48	−41	−1	−23	−6	2	146	136	34	17	2
Tomatoes	9	16	n.a.	n.a.	n.a.	n.a.	n.a.	4	0	1	0
Wheat	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	16	4	0
Wine	−16	−13	4	4	4	11	1	11	4	2	1
Import-competing	60	90	103	68	70	93	93	70	56	55	28
Barley	39	59	66	n.a.	n.a.	n.a.	108	104	32	n.a.	n.a.
Beef	20	79	62	52	12	120	150	93	100	132	86
Eggs	28	18	20	1	23	17	22	10	9	1	0
Maize	−9	24	55	37	56	43	90	89	31	25	19
Milk	259	301	314	269	431	335	291	122	87	61	19
Oats	3	34	46	20	45	0	37	47	47	23	8
Oilseeds	55	2	0	0	0	0	109	55	0	0	0
Pigmeat	28	75	139	113	88	111	24	13	25	28	17
Potatoes	—	—	—	43	90	48	16	16	13	10	10
Poultry	130	64	54	88	55	75	79	105	81	64	78
Sheepmeat	170	197	343	340	277	189	164	97	45	38	65
Soybeans	13	11	—	0	0	0	121	61	0	0	0
Sugar	137	121	295	23	131	140	227	162	167	191	111
Wheat	11	52	67	5	2	38	84	75	n.a.	n.a.	n.a.

(*Table continues on the following page.*)

Table 3.2. NRAs to Covered Farm Products, EU,[a] 1956–2007 (*continued*)
(percent)

	1956–59	1960–64	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–04	2005–07
NRA, *all covered products*	44	63	82	54	61	78	81	58	40	33	15
Domestic market support	0	0	0	0	0	0	3	2	0	0	0
Border market support	44	63	82	54	61	78	77	56	40	33	15
Dispersion of NRA of covered products	81	85	120	99	116	90	82	51	45	53	38
% Coverage at undistorted prices	*74*	*77*	*78*	*80*	*79*	*78*	*78*	*78*	*79*	*79*	*74*

Source: Anderson and Valenzuela (2008), drawing on authors' spreadsheet.

Note: — = not available; n.a. = not applicable.

a. Weighted averages, with weights based on the unassisted value of production. Dispersion is the simple five-year average of the annual standard deviation around the weighted mean. The EU is the original 6 countries to 1972, 9 countries to 1985, 12 to 1994, 15 to 2004, 25 to 2006, and 27 thereafter.

Table 3.3. NRAs to Covered Farm Products, Non-EU Western European Countries,[a] 1956–2007
(percent)

	1956–59	1960–64	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–04	2005–07
Barley	36	39	29	18	34	5	223	219	186	105	76
Beef	65	81	29	59	130	186	161	166	174	225	149
Eggs	−64	−69	−71	80	321	328	145	148	296	161	186
Maize	91	53	47	34	48	34	51	89	124	89	64
Milk	259	275	251	262	301	223	227	240	242	181	73
Oats	23	48	71	58	132	34	103	115	154	113	83
Oilseeds	28	18	14	8	7	14	58	126	334	260	287
Pig meat	51	63	74	38	12	45	71	82	180	172	116
Potatoes	130	144	167	59	63	63	38	35	—	—	—
Poultry	56	52	25	101	188	207	104	74	370	437	383
Rice	−18	−25	−14	−29	−21	−12	52	—	—	—	—
Sheep meat	110	81	78	64	75	80	168	170	101	68	51
Soybeans	—	—	—	−28	25	30	13	—	—	—	—
Sugar	265	253	446	47	126	121	250	198	233	255	173
Tomatoes	0	0	0	5	4	4	4	—	—	—	—
Wheat	29	42	43	7	14	46	126	170	195	91	61
Wine	0	0	0	0	0	0	0	0	—	—	—
Wool	—	—	—	—	124	36	78	207	187	167	207

(*Table continues on the following page.*)

Table 3.3. NRAs to Covered Farm Products, Non-EU Western European Countries,[a] 1956–2007 (*continued*)
(percent)

	1956–59	1960–64	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–04	2005–07
Exportables	37	43	55	37	35	30	98	133	236	172	70
Import-competing	82	81	66	43	57	61	169	191	194	171	114
All covered	68	69	63	41	50	51	119	152	204	171	99
Domestic market support	0	0	0	0	2	12	-20	-17	7	12	11
Border market support	68	69	63	41	46	33	138	169	198	159	88
Dispersion of NRA of covered products	90	91	125	67	109	103	81	73	84	105	112
% Coverage at undistorted prices	*73*	*73*	*74*	*75*	*74*	*75*	*86*	*75*	*69*	*69*	*80*

Source: Anderson and Valenzuela (2008), drawing on authors' spreadsheet.

Note: — = not available.

a. Weighted averages, with weights based on the unassisted value of production. Dispersion is the simple five-year average of the annual standard deviation around the weighted mean. Non-EU Western European countries in this study include the original seven EFTA members (Austria, Denmark, Norway, Portugal, Sweden, Switzerland, and the United Kingdom) plus Finland, Iceland, Ireland, and Spain to 1970; then without Denmark, Ireland, and the United Kingdom from 1973 (when they joined the EEC6); then without Portugal and Spain from 1986 (when they joined the EC); then without Austria, Finland, and Sweden from 1995 (when they joined the EU).

policies is in sharp contrast to the situations in the United States, where domestic support plays a major role (Gardner 2009).

Sixth, the average rate of assistance to farmers varies by country even among EU members (table 3.4). This is because the commodity composition of farm output varies across countries and over time, and hence so do the weights (based on value of production at undistorted prices) used to calculate the average.

Sixth, the gross subsidy equivalent of the support provided to Western Europe's farmers varies hugely across countries (table 3.5a) and across commodities (table 3.5c). Milk, beef, and wheat are subsidized most in total. Expressed per person engaged in farming, subsidies are highest in Norway and Switzerland. Among EU members, Denmark, the Netherlands, and France have rates almost as high (table 3.5b). Note that the subsidy equivalent per EU farmer drops by two-thirds in 2005–07, much more than the 45 percent drop in the aggregate value over 2000–04, because the number of EU farmers has expanded dramatically with the latest eastern enlargement (even though, strictly speaking, the new member countries are not in Western Europe). These figures are not actual cash transfers from the EU's budget in Brussels, but simply the value equivalent of the price support provided primarily via protection from non-EU imports.

Finally, since most assistance to farmers comes from border measures, those same measures raise consumer prices of farm products. The extent of the consumer tax equivalent (CTE) is similar to that of the NRA for covered products in percentage terms (less so the further a country is from self-sufficiency), but vary considerably across countries when expressed on a per capita basis: after Iceland, Norway, and Switzerland, it is Ireland, Denmark, and the Netherlands where consumers are most harmed (table 3.6). Notice that the value of the implicit transfer from consumers is very small on a per capita basis, at about US$100 for EU countries and US$300 for EFTA countries in 2000–04 (valued at 2000 US$). Since this is less than 0.5 percent of per capita income, it is not surprising that consumers see little benefit in joining together to lobby collectively against agricultural supports.

Policy Trends and Turning Points since 1955

This section attempts an analytical explanation of the reasons behind the evolution of policy and policy-related distortions since the mid-1950s. It complements the historical/institutional narrative and NRA estimates of the two previous sections by emphasizing the political economy forces behind the long-run trends and turning points, focusing on the CAP as the main policy for an increasing number of Western European countries (policy developments in the countries that opted to stay outside the EU show some similarity, however). Emphasizing the trends in policy allows for consideration of the changes in policy instruments over time and

Table 3.4. NRAs to All Agriculture,[a] Individual Western European Countries, 1956–2007
(percent)

	1956–59	1960–64	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–04	2005–07
Austria	25	33	36	12	17	17	49	71	45	41	19
Denmark	29	33	37	37	78	86	81	54	41	34	15
Finland	81	93	101	73	75	37	136	134	52	41	17
France	41	49	70	43	50	74	82	64	40	33	15
Germany	52	83	99	63	68	89	83	62	46	38	16
Iceland	—	—	—	—	229	252	346	289	173	144	153
Ireland	20	41	49	43	84	117	132	83	67	62	34
Italy	5	30	48	32	37	61	60	46	32	27	11
Netherlands	43	78	104	80	89	107	80	53	48	42	21
Norway	188	193	196	201	219	240	259	235	191	165	98
Portugal	−6	4	7	9	24	15	41	37	28	26	15
Spain	13	14	12	−2	−4	−1	53	44	31	26	14
Sweden	87	113	120	77	85	79	90	88	48	41	18
Switzerland	253	251	249	244	243	229	349	285	201	165	83
United Kingdom	65	60	43	32	68	83	95	70	47	40	20
Total Western Europe, weighted average	44	57	68	46	56	74	82	64	44	37	17
EU countries[b]	40	54	64	43	53	71	77	59	40	34	15
Other Western Europe[b]	228	230	230	230	233	233	313	266	197	164	90

Source: Anderson and Valenzuela (2008) based on authors' spreadsheet.

Note: — = not available.

a. Weighted averages, with weights based on the unassisted value of production. Dispersion is the simple five-year average of the annual standard deviation around the weighted mean.

b. The other Western European countries in our study comprise the original seven EFTA members (Austria, Denmark, Norway, Portugal, Sweden, Switzerland, and the United Kingdom) plus Finland, Iceland, Ireland, and Spain to 1970; then without Denmark, Ireland and the United Kingdom from 1973 (when they joined the EEC6); then without Portugal and Spain from 1986 (when they joined the EC); and without Austria, Finland, and Sweden from 1995 (when they joined the EU).

Table 3.5. Gross Subsidy Equivalents of Assistance to Farmers, Total, Per Farm Worker and by Product, Western European Countries,[a] 1956–2007

a. Total (*constant 2000 US$ millions*)

	1956–59	1960–64	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–04	2005–07
Austria	422	566	651	192	462	440	8,184	3,108	1,715	1,338	541
Denmark	1,439	1,667	1,983	2,403	5,719	5660	4,133	3,804	2,565	1,920	888
Finland	1,219	1,416	1,820	1,733	2,185	932	3,644	3,685	1,000	730	287
France	9,866	14,437	22,418	17,393	26,423	31,314	26,608	25,399	15,707	11,012	5,225
Germany	8,735	18,158	25,895	21,893	32,312	33,297	24,905	21,113	13,869	10,125	3,975
Iceland	—	—	—	—	314	246	245	177	113	96	123
Ireland	254	572	710	1,235	3,744	4,026	3,553	3,421	2,646	2,035	837
Italy	651	6,596	11,772	8,903	13,826	17,067	13,585	13,061	8,728	6,257	2,646
Netherlands	1,812	3,778	5,634	6,153	9,735	10,432	7,083	6,695	5,228	3,593	1,483
Norway	1,432	1,497	1,710	1,924	2,898	2,876	3,061	3,437	2,566	1,836	1,208
Portugal	−58	70	170	295	858	416	1,218	1,579	1,194	924	509
Spain	841	911	919	−816	−741	−604	8,792	9,431	6,446	5,440	3,372
Sweden	2,573	3,323	3,832	3,050	4,229	3,363	3,180	3,096	1,499	1,047	413
Switzerland	3,148	3,486	3,981	5,130	5,599	5,817	6,491	6,541	4,438	3,014	1,945
United Kingdom	8,937	9,177	7,181	6,915	16,530	17,597	14,013	12,752	8,138	5,498	2,411
Total, Western Europe	**41,271**	**65,653**	**88,676**	**76,403**	**124,095**	**132,880**	**128,695**	**117,300**	**75,850**	**54,866**	**31,173**
EU members[a]	21,065	42,969	65,718	54,342	108,415	119,393	103,890	97,256	68,734	49,920	27,618
Other Western Europe[a]	20,206	22,685	22,957	22,061	15,680	13,487	24,805	20,044	7,116	4,946	3,555

(*Table continues on the following pages.*)

Table 3.5. Gross Subsidy Equivalents of Assistance to Farmers, Total, Per Farm Worker and by Product, Western European Countries,[a] 1956–2007 (*continued*)

b. Per person engaged in agriculture (*constant 2000 US$*)

	1961–64	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–04	2005–07
Austria	805	1,161	409	1,257	1,361	28,429	12,023	7,947	7,661	3,468
Denmark	5,240	6,627	10,339	26,813	30,680	24,401	25,217	20,676	18,950	9,865
Finland	2,820	3,853	4,267	6,547	3,340	15,411	18,224	6,160	5,659	2,540
France	4,285	6,571	6,223	11,736	16,887	17,304	20,111	15,437	13,678	7,412
Germany	4,303	6,894	7,235	11,707	13,875	13,252	14,324	11,891	11,069	4,938
Iceland	—	—	—	24,186	19,696	17,016	11,597	8,195	7,529	10,223
Ireland	1,752	2,169	5,026	14,801	17,647	17,261	18,759	15,662	12,680	5,363
Italy	1,445	2,514	2,350	4,373	6,288	5,825	6,731	5,632	5,176	2,524
Netherlands	10,230	15,336	18,827	30,384	33,320	22,665	22,195	19,561	15,434	6,928
Norway	5,992	7,945	10,489	17,122	18,461	21,634	26,848	22,641	18,274	12,988
Portugal	39	143	276	765	357	839	1,925	1,668	1,492	891
Spain	182	230	−255	−259	−218	2,973	5,303	4,364	4,418	3,024
Sweden	8,365	10,773	10,105	15,409	13,520	14,501	15,848	8,999	7,422	3,200
Switzerland	13,128	16,193	23,432	27,951	30,661	33,093	34,182	25,954	19,938	13,796
United Kingdom	10,358	8,954	10,507	23,461	25,825	22,013	21,525	14,852	10,863	4,971
Total, Western Europe	2,957	4,258	4,433	8,164	10,089	11,392	12,425	9,612	8,369	2,471
EU members[a]	3,323	5,348	5,501	11,090	14,295	10,193	11,504	9,051	7,935	2,256
Other Western Europe[a]	2,395	2,689	2,999	2,908	2,799	22,448	20,325	23,927	18,664	13,316

c. By product (*constant 2000 US$ millions*)

	1956–59	1960–64	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–04	2005–07
Barley	1,649	2,866	3,627	2,072	5,456	1,707	6,532	6,361	1,621	120	50
Beef	2,529	7,192	7,950	7,914	6,252	13,145	19,075	16,169	12,144	9,877	6,177
Eggs	−604	−817	−534	−893	1,808	1,436	1,673	1,037	571	130	123
Maize	57	557	1,323	1,396	2,715	2,204	3,589	3,297	1,394	1,036	1,020
Milk	20,793	23,917	28,101	31,074	45,150	41,790	37,896	32,811	22,919	15,418	2,822
Oats	405	1,229	1,611	1,081	2,027	229	812	849	335	144	70
Oilseeds	83	23	27	29	84	66	2,833	1,899	44	32	41
Pig meat	3,936	8,899	14,823	14,400	15,941	15,699	7,011	4,732	5,175	5,401	4,051
Potatoes	2,653	2,804	2,841	2,518	5,846	2,802	1,127	1,221	912	465	735
Poultry	1,863	1,973	1,987	3,229	3,717	4,060	4,337	5,687	4,492	3,424	4,042
Rice	−246	−267	−62	−578	−126	−104	529	598	220	84	12
Sheep meat	1,194	1,562	1,997	3,195	5,274	4,064	3,163	2,581	1,432	1,087	1,458
Soybeans	0	0	—	−2	2	1	571	337	0	0	0
Sugar	2,354	2,433	4,151	−518	4,772	4,087	5,091	4,807	4,229	3,232	1,351
Tomatoes	44	387	710	1,046	1,539	1,345	887	356	44	75	0
Wheat	1,706	4,943	6,559	−1,229	304	6,465	9,849	9,114	2,039	546	126
Wine	−1,630	−998	568	681	664	847	399	1,707	721	240	267
Wool	—	—	—	—	26	2	18	16	11	8	9
Total, Western Europe	**36,784**	**56,703**	**75,678**	**65,415**	**101,451**	**99,844**	**105,391**	**93,581**	**58,303**	**41,319**	**21,916**
EU members[a]	19,158	36,948	55,749	47,291	88,543	88,805	84,016	77,079	53,218	37,773	19,033
Other Western Europe[a]	17,626	19,755	19,929	18,124	12,908	11,038	21,375	16,502	5,086	3,546	2,883

Source: Anderson and Valenzuela (2008) based on authors' spreadsheet.

Note: — = not available.

a. The EU is the original 6 countries to 1972, 9 countries to 1985, 12 to 1994, 15 to 2004, and 27 thereafter. The EFTA countries are the original 7 to 1970; then 8 (with Iceland) to 1972; then 6 from 1973 (when the United Kingdom and Denmark joined the EEC) to 1985; then 5 from 1986 (when Portugal joined the EC) to 1994; then 3 after Austria, Finland, and Sweden joined the EU in 1995. For 2005–07, the "EU members" and "total Western Europe" aggregates also include the most recent 12 countries that joined the EU in May 2004 and January 2007.

Table 3.6. CTEs of Policies Assisting Farmers, Covered Products, Total and Per Capita and by Product, Western European Countries,[a] 1956–2007

a. Aggregate CTE by country (*percent*)

	1956–59	1960–64	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–04	2005–07
Austria	74	88	77	22	24	22	63	88	39	35	17
Denmark	42	44	39	41	95	79	70	48	38	32	12
Finland	113	123	132	91	93	45	202	201	46	40	17
France	49	52	75	50	54	76	61	45	34	30	15
Germany	65	95	107	67	67	82	59	41	35	30	13
Iceland	—	—	—	—	42	72	272	210	117	95	104
Ireland	25	38	45	43	125	126	115	73	56	46	20
Italy	5	33	52	35	37	58	46	35	29	26	10
Netherlands	52	89	118	82	96	111	83	56	47	38	18
Norway	272	282	285	276	230	70	93	116	114	111	85
Portugal	−1	11	18	11	34	21	37	33	25	24	16
Spain	19	20	19	−4	0	5	36	30	24	21	13
Sweden	104	106	134	76	108	90	124	109	46	44	23
Switzerland	275	271	261	253	223	97	245	215	143	144	83
United Kingdom	69	65	46	34	71	89	77	54	44	40	22
Total, Western Europe	53	65	74	49	59	70	65	49	37	33	17
EU members[a]	42	62	80	54	60	78	59	42	34	30	15
Other Western Europe[a]	72	70	62	39	51	37	119	141	133	131	84

b. Total CTE per capita (*constant 2000 US$*)

	1960–64	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–04	2005–07
Austria	95	95	26	54	44	1026	354	145	108	46
Denmark	220	211	276	624	498	343	299	221	165	55
Finland	291	353	327	413	181	699	665	717	525	207
France	246	353	283	380	367	259	229	159	115	55
Germany	235	311	261	362	330	211	157	110	82	33
Iceland	—	—	—	1070	969	937	465	310	277	379
Ireland	94	114	252	792	696	495	435	299	221	65
Italy	125	218	165	226	243	178	162	117	87	33
Netherlands	228	322	290	439	408	271	245	188	129	48
Norway	319	367	446	593	333	374	447	326	241	226
Portugal	19	41	29	121	58	107	134	105	84	48
Spain	32	34	−29	0	6	146	150	108	89	56
Sweden	256	346	254	457	311	303	284	138	119	52
Switzerland	708	704	843	790	627	820	792	486	354	266
United Kingdom	185	135	136	302	272	188	157	111	86	41
Total, Western Europe	**162**	**205**	**198**	**306**	**276**	**226**	**207**	**138**	**103**	**46**
EU members[a]	161	232	240	339	319	209	178	128	96	41
Other Western Europe[a]	165	156	119	193	128	293	488	422	310	254

Source: Anderson and Valenzuela (2008) based on authors' spreadsheet.

Note: — = not available.

a. The EU is the original 6 countries to 1972, 9 countries to 1985, 12 to 1994, 15 to 2004, and 27 thereafter. The EFTA countries are the original 7 to 1970; then 8 (with Iceland) to 1972; then 6 from 1973 (when the United Kingdom and Denmark joined the EEC) to 1985; then 5 from 1986 (when Portugal joined the EC) to 1994; then 3 after Austria, Finland, and Sweden joined the EU in 1995. For 2005–07, the "EU members" and "total Western Europe" aggregates also include the most recent 12 countries that joined the EU in May 2004 and January 2007.

the role of instrument changes in improving efficiency in meeting the various policy objectives. Discontinuities in the trends can also come from the impact of changes in ideas among domestic political forces that impact farm policy in Western Europe, the introduction of international rules and institutions, and the impact of bilateral and other trade agreements.

Long-run trends

Several important trends can be identified as having shaped Western European agricultural policy in the postwar period: the production increases in European agriculture that have transformed the sector from a significant importer of temperate-zone agricultural products to a major exporter; the changing emphasis over time away from the production of undifferentiated farm commodities and toward quality and other attributes that allow for product differentiation; the increasingly globalized market that both provides raw materials and intermediate inputs for the European food system and offers expanding access to consumers in other countries; and the increasing concern with environmental and other objectives that are constantly changing the nature of the coalition of interests necessary for agricultural policy support. The reinstrumentation of agricultural policy has been a consequence of trends away from import protection that allowed the sector to have a sheltered environment for growth and toward direct payments that are supported as rewards for socially responsible farming practices. Intervention in the market and the dumping of surpluses abroad has largely given way to a regulatory approach that encourages quality foods that have a ready market and protection of locational and other indicators associated with quality attributes. The reinstrumentation itself has been largely responsible for the moderation of the levels of protection relative to nonagricultural sectors and for less consumer taxation mentioned above.

Production increases

Somewhat ironically, it is the strong growth of agricultural production in Western Europe that brought about the most intractable policy problems. Policies introduced in the EEC were premised on the fact that agriculture needed support because it could not compete with domestic industry for labor and capital or with production from overseas farms that were larger and perhaps less constrained by social and environmental factors. The instruments used were designed to insulate domestic producers from developments in world markets. World prices were seen as too volatile to act as a basis for stable domestic markets. When prices were propped up by imports entering over the protective wall, this system was at least manageable, despite its inefficiency. But when production outstripped demand,

surpluses began to accumulate. New instruments had to be developed, while those that intended as occasional market supports undertook new functions.

Pressures arising from production increases were first noticed in the cereals market. As a result of the initial decision on cereal prices, production of wheat, barley, and maize (corn) increased sharply. Use of grains for animal feed dropped rapidly, leading the search for alternative feeds to begin in earnest. One external factor played a significant role in the development of such alternatives: the level of protection of several nongrain feedstuffs was fixed at zero (or otherwise very low levels) in the Dillon Round of the GATT, which concluded in 1962. Feed compounders in Europe found that soybean meal (from imported soybeans) and cassava chips (from Thailand and Indonesia) made a cheaper feed for livestock than domestic corn and barley. The expanded imports that resulted exacerbated the domestic supply imbalances, adding to the growing stocks of cereals.[36]

Dairy prices had also been set high in the EEC, encouraging production and discouraging consumption. Structural change in the dairy sector added to the increase in production.[37] Surpluses showed up early, and various mechanisms were suggested to get rid of the "butter mountains" that had resulted from intervention buying. Taxes on the use of nondairy products were suggested but not approved. Subsidies for the use of skimmed milk powder in animal feed were effective but did not discourage production. Modest price cuts (through coresponsibility levies) also were too small to curb production. Finally, in 1981, quotas on milk production were introduced. They have been in place ever since, and have been an effective, if inefficient, way to restrain production.

Beef production also expanded rapidly in the EEC, in part as a reflection of the increase in dairy production (most beef in Europe comes from the dairy herd) and in part a reaction to hill farming and other livestock subsidies. But in the 1970s, consumption of veal slumped as a result of health concerns related to the use of growth hormones, and in the 1990s beef consumption plummeted following the discovery of a probable link between Bovine Spongiform Encephalopathy (BSE) in cattle and a new variant of Creutzfeldt-Jakob disease (nvCJD) disease in humans. So the policy response had to focus on reassuring consumers rather than discouraging producers from overproduction.

Another product where surpluses appeared was sugar, a crop that has a very long production history in the region (sugar beets were grown for 150 years as a rotation crop for Northern Europe and provided a valuable calorie source in times of interuption in trade).[38] But both France and the United Kingdom had former colonies that depended on the European market to sell their sugar cane. When the United Kingdom acceded to the EEC in 1973, a guaranteed market was conceded for its overseas suppliers. So the EU has struggled with an import commitment alongside a growing export surplus. When other exporters challenged the legality

of the EU's policy of reexporting the imported sugar, a panel found that the EU had exceeded its export subsidy commitment under the WTO. The sugar policy has now been reformed, by reducing support prices and paying compensation to growers and beet crushers, so that it is less intrusive on world markets.

In each of these cases, the main problem was that prices were rigid downwards, largely as a result of the decision-making system. Farm ministers were reluctant to return from the annual price negotiations in Brussels having agreed to price cuts. In some cases, financial control was also lacking, largely because the impact of price decisions on spending were not apparent to those (the farm ministers) making the decisions. As the budget cost of export subsidies was shared among all members (and the import levies pooled), the true (foreign exchange) cost to each country was the internal price. Under these circumstances, it was not surprising that price cuts were rare. Productivity growth put pressure on the costs of the policy and on the external impact, but the lack of financial accountability and the difficulty of getting the political support needed for a major policy change led to an environment of continual crisis and controversy.

Comparisons with other high-income countries

The predominant feature of agricultural policy in Western Europe over the past 50 years has been the high level of support (relative to other temperate-zone producers) given to most agricultural sectors. Though agricultural protection in East Asia rose from low levels in the 1950s to be well above that in Western Europe (Honma and Hayami 2009), protection in Australia, Canada, New Zealand, and the United States was generally at a much lower level (Gardner 2009; Anderson, Lattimore, Lloyd, and MacLaren 2009).

Including agriculture in the experiment of economic integration was a bold move for the EEC. The economic rationale was similar to that in other sectors: the agricultural sector would gain from rationalization on a continent-wide basis and the price of agricultural products would be reduced. In turn, this created the hope that an integrated European agricultural system could compete with the Americas and the temperate-zone producers of the Southern Pacific. But this would have required earnest competition among EEC farmers and halting of support for the less efficient of them. In general, the level of protection in Western European agricultural policy over the past 50 years can be attributed to the reluctance of politicians (and to a large extent, of society in general) to expose the sector to true competition. Integration of agricultural markets has indeed taken place, but in an environment where inefficiencies were able to survive and production decisions did not reflect the realities of the market. In short, the distortions that have continued in European agriculture have been the result of the political reluctance to encourage needed adjustments in the sector. The social costs of such adjustments

played a dominant role in shaping crucial decisions to undertake agricultural support—support that absorbed resources that could have had greater benefits to society elsewhere. The process of outmigration from agriculture has undoubtedly been slowed by the incentive structure of the CAP. Thus the policy has been successful in its own terms, by mitigating the adjustment cost, but expensive in societal terms by delaying changes that would have been beneficial.

The unwillingness of governments to subject their agricultural sectors to the rigors of the market was also evident in the decisions of those countries that chose not to join the EU. The need to lower support prices in Norway and Switzerland in the event of membership was a major factor in generating opposition to EU accession in rural communities. These high-cost countries have been reluctant to expose their farmers to competition from the EU and to induce the structural changes and entrepreneural initiatives that offer the chance for competitiveness. Each has protected its agriculture behind high tariffs, thus blunting market signals and burdening the downstream sectors with higher costs.

Environmental and quality objectives

The five decades discussed above cover a period of a major transformation of agricultural policies not just in terms of the instruments used but in the objectives that lie behind government intervention in the agricultural sector. The focus of agricultural policy has over the period swung away from a narrow focus on the income level of farmers toward a raft of policy objectives ranging from the preservation of the coutryside and the provision of healthy food to rural development and animal welfare. Farm incomes have over time become more of a constraint on policy change than a rationale for the existence of policy. Those who benefit financially from the policy have been able to slow down the shift in emphasis (and budget allocation) but not stop it altogether.

The need to include incentives in the improvement of farm structures was recognized in the 1960s, when the Mansholt Report emphasized the dangers of persuing all objectives through price support. The introduction of a structural program proved slow, as it was in competition with funds for market management. Similarly, the need for funds for rural development was realized in part as a way of helping agriculture adjust. Eventually, the "second pillar" of the CAP was constructed in the Agenda 2000 reform and supplied with enough funding to make it a significant aspect of policy. National funds are also now authorized, subject to constraints, to be shifted from price and income support to rural development programs (modulation) that meet other objectives. Second pillar spending currently accounts for about 19 percent of total CAP expenditure.

Environmental objectives have also become important in shaping the CAP and policies in the EFTA countries. Originally, the thrust was to prevent the negative

impacts of intensive farming on the countryside (and adjacent urban areas) and on soil, air, and water pollution. Over time, this has evolved into an emphasis on the positive contribution of agriculture as the dominant activity in much of the Europe's more scenic rural areas. In the 1990s, environmental objectives became associated with the term "multifunctionality," reflecting the range of public goods provided by rural businesses. But other exporters pointed to the risk that this could become an excuse for a blank check to policy makers who were looking for reasons to continue income support in a more acceptable guise—thus perpetuating distortions to resource allocation.

The first evidence of major changes to the politics and political economy of the CAP came as a result of public concerns over food safety. Building on public reactions to reported instances of human exposure to hormones used in livestock production, the EU banned the use of such substances in animal production. In addition to the international ramifications of this decision (U.S. and Canadian beef and beef products were banned), the impact on domestic policy was palpable, as it ushered in perhaps the most significant change in the perception of the CAP, its link with food quality, and the production practices employed by farmers.[39] Advocates of more emphasis on local foods and on more animal-friendly livestock practices joined with those who opposed the use of transgenic technology in foodstuffs to form a formidable new voice in agricultural policy. Alongside this trend, food safety and quality policies and regulations on animal welfare have become increasingly centralized. The policy has itself been redefined as one that emphasizes quality over quantity and the promotion of foods that reflect the cultural richness of rural Europe. Farmers spotting this trend have shifted their own production and marketing practices toward these new demands. While some argue that this market orientation reduces distortions, others might regard the policy-supported changes in demand as distortions for the consumers who cannot or do not wish to shift their eating habits in this way.

Reinstrumentation

The original policy instruments chosen by the EEC were intended to provide a stable price environment for the agricultural sector. The variable levy smoothed out the fluctations that would have otherwise been transmitted to the domestic market. The export subsidies (restitutions) allowed goods to be withdrawn from the domestic market and sold at lower world prices. Only dairy (after 1981) and sugar (strictly speaking, a "temporary" market order) were subject to supply controls. Some producer subsidies existed, including those for durum wheat and olive oil, but these were also backed up by tariff protection. Wine was regularly taken off the internal market for distillation, and producer groups could withdraw fruits

and vegetables with assistance from the European Commission if prices fell to "crisis" levels. The changes that have come about in the instruments used in the CAP are as important in their impacts as the levels of protection themselves. Though these changes have not come easily, they have had a lasting impact on the shape of the CAP.

The most significant modification of policy instruments came in 1992, with the MacSharry reforms.[40] Direct payments in compensation for price declines added flexibility to the policy, as described earlier. But this transition also followed a pattern observed in other countries. The Unite States, for example, began to move from price supports to direct payments and to decouple those payments from production and prices during the 1980s (Moyer and Josling 1990). At the time of the Uruguay Round, it became apparent that one way to reduce overseas threats to the CAP was to make the instrumantalities more similar to those of trading partners.

Since the mid-1980s, the gap between total producer support and that derived from market price support has widened, particularly after the 1992 reforms. Currently, market price support accounts for just over one-half of total CAP support, compared to 90 percent 20 years ago. To the extent that the new instruments are significantly less trade distorting, they also are less distorting for the domestic economy. A similar trend is noticeable in Switzerland: the "decoupling" of payments from output and price was introduced even though the absolute level of support is still greater in that country than in the EU. Though Norway has not increased its degree of decoupling, the absolute level was in any case lower as a result of subsidies aimed at keeping people in the northern regions of the country regardless of their levels of output. The decoupling of support from price and output has also allowed for a trend to attach payments to other policy objectives in these EFTA countries as it has in the EU.

Turning points

Though these trends have evolved since 1955, several turning points have been crucial in influencing the macroeconomic environment, which in turn affected the level of distortion in agricultural policies in Western Europe over the period. These include, for example, the increase in the price of oil in 1973 and changes in commodity markets and food prices.

The oil price increase impacted the CAP in two respects. First, it increased costs to farmers in a way that was readily apparent and led to compensating price increases. Coming not long after the end of the transition period in 1967 (a time when policy makers were attempting to reduce price incentives) and the exchange rate changes of 1968 (when prices diverged again within the EU),

the pressure for price adjustment was difficut to resist. Moreover, the oil price increases coincided with the sharp rise in cereal and sugar prices on world markets, thus fueling fears of longer-term shortages and masking the level of underlying distortions that were present in the system. The opportunity to make use of the high price period to reduce the support prices was lost. Instead, support prices followed the world market upward, only to be left isolated when world prices declined again.

The oil price hike also coincided with the accession of the United Kingdom to the EEC, a shift that was expected, based on the country's history of international openness, to bring a fresh look at European farm policy. Some countries, such as the Netherlands, welcomed this while others were prepared to resist (notably France but also Germany). However, the period of inflation and currency movements that followed in the 1970s overwhelmed the possibility of policy improvements and left the United Kingdom reluctantly accepting the CAP so long as the budget cost to the United Kingdom was constrained and it controlled the pace of adjustment of the "green" rate of exchange. This compromise lasted through the runup to monetary union, when policy prices in the EU became common again.

Political changes also have had an impact on the CAP, and hence on the level of distortion in Western European agriculture.[41] The fall of the Berlin Wall in 1989 and the subsequent unification of Germany offered an opportunity for the return of Central and Eastern European countries to the economic and political mainstream. Agreements were negotiated with Central and Eastern European countries that were deemed to be ready for accession, and agricultural products were included, albeit with some quantitative restrictions. All agricultural policy decisions since that time have had to be measured in light of their implications for the larger European market. This has acted as a disincentive to increase support levels in the existing EU.

To an extent unmatched in most other developed regions, agricultural policy in Western Europe has been influenced by external pressures as well as by those of a more domestic nature. But a major turning point came in the mid-1980s as a direct result of this external pressure. Up to that point, decision making within the CAP always took place within the context of the state of world markets, which impacted budget costs in particular. But the Uruguay Round introduced, within the URAA, a legal framework that restricted the scope for domestic action. Through the negotiation and enforcement of tariff reductions and scheduled cuts in subsidies, the URAA also gave domestic policy makers a lever on the policies of other countries.[42] Thus the CAP, along with the policies of other countries, was challenged after 1995, and policy changes that would have been mainly of internal interest became internationally significant.[43]

Prospects for Future Reform of Western European Policy

The essence of the CAP is that it represents a bargain among member countries, as all countries in the EU maintain their own agricultural policy objectives even if they have ceded the ability to use many instruments to acheive those objectives. The CAP, then, is a result of the bargaining process within the EU as much as a coordinated and consistent European view of appropriate role for government in agriculture. Reform can come about as a result of changes in the terms of the bargain just as easily as a shift in the model of agriculture that underlies policy or the reactions to exogenous events. However, it is still possible to speculate on the change in underlying attitudes to agriculture in the development of the CAP, and hence hazard a guess as to where those trends might be heading. In the light of the political economy constraints and incentives mentioned earlier, this section attempts to draw out the prospects for further policy reform in Western Europe.

One issue is whether the consolidation of Western Europe in the EU, and by implication the extension of the CAP to all Western European agriculture, will be completed in the foreseeable future. This implies the entry of Norway and Switzerland to the EU. Thus far, Norway has resisted in part because its position as an oil and gas exporter has enabled it to have a high level of income as an "adjunct" to the EU market. Though investment could be stimulated by accession, it is not enough to convince the electorate to "share" its fish resources, subject its farmers to price decreases, and possibly force the modification of control and use of energy supplies. But the possible exhaustion of Norway's oil reserves and an autonomous reform of its agricultural policy (alongside a more acceptable fisheries policy in the EU) could change the situation. The level of agricultural protection, though, is still considerably higher in Norway than in the EU, and significant policy adjustments would be needed before Norway's agricultural sector could be assimilated into the CAP.[44]

In Switzerland, most aspects of policy, both industrial and agricultural, have been steadily converging with those of the EU. As a result, one would expect the economic aspects of accession to be less significant than the political aspects. Not only does Switzerland have a strong history of avoiding foreign entanglements, but its status as a participatory democracy poses problems for the transfer of sovereignty to the EU level. If a time comes when major sectors of the Swiss economy are harmed by exclusion from the EU, one might expect to see an application to join. But as in the case of Norway, the level of farm protection is still considerably higher than in the EU.[45]

An enlargement issue of a different kind is the prospect of the accession of Turkey to the EU, one that poses an economic and political dilemma for the EU. In this regard, the impact on the level of distortion in Western Europe may well be

significant. On the one hand, the geopolitical argument points to the benefits of offering membership to a strategically important country. On the other hand, Turkey has an income level of about one-third that of the average EU level, and its membership would add some 20 percent to the population of the bloc. The impact on the EU economy of Turkey's joining would thus be considerable (in a positive as well as a negative direction), with the challenge to agriculture being a major consideration. For these reasons, one might expect a long period of transition before Turkey is fully incorporated into the single EU market (see also Anderson and Swinnen 2008).

More trade agreements are in the cards for the EU, as it consolidates its relations with its neighbors in North Africa and the Middle East and extends its "neighborhood policy" to include Central Asia and the Caucasus. The current wave of trade agreements under negotiation also include arrangements between the EU and the countries of Latin America, through an EU-Mercosur trade pact. To avoid getting left behind relative to competitors in North America and East Asia, trade policy plans of the European Commission also include agreements with major Asian countries. Where they include improved market access for farm products, these agreements will tend to put downward pressure on agricultural distortions. The extent to which this pressure is reflected in real changes will depend on the political significance attributed to the free trade agreements themselves. Domestic agricultural policy has proved resistant to many such trade policy developments, but not all. The Everything but Arms agreement that gave the least developed countries tariff- and quota-free access to the EU market included agricultural products, and led in turn to the reform of politically sensitive sugar policy in 2006.

The CAP has always absorbed a major share of the EU budget, though that share, once above 75 percent, has now been reduced to about 45 percent. More countries are being included in the activities funded from the budget without corresponding increases in the level of funding. While the prospect of substantially increased funds available for agricultural policy is slim, this in turn means that shifts in instruments toward the less distorting direct (decoupled) payments is increasingly difficult. More likely is the addition of funds for projects such as the development of biofuels (which could benefit agriculture in a more acceptable way, depending on how the perception of the environmental effects of such interventions evolve).

The impact of the Uruguay Round on the CAP has been emphasized above. Negotiations surrounding the Doha Round, the WTO's follow-up to the Uruguay Round, have been underway since 2001. The Doha Round would cut tariffs, eliminate export subsidies, and reduce the scope for trade-distorting domestic support. Though the talks are presently on hold, there is still the possibility that

they may be concluded by the end of 2009. If an agreement is eventually reached within the range of options on the table, the EU would phase out its export subsidies altogether by 2013 and significantly cut its ability to support prices. Though much of domestic policy is now sheltered in the green box (and thus not subject to reductions), the Doha Round would "lock in" those aspects of reform. Tariffs would be cut by about 60 percent, with some exceptions for the most sensitive products, such as dairy and beef. WTO dispute settlement panels have already found that the sugar and banana regimes were inconsistent with WTO obligations: other countries will no doubt explore further challenges where they consider the CAP too distortive in world markets.

One vital question with respect to the future of the CAP is whether the trend is toward a renationalization of the policy. There have been small moves in this direction, with flexibility built in to the direct payments. But the degree of decoupling, for some commodities, is at the discretion of the member countries. How far this trend will go is a matter of political decisions well above that of the agricultural policy.[46] So long as they do not influence competition, there is a logic to the renationalization of payments that are not related to farm output, and the possibility of an eventual division between the market mechanisms that would be controlled at the EU level and the payments for public goods that may revert to the national level. In sum, there could be a convergence of likely and desirable policy directions before 2020. A continuation of decoupling of support from price and output should over time significantly reduce distortions, though if such payments are "recoupled" to other objectives there could be some economic cost. Trade agreements will reinforce this trend, as access to the EU market will be an important incentive for other countries to conclude such agreements.

What, if any, are the policy lessons for developed, developing, and transition economies of the trends and turning points in Western Europe's agricultural policies? In many ways, the EU is unique in having agreed at its founding on a system of internal free trade and a common policy for market management and external protection. In that regard, the lessons are unlikely to be directly applicable. But the development of the CAP does offer some general lessons. Among the most important of these has to do with the pitfalls of attempting to manage markets in such a way as to give farmers adequate incomes. Technical advances, demand shifts, and the natural responses by private actors to incentives offered by policy will undermine the ability of policy administrators to achieve the required outcome. In general, the CAP is too inflexible to adapt to changes in the internal or external market, ministers of agriculture meeting periodically are unlikely to be able to adjust policy instruments and price levels in the face of such changes. So the policy is always a step behind the market. In addition, the income streams generated by the policy ensure that there are always interests lined up against change.

The combination of inflexible decision making and a bias toward the status quo make it impossible for the CAP to keep its relevance over the decades.[47] But external pressure through the GATT talks and the WTO, as well as a feeling that the CAP was no longer viable in its original form, have encouraged a series of changes that have shifted the nature of agricultural policy in Europe. The policy is still somewhat inflexible, and changes may be even harder now with 27 members, but the reduction of prices of most of the main products to near world market levels provides much more scope for creative policy making. The flexibility of direct payments, though it can be overused, gives hope for agricultural policy that is less distortive of world markets and less obtrusive of economic adjustments on the domestic front. The way in which this was accomplished should indeed be of interest to other countries.

What Have We Learned?

Three main conclusions emerge from this chapter. First, the level of distortion to the Western European economies resulting from direct and indirect policy interventions in agriculture has declined in recent years. Protection of agriculture, highest in the 1960s, fell in the 1970s as world markets became tight and European agriculture appeared, temporarily, to be more competitive. But reaction to the period of high world prices and inflation at home led to a rapid increase in distortion between the mid-1970s and early 1980s. That the level of distortion in the EU remained high for several years attracted criticism from at home and abroad, prompting changes in policy that have led to steady decline and increased stability in the level since the mid-1980s. In the countries that remained outside the EU, distortions remain high and more variable, although in the last few years there have been signs of convergence with the EU.

Second, the act of joining the EU has had a mixed impact on country levels of distortion, and hence on the total level of distortion in the region. In some cases the accession of new members has raised the protection level and in others it has decreased it. Protection levels in Western Europe increased as a result of the 1973 accession of Denmark, Ireland, and the United Kingdom. Agriculture in each of these countries expanded and their competitiveness with respect to world markets was eroded. The entry of Southern European countries in the 1980s also increased the overall level of protection by including countries such as Spain and Portugal, which had relatively low levels of assistance, in the CAP. But many of the countries that chose to stay outside the EEC in the 1960s were also those with high-cost farming sectors. The high levels of protection were not "imported"into the EU from countries such as Finland and Austria. Hence, the overall result of the incorporation of the many of the Nordic and Alpine countries has been to reduce

overall protection in Western Europe somewhat when they eventually joined the EU. This is confirmed by the nature of the two major countries in Western Europe that have remained outside the EU (Switzerland and Norway), both of which have far higher levels of agricultural distortion than the EU. This suggests that their eventual accession could play some role in reducing distortions in these countries, even if not in the current EU countries.

The accession of the 10 new EU members from Central and Eastern Europe posed—and continues to pose—a challenge for the CAP and the process of reform. Though producers in the EU expressed the fear that the competition from those countries would oversupply markets in the EU, particularly for products such as pig meat, the European Commission was more concerned with the implied commitment to distribute direct payments to the large number of farmers that were about to join the EU and come under the political umbrella of the CAP. As it happened, prices rose steadily in the new entrants, but surplus production has not been a problem. Market disruption has been limited to isolated cases, and the eastern half of Europe is rapidly becoming integrated with Western markets. The prospect of additional costs under the CAP proved a real stimulant for reform, as funds allocated for a EU containing 15 countries were to be spread over 27 countries. So one can reasonably conclude that the latest EU enlargement has tightened the constraints already limting the CAP, even though it raised farm protection in Central and Eastern European countries (Anderson and Swinnen 2009).

The third conclusion is that domestic policy operates in an international environment, even as domestic politicians proclaim their autonomy. The development of policy in Western Europe became an international issue in itself, and external pressures could not be ignored. This posed a major challenge for policy makers, who could have used the external pressure as a reason for positive change or as a negative force that calls for defenses that deflect its impact. For many years, the EU attempted the latter strategy, though since 1990 it has made significant use of bilateral and multilateral agreements to guide agriculture in a direction that makes it compatible with a more open trade system. So economic distortions have been reduced as compatibility issues with the international economic system have been resolved. The pace of such developments has been dictated by those who were gaining most from the unreformed policy, but in the end the political benefits that flowed from reforming the policy came to outweigh the costs of change. Though considerable distortion in Western European agriculture still exists, the path to reducing that distortion is opening up. Allowing farmers to respond to consumer demands not artificially stimulated by government regulation is the most desirable way to point agricultural policy. The rhetoric of the CAP has adopted this approach for the past five years, and the policy is slowly moving in that direction.

Notes

1. In a recent survey of European economic growth since 1950, Crafts and Toniolo (2008) conclude that incentive structures are a crucial explanation of comparative growth rates of the economies of Europe (east as well as west).

2. The countries of Western Europe, for the purposes of this chapter, include the 15 countries that were members of the EU (the EU-15) in early 2004 plus Iceland, Norway, and Switzerland. In terms of policy development, each country is considered to have abandoned its autonomous domestic farm policy when it joined the EU. Thus, 18 countries had independent policies at the start of the period, in 1955, but by 2004 the number of independent policies had dropped to four—the EU, Norway, Iceland, and Switzerland. The EU then expanded eastward to include eight Central European countries (plus Cyprus and Malta) in May 2004, and again in January 2007 to include also Bulgaria and Romania. Most of this chapter focuses on the period prior to the EU's expansion eastward, while the chapter by Anderson and Swinnen (2008) focuses on Eastern Europe and the former Soviet Union.

3. Comparable figures for the United States show a utilized agricultural area of 379 million hectares and 2.1 million farms, with an average size of 180 hectares.

4. The agricultural sector in the United States employs 0.7 percent of the civilian labor force and contributes 0.9 percent of GDP.

5. The economy of Western Europe as a whole expanded by 2.7 percent over 1955–2004.

6. For a discussion of the different reactions of the Western European countries to the mid-19th-century period of relatively free trade, see Kindleberger (1975). Swinnen (2008a) emphasizes changes in social and political institutions (such as the expansion of voting rights, changes in landlord-tenant relationships, and the emergence of agribusiness organizations) that undoubtedly contributed to the policy environment.

7. The Enclosure Acts of the 18th century gave the United Kingdom a farm structure that allowed it to take advantage of the emerging technologies (mechanization) and farming practices of the period (Orwin 1949).

8. Output per hectare in Denmark more than doubled between 1880 and 1930, whereas the same measure stayed steady in the United Kingdom (Ingersent and Rayner 1999). Agriculture accounted for 45 percent of Denmark's GDP in 1880.

9. Rural incomes in Germany declined by almost 40 percent between 1929 and 1932.

10. Marshall Petain, in particular, had a vision of the agricultural destiny of France, reviving the notion of agricultural protection that had been promoted by Meline in the 19th century.

11. The enlargement of the EU to include 10 new members in May 2004 is discussed in the context of its influence on policy later in this chapter. Implications for the new members are dealt with in detail in Anderson and Swinnen (2009).

12. The abreviation EU is sometimes used even for the period before the transformation of the EEC into the EC and later into the EU.

13. See Josling (2008b) for a larger discussion on external influences on CAP reform.

14. The original six countries of the EEC were Belgium, France, Germany, Italy, Luxembourg, and the Netherlands. In economic terms, Belgium, Luxembourg, and the Netherlands had already agreed to an economic union (the Benelux Union) in 1948, and so were on the road to becoming a single unit.

15. The inclusion of agriculture in the free movement of goods within the EEC was at the insistence of the Dutch, who had struggled with the same issue in the formation of the Benelux Union.

16. This terminology was used for the cereal market regime. Some differences in instruments and nomenclature, however, were introduced in the other commodity-market organizations.

17. The world price over this period was about US$60 per ton.

18. The "non" from Charles de Gaulle in 1963 that ended the first set of talks about U.K. accession reflected a fear that the nature of the EEC, and in particular the CAP, would be compromised by the admission of a country that boasted of its "special relationship" with Washington. The United Kingdom was widely seen as a Trojan horse for U.S. policy interests, and its accession a sure recipe for continued pressure on the CAP.

19. The United Kingdom appeared to be an exception to this trend, though Howarth's price support measures did not reflect the full range of input subsidies that were introduced over those years.

20. The present study has a broader product coverage than the earlier attempts to measure protection.

21. Though independent data for the other two (much smaller) members, Belgium and Luxembourg, are not included in this study, it is likely that the distortions are similar in those two countries, as they have been in an economic union since 1922 (to which Luxembourg contributes just 4 percent of the union's population of less than 11 million).

22. Italy, however, had low rates of assistance through the 1950s.

23. Portugal was one of the countries studied in the study led by Kreuger, Schiff, and Valdés (1988). Its income level was below that of Brazil at the time, and the country had many of the features common to developing countries.

24. Price data for Switzerland and Norway for some products were not available prior to the latter 1970s so the NRAs for them were assumed to be similar to the earliest years for which data are available. Hence the lesser degree of fluctuation in their lines in figures 3.2b and 3.3b.

25. The Kennedy Round of GATT talks (1963–68) took place over this time, and the main focus of the exporting countries was to constrain the protectionist tendencies of the CAP. In this they were largely unsuccessful.

26. The major political reason for the decision of Sweden and Norway not to join the EEC was the requirement for neutrality that each had enshrined in their constitution. Finland was even more constrained, as it bordered on the Soviet Union, and was accordingly inhibited in foreign policy initiatives. Likewise, Austria was also constrained by the postwar treaties, and Switzerland by its determination not to join alliances or even multilateral organizations. Ireland stayed out both to keep in step with the United Kingdom, its major market, and to retain its neutrality. Ireland did not join EFTA in spite of the links with the United Kingdom, but it did retain some preferences into that market.

27. It may seem that the measure of assistance used in this study is unduly influenced by world price movements. But the NRA indicates the distortions at any particular level of world prices: if world prices change, then so do the distortions caused by policy. This phenomenon appeared again when food prices soared during 2005–08.

28. The European currency unit (ECU) was a basket of currencies used as a unit of account in the European Community prior to the launch of the euro in 1999.

29. The European Union was established in 1993 by the Maastricht Treaty.

30. Livestock protection was changed only incidentally, as tariffs and levies on pigs, poultry, and eggs had been tied to the levies on cereals.

31. Another member of EFTA, Iceland, did not participate in talks about joining the EU. The concern that that country would have to adhere to the Common Fisheries Policy has always been a major political hurdle. Lichtenstein, an independent country in a customs union with Switzerland, joined the EFTA-EU accord even though Switzerland did not.

32. Estimates for Iceland are included only from 1979, when comparable data became available from the OECD.

33. Among the other changes introduced in the Agenda 2000 reforms was the definition of a "second pillar" of the CAP to complement the market price and income support. This second pillar was to channel funds to rural development and be managed as a joint activity between the European Commission and the member states. An element of cofinancing was also introduced, as was the requirement to move some of the direct payments into this pillar (modulation). As spending on rural development has an ambiguous relationship with agricultural incentives (it is designed largely to offer attractive alternatives to farming), these second pillar funds are not be included here as distortionary payments.

34. The NRA was calculated with NPS payments and direct decoupled payments (both included and excluded) to help identify the importance of these policy changes.

35. The extent to which a payment is production-neutral (the degree of decoupling) differs depending on the way it is administered and the expectations of the recipient, so the categorization of

policies by the degree of production-neutrality is a hazardous endeavor. No attempt is made here to evaluate the extent of the distortion that might still be present from policies defined as decoupled from output price and quantity produced. Rather, the value the OECD estimates is included under certain categories of support as decoupled. For the years 1979–85, there was just one category, called "direct payments." From 1986, those payments are specified to comprise the OECD's items C (payments based on area planted/animal numbers), D (payments based on historical entitlements), F (payments based on input constraints), and G (payments based on overall farming income), all of which are defined in the OECD PSE-CSE Database. For 2005–07, those items were replaced by similar but newly defined items C to E. While the administration of the EU's direct payments policies varies among the member countries, data is insufficient to do more than assume the percentage points of NRA from decoupled payments is the same for all EU members. This categorization for economic purposes (and that for NPS assistance) should not be confused with the legal allocation of domestic support measures into the WTO's "colored boxes" in the context of international commitments.

36. In addition, the soybean oil produced along with the soybean meal was a major competitor for butter and for olive oil, increasing the surpluses of these crops.

37. Trade issues also played a role here, as the United Kingdom insisted on continued preferential access for New Zealand for butter as part of its accession arrangements.

38. Sugar beet production was developed and encouraged in the Napoleonic era as a food security strategy.

39. The emergence of this parallel justification for the CAP, as a guardian of a safe food supply, is described in Roderer-Rynning (2009).

40. A change in the oilseeds policy preceeded that in the cereals market, when a GATT panel ruled that payments to processors tied to the use domestic raw material were inconsistent with GATT obligations. This change allowed the EU to gain experience with a direct payment program.

41. The significance of EU enlargement in the Agenda 2000 and the 2003 Fischler reforms is explored in Swinnen (2008b).

42. Swinbank and Daugbjerg (2006) explore the links between the 2003 Fischler reforms and the WTO trade negotiations that began in 2001.

43. External influences on the CAP also included the many regional trade agreements concluded between the EU and other countries. In these agreements, domestic agriculture was usually sheltered from direct competition. But over time, the pressure to allow some market access became an additional stimulus to reform.

44. Much the same could be said for Iceland.

45. Due to the small economic size of Norway and Switzerland, however, the absolute value of the subsidies is much smaller than that of the EU. As a result, the international implications of such protection are less immediate.

46. In addition to the political nature of these decisions on funding the CAP, the institutional changes also have an impact. Thus, for instance, if the Lisbon Treaty were to be ratified, the European Parliament would have a right to codecision on major aspects of the CAP (though it would keep its consultative role for technical issues). See Roederer-Rynning (2009) for a fuller description of these changes.

47. The link between the CAP and the way in which decisions are made in the EU has been emphasized by several writers. See Swinbank (1989) for an early discussion, and Pokrivcak, Crombez, and Swinnen (2006) for a more recent examination of the importance of decision-making institutions.

References

Anderson, K., and Y. Hayami. 1986. *The Political Economy of Agricultural Protection*. London and Sydney: Allen and Unwin.

Anderson, K., R. Lattimore, P. Lloyd, and D. MacLaren. 2009. "Australia and New Zealand." Chapter 5 in this volume.

Anderson, K., and J. Swinnen. 2009. "Eastern Europe and Central Asia." Chapter 6 in this volume.
Anderson, K., and E. Valenzuela. 2008. *Global Estimates of Distortions to Agricultural Incentives, 1955 to 2007.* Core database at http://www.worldbank.org/agdistortions.
Avillez, F., T. Finan, and T. Josling. 1988. *Trade, Exchange Rates, and Agricultural Pricing Policy in Portugal: The Political Economy of Agricultural Pricing Policy*, World Bank Comparative Studies, Washington, DC: World Bank.
_____. 1991. "Portugal." In *The Political Economy of Agricultural Pricing Policy: Volume 3 Africa and the Mediterranean*, ed. A. Krueger, M. Schiff, and A. Valdés, Baltimore: Johns Hopkins University Press.
Corkhill, D. 1995. *The Portuguese Economy Since 1974.* Edinburgh: Edinburgh University Press.
Crafts, N., and G. Toniolo. 2008. "European Economic Growth, 1950–2005: An Overview." CEPR Discussion Paper 6863, Centre for Economic Policy Research, London.
Eurostat Database. 2006. http://epp.eurostat.ec.europa.eu/portal/page/portal/eurostat/home/ (accessed June 2006).
FAO (Food and Agriculture Organization). 1973. "Agricultural Protection: Domestic Policy and International Trade." FAO Conference Document C 73/LIM/9. Rome: FAO.
Gardner, B. 2009. "The United States and Canada." Chapter 4 in this volume.
Gulbrandsen, O., and A. Lindbeck. 1973. *The Economics of the Agricultural Sector*. Uppsala: Almquist and Wicksell.
Hallett, G. 1981. *The Economics of Agricultural Policy.* Oxford: Blackwell Press.
Heidhues, T., T. Josling, C. Ritson, and S. Tangermann. 1978. "Common Prices and Europe's Farm Policy," Thames Essay 14, Trade Policy Research Centre, London.
Honma, M., and Y. Hayami. 2009. "Japan, Republic of Korea, and Taiwan China." Chapter 2 in this volume.
Howarth, R. W. 1971. *Agricultural Support in Western Europe*. London: Institute of Economic Affairs.
Ingersent, K., and A. J. Rayner. 1999. *Agricultural Policy in Western Europe and the United States*. Cheltenham: Edward Elgar.
Josling, T. 1970. "Exchange Rate Flexibility and the Common Agricultural Policy of the European Economic Community." *Review of World Economics* 104 (1): 57–95.
_____. 2008a. "Distortions to Agricultural Incentives in Western Europe." Agricultural Distortions Working Paper 61, World Bank, Washinton, DC.
_____. 2008b. "External Influences on CAP Reform: An Historical Perspective." In *The Perfect Storm: The Political Economy of the Fischler Reforms of the Common Agricultural* Policy, ed. J. F. M. Swinnen. Brussels: Centre for European Policy Studies Publications.
Josling, T., and S. Harris. 1976. "Europe's Green Money." *The Three Banks Review* 109: 57–72.
Kindleberger, C. P. 1975. "The Rise of Free Trade in Western Europe, 1820–1875." *Journal of Economic History* 35 (1): 20–55.
Lieberman, S. 1995. *Growth and Crisis in the Spanish Economy, 1940–93*. London: Routledge.
McCrone, G. 1962. *The Economics of Subsidizing Agriculture*. London: Allen and Unwin.
Moyer, W., and T. Josling. 1990. *Agricultural Policy Reform: Politics and Processes in the EC and USA*. Hemel Hempstead, U.K.: Harvester-Wheatsheaf Publishers.
_____. 2002. *Agricultural Policy Reform: Politics and Process in the EU and the US in the 1990s.* Aldershot, U.K.: Ashgate.
Nash, E. F. 1955. "The Competitive Position of British Agriculture," *Journal of Agricultural Economics* 11 (3): 222–41.
Nash, E. F., and E. A. Attwood. 1961. *The Agricultural Policies of Britain and Denmark: A Study in Reciprocal Trade*. London: Land Books.
OECD (Organisation for Economic Co-operation and *Development*). 1967. *Agricultural Policies in 1966*. Paris: OECD.
_____. 2006. Agricultural statistics database. http://www.oecd.org (accessed April 2007).
_____. 2008. *Producer and Consumer Support Estimates, OECD Database 1986–2007.* http://www.oecd.org (online database for 1986–2007 estimates; OECD files for estimates using an earlier methodology for 1979–85).

Orwin, C. S. 1949. *A History of English Farming*. London: Thomas Nelson and Sons.

Pepelasis, A., G. Yannopoulos, A. Mitos, and others. 1980. "The Tenth Member—Economic Analysis." Sussex European Papers 7, University of Sussex.

Pokrivcak, J., C. Crombez, and J. F. M. Swinnen. 2006. "The Status Quo Bias and Reform of the Common Agricultural Policy: Impact of Voting Rules, the European Commission and External Changes." *European Review of Agricultural Economics* 33 (4): 562–90.

Roederer-Rynning, C. 2009. "The Common Agricultural Policy." In *Policy-Making in the EU*, ed. H. Wallace, M. Pollak, and A. Young. Oxford: Oxford University Press.

Roesener, W. 2000. "The History of German Agriculture." In *Agriculture in Germany,* ed. S. Tangermann. Frankfurt: Verlag.

Snyder, L. L. 1945. "The American-German Pork Dispute, 1879–1891." *Journal of Modern History* 17 (1): 16–28.

Swinbank, A. 1989. "The Common Agricultural Policy and the Politics of European Decision Making." *Journal of Common Market Studies* 27 (4): 303–22.

Swinbank, A., and C. Daugbjerg. 2006. "The 2003 CAP Reform: Accomodating WTO Pressures." *Comparative European Politics* 4 (1): 47–64.

Swinnen, J. F. M. 2008a. "The Political Economy of Agricultural Protection: Europe in the 19th and 20th Century." Paper prepared for the Project on Political Economy of Agricultural Distortions, World Bank, Washington, DC.

_____. 2008b. "The Political Economy of the 2003 Reform of the Common Agricultural Policy." In *The Perfect Storm: The Political Economy of the Fischler Reforms of the Common Agricultural Policy,* ed. J. F. M. Swinnen,. Brussels: Centre for European Policy Studies Publications.

Tracy, M. 1989. *Government and Agriculture in Western Europe*, *1880–1988*. Hemel Hempstead, U.K.: Harvester Wheatsheaf.

Tyers, R., and K. Anderson. 1992. *Disarray in World Food Markets: A Quantitative Assessment*. Cambridge and New York: Cambridge University Press.

4

UNITED STATES AND CANADA

Bruce L. Gardner*

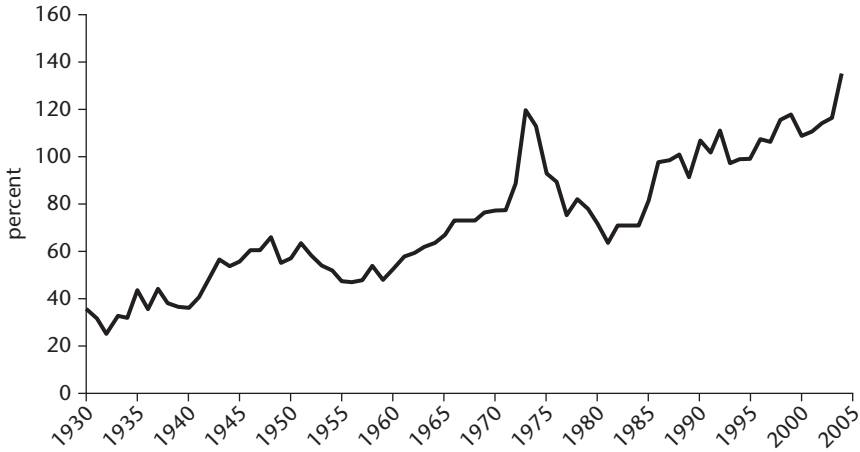
There is much in common between the agricultural sectors of the United States and Canada. The number of farms in North America has been falling for decades, a well-known trend that has given the public a sense that agriculture is a hard-pressed industry in decline. What is less well known is that the decline has greatly slowed over the past 20 years. During the 1950s and 1960s, the number of farms in the United States fell at the rate of 3 percent annually, declining by half in 20 years. Between 1995 and 2005, the number declined by only 4 percent for the whole decade (figure 4.1).[1] To fully understand the trend, it is necessary to consider farms of different sizes separately. The number of farms with annual sales of more than US$500,000, for example, quadrupled between 1978 and 2005, from 18,000 to 79,000. The number of farms sales between US$100,000 and US$500,000 also increased during those years. The number of farms with sales of less than US$25,000 per year, however, has held quite steady. Farms with sales between US$25,000 and US$100,000 represent the largest portion of the total decline.

Along with the decline in the number of farms, U.S. land dedicated to farming has also declined, at an annual rate of 0.4 percent between 1950 and 2005. Over those years, this has resulted in the loss of about 230 million acres of farmland.

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*Professor Gardner died in March 2008. The editing of this chapter (which does not include a discussion of the latest U.S. Farm Bill, but see Orden, Blandford, and Josling [2009] for more on the topic) was done as faithfully as possible given his original manuscript. The author was grateful for helpful comments from workshop participants, and for invaluable help with data compilation by Johanna Croser, Esteban Jara, Marianne Kurzweil, Signe Nelgen, Francesca de Nicola, Damiano Sandri, and Ernesto Valenzuela. The working paper version of this chapter (Gardner 2008) contains additional background material and appendix tables.

Figure 4.1. Farm Household Income as a Percent of National Household Income, United States, 1930–2005



Source: Gardner (2002, figure 3.12) and U.S. Department of Agriculture, Economic Research Service, Briefing Rooms (http://www.ers.usda.gov/Briefing/).

Available cropland acreage, however, has remained relatively constant over this period, with 345 million acres harvested in 1950, versus 321 million acres in 2005. Considering the increase in irrigated and better-drained acreage, quality-adjusted cropland may even have increased slightly. Together with declining farm numbers, the acreage data imply an increase in the average size of farms. But as the decline in numbers has slowed significantly in recent decades, so has the growth in average farm size. In 2005, the average U.S. farm had 444 acres (180 hectares); 30 years earlier, the average size was 431 acres (175 hectares).

In Canada, the number of farms peaked in 1941. In the 40 years between 1961 and 2001, the number of farms declined by half, from 480,000 to 246,000. This is a rate of decline of 1.7 percent annually, and faster than the U.S. rate of 1.4 percent during the same period. Though Canada's land devoted to cultivated crops declined over the 1960–2000 period, it did so less rapidly than the number of farms: Canada had 111 hectares of cropland per farm in 1961, and 147 in 2001 (compared to about 75 hectares of cropland per U.S. farm in 2002). Yields and value of output per hectare of cropland were lower in Canada than in the United States, however, reflecting the generally cooler and drier climate of Canada. Total agricultural land declined much more slowly in Canada than in the United States—indeed, hardly at all, from 69.8 million hectares in 1961 to 67.5 million hectares in 2001.

Relative to the decline in the number of farms, the farm labor force in Canada and the United States continues to fall at a more rapid pace, mainly because there is less unpaid family labor. At the same time, the use of material inputs (fertilizers, fuels, and purchased feed additives) has doubled in the United States since 1950, leaving the aggregate input index calculated by the U.S. Department of Agriculture (USDA) remarkably constant, at 102 in both 1950 and 2000 (base 1996=100). But agricultural output has continued to grow at a steady clip, so total factor productivity (TFP) growth has been an impressive 1.9 percent per year, with no evidence of slowdown in the trend in recent years despite energy price shocks, environmental constraints, and concerns about exhaustion of TFP gains attributable to earlier breakthroughs in improved hybrid seeds and other innovations. So far, continued advances in genetics, livestock management, capital equipment, and economies of scale have kept the real cost of U.S. farm products on a pronounced downward path. These cost declines have been largely reflected in lower prices of farm products and hence lower costs of raw materials for other foods. While the average price of farm products rose 40 percent between 1978 and 2005 (1.2 percent per year), the gross domestic product (GDP) deflator rose at an annual rate of 3.2 percent. Thus the real price of agricultural output fell by an average of 2 percent during this period—essentially the same as the rate of TFP growth.

Overall farm size (in terms of total land and output per farm) has increased in Canada at a rate faster than in the United States since the 1950s. As of 2001, the average Canadian farm was 670 acres, compared to 440 acres for American farms. Larger farm size in Canada has not hindered output or productivity growth, though: real output per farm increased more rapidly than farm size, reflecting increased yields per hectare and a strong trend in total factor productivity growth, which is estimated to have increase 2.5 percent annually in recent decades (Furtan 2006).

The fact that farm prices have fallen in real terms largely in parallel with cost decreases indicates that real incomes of farmers may not have benefited from farm productivity growth. Yet the incomes of people employed in agriculture have in fact grown, both in real dollar terms and relative to real incomes of the nonfarm population. From the 1930s to the 1960s (which includes the Great Depression and Dust Bowl years), farm households could be reasonably categorized as a low-income population. By the 1990s, farm and nonfarm household incomes had equalized. Since 2000, U.S. farm household incomes have been significantly higher than those of nonfarm households (figure 4.1).

How has this income growth been achieved, given that the decline in real prices has equaled the decline in farmers' costs of production? The answer is the increasing importance of farm households' integration into the nonfarm economy, so that in recent years, off-farm income sources account for 85–90 percent of average

U.S. farm household incomes. These data suggest that income from farming itself may indeed be quite low. However, a full understanding of the farm income data requires consideration of differences between farms of different sizes. Numerically, a majority of farms—87 percent in 2004—have less than US$10,000 annually in sales. The costs of farming at this scale are such that these farms on average earned only US$1,020 from farming, and more than half are estimated to have losses from their farm enterprises. Nonetheless, the average household income of these farms is US$71,500, thanks to off-farm income. At the other end of the spectrum, family farms classified by the USDA as commercial scale operations (those which have US$250,000 or more in sales) earned an average of US$145,300 from farming plus US$46,038 from off-farm sources, and these latter farms produce more than two-thirds of U.S. agricultural output.[2]

On a per-farm basis, net income from farming in Canada during 2001–05 was almost the same as in the United States, although net farm income in Canada, as in the United States, was highly variable from year to year.[3] On average, Canadian farm households receive less off-farm income than in the United States.

Agricultural Policies in the United States

Legislative proposals in the United States to improve the economic situation of farmers through governmental intervention in commodity markets were first developed conceptually as remedies for the precipitous fall in product prices in the aftermath of World War I. After several failed attempts to enact farm support bills in the 1920s, the further decline in agriculture's situation with the onset of the Great Depression of 1929–32 led to legislative success in the landmark New Deal programs beginning in 1933. These programs had the principal purposes of increasing the incomes of farm people (with an explicit goal stated in terms of "parity" of farm income with reference to a pre–World War I standard) and stabilizing farmers' revenues. The fateful choice was to attempt to achieve both these goals by means of supporting farmers' prices received for a subset of commodities ("basic" commodities in U.S. law—initially, wheat, corn, cotton, rice, tobacco, pork, and milk).

The four main feasible means of market intervention in pursuit of higher producer receipts had been implemented for key commodities and were already in use in the 1930s: production controls, government purchases of commodities for stockpiling at price support "loan rates" at which farmers could forfeit the basic commodities instead of making repayment of the loan plus interest, disposal of surplus stocks through distribution or subsidized sale for export or to domestic consumers, and direct payments to producers. The first direct payments, in 1933, were tied to farmers' idling of land or destruction of livestock, so from their inception they were not classical production-inducing subsidies.

In 1936, the U.S. Supreme Court ruled that the federal government had no authority to administer land-idling acreage controls under New Deal farm legislation, on the constitutional grounds "that powers not granted are prohibited. None to regulate agricultural production is given, and therefore legislation by Congress for that purpose is forbidden." Subsequently, the Court's alleged respect for precedent was not extended to this decision, and many later production control measures have passed constitutional muster.[4] At the time, the result of the Court's decision was a merger of prior concerns about conservation with measures to remove acreage from commodity production. This was done in the Soil Conservation and Domestic Allotment Act of 1936 principally by defining "soil-depleting" crops (the main basic commodities) and "soil-conserving" crops (grasses and legumes), and paying farmers to substitute the latter for the former.

Trade policy was almost negligible in the 1930s' programs. The policy proposals of the 1920s, in contrast, had given a central role to export promotion. The Smoot-Hawley Tariff Act, signed into law in June 1930 (despite a petition to President Hoover signed by more than 1,000 economists asking that he veto the bill) protected manufacturing much more than agricultural products. It is notable, however, that the crossover Democratic votes needed to pass the bill in the Senate (the Republicans were then the main protectionists and the Democrats free traders) were lured by the desire to protect sugar (Louisiana), wool (Wyoming), and Florida fruit (Benedict 1953). By 1934, it was clear that even these elevated tariffs were insufficient to protect sugar, and the first Sugar Act added sugar to the list of basic commodities, authorizing import and production quotas. With respect to overall agricultural trade, by 1934 the combination of the Great Depression and trade restrictions in the United States and elsewhere reduced both U.S. agricultural exports and imports to about US$600 million per year each, one-sixth of the levels of 1920.

Experience during and after World War II made it apparent that export demand was capable of creating farm prosperity to an extent, and with far less cost and turmoil, than a decade of intensive effort by the federal government had been able to deliver in the 1930s. Under the Marshall Plan, U.S. exports of foodstuffs were 19 million tons annually in 1947–50, compared to 4 million tons in 1935–39. However, three aspects of the situation in the United States were obstacles to free-trade ideas in agriculture. First, the Marshall Plan and subsequent agricultural exports were in large part financed by subsidies rather than being bought abroad at world market prices. Second, U.S. commodity policy held some domestic commodity prices above world levels, so that import restrictions were vital to these policies (otherwise, the program would have to support the world price, not just the U.S. price). Third, the relatively few U.S. importable farm commodities—notably sugar, dairy products, and some meats and fruits—had sufficient political

power to maintain protection via tariffs or quotas even when giving them up as part of a larger trade liberalization agreement would have been beneficial to the nation as a whole.

Section 22 of the Agricultural Adjustment Act of 1933 required import quotas to be imposed if imports threatened the effectiveness of a price support program. This situation led the United States to join Europe in pressing for a waiver of agricultural products from General Agreement on Tariffs and Trade (GATT) members to reduce export subsidies or provide increased import access to their markets. Some experts argued vigorously for changing U.S. farm programs to make them compatible with liberal trade, notably in the "Brannan Plan" of 1948 and other proposals to replace production controls and price supports by payments to farmers and adjustment assistance (Johnson 1950). But U.S. policy did not turn to favoring the inclusion of agriculture in the GATT until the 1960s. By then, European farm policy had taken a decisively protectionist path that precluded significant agricultural trade liberalization.

Beginning with the Agricultural Trade and Development Act of 1954 (P. L. 480), U.S. policy followed a path suggested by the Marshall Plan of using food aid to foreign countries as a mechanism for surplus disposal. During 1956–64, about one-fourth of U.S. agricultural exports were shipped under this program. Though P. L. 480 exports have had varying degrees of concessionary pricing, depending on the status of the importing country, overall there has been a substantial subsidy element in these exports. Since the 1970s, the program has shipped a fairly constant amount of just under US$1 billion in commodities annually. In addition, going back to 1935, government-provided export credit and guarantees of repayment to private sector lenders have been used to stimulate foreign demand for U.S. commodities. Exports have also been promoted through USDA grants to farm or commercial interests for the purpose of informational and sales efforts abroad. Revamped as the Marketing Assistance Program in 1990, spending under such programs still amounts to about US$100 million annually.

More explicit export subsidies were paid through most of the post–World War II period, most notably in wheat, where their role was negotiated under the International Wheat Agreement starting in 1949.[5] In the 1960s, more than 85 percent of U.S. wheat exports were assisted by subsidies. Then, during the worldwide commodities boom of the 1970s, it appeared that the era of export subsidies might be replaced by commodity scarcity, with trade policies restraining rather than subsidizing exports. The United States embargoed grain shipments to the Soviet Union and a few other countries for short periods during 1974–80. Commodity scarcity proved temporary, however. The worldwide collapse in commodity prices of the 1980s provided the stimulus for export promotion programs. The European Community intensified its longstanding practice of export subsidies (Josling 2008). The United States began offering specific-destination export

subsidies in retaliation in the early 1980s, regularizing this approach in the Export Enhancement Program (EEP) established in 1983 under the Reagan Administration. Where feasible, Canada met the subsidy competition through the pricing policies of the Canadian Wheat Board (CWB).

The EEP, like the pre-1970s export subsidies, was first and foremost a wheat program. It began as low-price government sales of wheat stocks held by the Commodity Credit Corporation (CCC) as a result of the domestic price support programs to North Africa in 1983. The EEP was complicated, using a payment-in-kind approach. USDA would determine particular countries and commodities for which it believed export subsidies would be helpful in selling U.S. products. Exporters would then negotiate a deal with a foreign buyer at a price discounted from prevailing world trading prices. The exporter would then apply to USDA for a payment sufficient to make up the difference between the market price and the negotiated discount price. USDA, if it approved the sale, would give the exporter sufficient wheat from CCC stocks to cover the payment, called the export "bonus." By the late 1980s, the bonuses were totaling US$1 billion annually, with more than 80 percent of EEP commodities accounted for by wheat in 1985–89. The program was widened and generalized so that CCC wheat stocks could be used to subsidize exports of other commodities, and in 1990, when available CCC wheat stocks were exhausted, in-kind bonuses were replaced by cash.

As the United States expanded its export subsidies in the 1980s, Europe and Canada, within their respective support structures, met the competition with increased export subsidies of their own. The Uruguay Round of GATT negotiations was a natural venue for mutual agreement to rein in this costly competition. After long and tortuous negotiations, the finalized Uruguay Round Agreement on Agriculture (URAA) contained disciplines that, together with strategic rethinking and changed grain market conditions, greatly reduced the role of export subsidies after the mid-1990s in both the United States and the European Union. Both have agreed such subsidies should be outlawed, which has allowed farm policy discussion in the Doha Round of the GATT's successor, the World Trade Organization (WTO), to focus primarily on market access (import protection via tariffs and quotas) and domestic price supports via subsidy payments to producers.

Import protection measures

A hundred years before the first domestic commodity support programs were enacted, international trade policy was already a hot political issue in the United States. Manufacturing interests of the North wanted protection and, after 1820, received it in the face of opposition from Southern agricultural interests, who bought imported manufactured producer and consumer goods and also linked their capacity to export some products, especially cotton, to the U.S. willingness to

import from Europe. The North, to succeed politically, needed an alliance with the West, which was in place until the Jackson presidency, when his vetoes of legislation for Western improvements changed the balance of interests in favor of lower tariffs—ultimately, the "free trade tariff" legislation of 1846, which generated average tariff rates of 25 percent in 1850 (calculated from tariff receipts as a percentage of the value of dutiable imports), as compared to 57 percent in 1830. Higher tariff protection resumed after the Civil War, especially on manufactured goods, with average rates of about 40 percent between 1870 and 1910. Throughout this period, there were tariffs on imported agricultural products such as wool and sugar, but rates averaged about five times as much for manufactured imports as for agricultural imports (Davis, Hughes, and McDougall 1965).

Table 4.1 shows the evolution of U.S. protection as measured by customs duties as a percentage of the value of imports. This measure does not always provide a

Table 4.1. Customs Receipts as a Percentage of Value of Imports, United States, 1821–2000

(percent)

	Manufactured products	Agricultural products	All merchandise
1821	47	47	43
1830	64	62	57
1840	21	00	18
1850	27	3	25
1860	19	2	18
1870	46	47	50
1880	39	6	29
1890	41	8	30
1900	40	15	28
1910	29	9	21
1920	7	2	6
1930	18	8	15
1940	15	7	13
1950	9	2	6
1960	—	—	7
1970	—	—	7
1980	—	—	3
1990	—	—	3
2000	—	—	1.6

Sources: Davis, Hughes, and McDougall (1965) for manufactured and agricultural products; Carter (2006) for all merchandise.

Note: — = not available.

good indicator of the trade effects of tariffs, however, notably because a tariff so high as to shut off all imports generates no customs duties and so counts the same as free trade in calculating the numerator of this measure. Irwin (2006) reviews this and other shortcomings of that table 4.1 indicator, and estimates a trade restrictiveness index that takes into account the effect of a tariff on imported quantities and the fact that the distortive effects of a tariff increase more than proportionately with the height of the tariff. His estimates indicate that for all merchandise trade, while customs duties as a percentage of all imports had fallen to 60 percent of the 1875 level in 1931, the TRI in 1931 remained at 97 pecent of its 1875 level—that is, the reduction in the crude measure greatly overstates the extent of liberalization. But between 1931 and 1960 the TRI fell faster than the crude measure. By 1960, the extent of overall trade liberalization between 1875 and 1960 was about the same for both measures. That is, by either measure, the restrictivenes of tariffs in the post–World War II period was about one-fourth the level of the late 19th century (Irwin 2006).

Because the United States has always been a net exporter of agricultural goods, and imported manufactured goods are used directly and in the production of inputs used in farming, the tariff structure effectively taxed agriculture throughout the 19th century. The estimates of Irwin (2006) indicate that for the 1870–1900 period, an average 30 percent protection on imported goods (duties as a percentage of all import values including duty-free imports) generated a net subsidy to import-competing manufacturers of 15 percent and a net tax on agriculture (and other exporters) of about 11 percent.[6]

This situation was reversed by increasing protection (through both import restrictions and domestic support) of agriculture after 1920. Import duties on wheat, maize, wool, sugar, and meat were raised sharply in "emergency" legislation of 1921 and the Tariff Act of 1922 when "the representatives of the agricultural states had committed themselves to a policy of high and even ruthless protection" (Taussig 1931, pp. 452–53). At the same time, imports of many manufactured products used in farming were made duty-free.[7] After 1910, U.S. manufacturing became sufficiently export-oriented itself as not to be the strong political force for protection it once was, and after World War II protection of manufacturing steadily declined to the point that by 2000, import duties as a percentage of aggregate import value had declined to 1.6 percent (albeit with additional signficant protection of politically sensitive sectors such as textiles through nontariff barriers). Tariffs on agricultural products were also reduced, though protection from imports increased due to quantitative restrictions. In short, between the broad periods of 1820–1900 and 1930–2000, there was a substantial turnaround in manufacturing as compared to agricultural import protection. However, it was already apparent in the 1920s that too much agricultural production was exported to make import

protection effective in alleviating farmers' losses in the post–World War I price plunge, and this changed the focus of farm policy in terms of other measures.

Overall, protection of agricultural products relative to merchandise has increased over the past 50 years. Though rates of import protection of the agricultural and manufacturing sectors were equal in the late 1950s and 1960s, protection of manufacturing has since fallen faster than assistance to agriculture. It should be noted, however, that comparing market-distorting agricultural protection with merchandise tariff rates has become decreasingly relevant in capturing the main U.S. import protection elements in either agriculture or manufacturing, because in agriculture and in industries such as steel, automobiles, and textiles, the more important distortions of international trade have become quantitative restrictions, often in the form of "voluntary restraint" agreements between the United States and exporting countries. More economically relevant measures compare internal U.S. prices with international prices for the same goods, as discussed below. Nonetheless, the picture remains essentially the same—that governmental action to assist agriculture is increasing in impact compared to action to protect manufacturing.

Export subsidy measures

An indicator of the role of export subsidies can be obtained from the value of subsidies paid per unit quantity of exports. In the United States, these have been most significant for wheat, as noted above. Subsidies were as high as US$1.3 billion for exported wheat in 1993 under the EEP. They were targeted to particular sales, however, and not available for all exports. This raised questions about their efficacy in actually increasing export quantities. By focusing subsidy funding on particular sales, the government's expenditures were made more effective at increasing those targeted sales. Subsidized wheat received payments as high as US$43 per ton in 1991. But at the same time, large sales to other importers, notably Japan, were not subsidized at all.

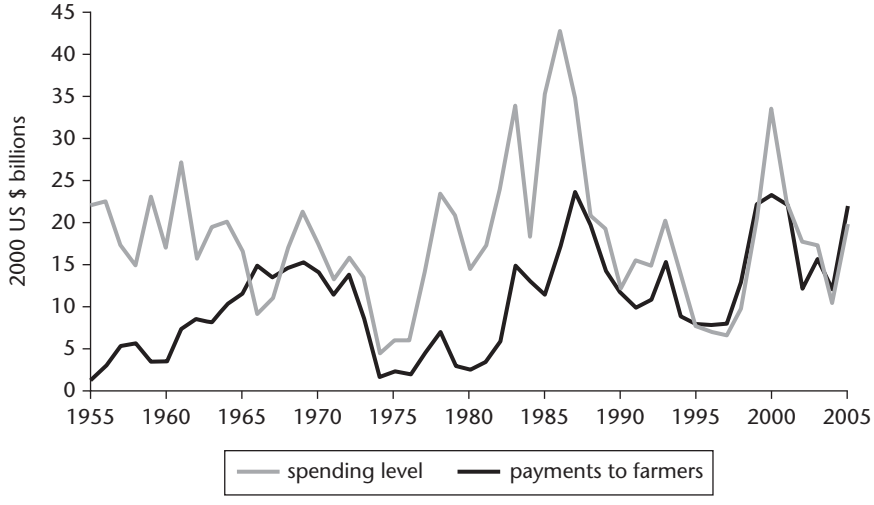
Because of the targeted nature of the subsidies, the proper measurement of the subsidy, not to mention its effects on net exports, is difficult to nail down (as is the effects of the wheat export embargoes of the 1970s).[8] The USDA budget provides information on the range of export promotion activities. In fiscal year[9] 2005, as in the several years prior, there were no export subsidies under the EEP or the more recent Dairy Export Enhancement Program. A total of US$2.2 billion was spent on USDA's Foreign Agriculture Service (FAS) programs, but US$1.7 billion of this was on food aid programs. Market development programs and export credit guarantees are export promotion activities that also have features making them similar to export subsidies. In fiscal 2005, FAS spent US$184 million on market development programs such as sending teams abroad to make the case for U.S. commodities

and informational campaigns in the United States and abroad. Export credit guarantees covered US$2.6 billion in sales during fiscal 2005 (at a budgetary cost of US$137 million, which is a rough indicator of the subsidy element of the program). In response to a WTO dispute resolution panel in 2005, the United States has eliminated some high-risk countries from the guarantees and made other changes "intended to remove any long-term subsidy component of the program" (USDA 2006, p. 38). Unlike import restrictions, whose effects can be estimated by comparing internal and world reference prices because they are focused on a few commodities and create big effects, these export programs are spread so thinly across many commodities that it would not be credible to attribute to them any observed elevation in U.S. commodity prices relative to foreign prices for the same commodities. Rather, it makes more sense to treat such expenditures together with domestic programs as elements of overall non-product-specific (NPS) support, following Organisation for Economic Co-operation and Development (OECD) practice.

Direct producer support through commodity programs

Payments to producers have been a central element in U.S. agricultural policy since the first New Deal programs of 1933. Figure 4.2 shows payments in billions of U.S.

Figure 4.2. Expenditure on Commodity Programs and Payments to Farmers, United States, 1955–2005



Source: Author's compilation from the Congressional Budget Office (CBO), Washington, DC.

dollars in real terms using the GDP deflator of 2000 = 100. For comparison, the figure also shows the total level of spending on "commodity stabilization and support" as measured by the U.S. Office of Management and Budget. Spending levels are higher than payments prior to 1990 because much of the spending was for removing products from the market using stockpiling programs, purchases for sale to schools and other food assistance, or subsidized sales abroad. In recent years, spending has been overwhelmingly dominated by direct payments to producers.[10]

Summarizing the effects of U.S. direct support programs is difficult because of the variety of policy instruments used and their evolution toward being increasingly decoupled from production decisions over time. Throughout the 1950s, the price suppport loan rates at which farmers could forfeit basic commodities to the CCC remained a primary policy instrument, and were reinforced by payments for idling land. By the 1960s, lower loan rates and direct payments to reduce forfeitures at a supported price entered the policy arsenal. In the 1970s, direct payments were further institutionalized in the form of "target prices" and "deficiency payments" to farmers when the price of basic crops they produced fell below the target. By the 1980s, deficiency payments were being made on only 85 percent of a farmer's base acreage, and for a historical level of "program yields." Deficiency payments thus came to be somewhat decoupled from production decisions, although the specific basic crop for which payments were received had to be grown on the corresponding base acreage. Farmers also had to comply with annual acreage reduction requirements to be eligible for deficiency payments. Annual acreage reductions idled at an average of 46 million acres during 1983–88 as world agricultural prices collapsed in the mid-1980s, and then fell to much lower levels.

Income support in the 1996 and 2002 Acts

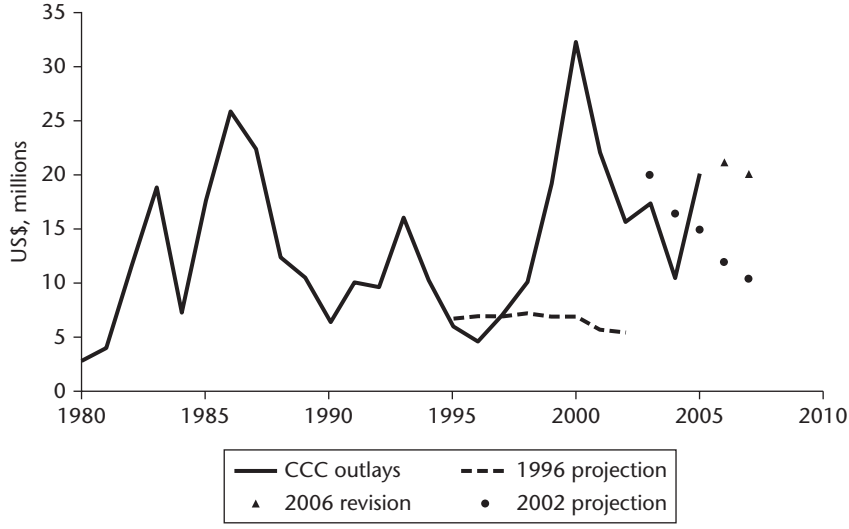
The most important change in support to farmers contained in the 1996 Farm Act was its Title 1, the Agricultural Market Transition Act (AMTA). With rising world prices for U.S. farm commodities in 1995 and 1996, AMTA replaced target prices, deficiency payments, and annual acreage set-asides for wheat, rice, feed grains, and cotton by a scheme of fixed "production flexibility" payments. The payments were based on amounts farmers received, or would have received if they had participated, in the pre-1996 deficiency payment program. The amount of the payment was independent of prices and was fixed by each farm's production history. It could not be increased or decreased by changes in the farm's acreage or yield of the program crops, while the program allowed farmers to plant a wide range of crops on base acreage (the reasons for the "production flexibility" label). The production flexibility payments were in this sense further decoupled from both prices and production, although payments were not divorced from all production decisions in

that producers lost payments if they increased plantings of nonsupported fruits or vegetables or if they left farming completely. The aggregate of payments was scheduled to decline from about US$6 billion annually in 1996 and 1997 to US$4 billion in 2002. AMTA payments constituted the bulk of projected commodity support in 1996, and the projections were for substantially less government spending on commodity programs than had occurred before 1995, as figure 4.3 shows.

The 2002 Farm Act

Within a year after the 1996 Farm Act was introduced, commodity prices began to fall substantially. By 1998, as the Asian financial crisis and China's lack of an expected increase in imports weakened world demand and hence U.S. exports and prices, it became clear that prices were likely to remain at low levels for some time. These low prices triggered two policy responses, one automatically and one through Congressional response. The automatic response came through the "marketing loan" program. This program was introduced in 1990 to replace the former loan rate program of supported market prices through forfeitures of commodities at an established "loan rate" price. The forfeiture program created a market price floor at the loan-rate price, because farmers could always get that price through the loan program. To keep the program from resulting in the government accumulating

Figure 4.3. CCC Commodity Program Outlays, United States, Fiscal Years 1980–2007



Source: Author's compilation from the CBO, Washington, DC.

unwanted stocks of commodities, loan-rate prices were mostly kept below actual average prices after the 1960s. The marketing loan program precluded stock accumulation altogether by having the government not actually acquire grain, but instead by offering farmers a "loan deficiency payment" equal to the difference between the policy-determined loan-rate price (which varied from county to county) and the local county price. Because the loan-rate prices were set below average prices, hardly any loan deficiency payments were made during 1990–97. But by 1998, commodity prices fell sufficiently below loan-rate levels to trigger US$500 million in loan deficiency payments. Unlike the target-price-related deficiency payments paid on a historically fixed level of output, the loan deficiency payments are made on all of current output. In fiscal years 1999, 2000, and 2001, these payments rose to US$3.4 billion, US$6.4 billion, and US$5.3 billion, respectively, as all the grains, cotton, and rice experienced continuing historically low market price levels.

The Congressional response to these low prices was to enact emergency "market loss assistance" programs in each of the years 1998–2001. These programs provided an average of US$4.8 billion annually for those four years and added proportionally to each farmer's production flexibility payments (in most cases doubling them during 1999–2001). Together, the market loss assistance program and production flexibility payments were the main factors behind the huge expansion of commodity program spending during 1998–2001 as compared to the levels anticipated in 1996, shown in figure 4.3. Actual spending in those years averaged more than US$20 billion, rather than the US$6 billion that was expected.

By 2001, it was clear that Congress was dissatisfied with the political wrangling involved with annual emergency legislation and that more permanent revision of the 1996 Farm Act would be legislated. The Farm Security and Rural Investment Act of 2002 provided for additional spending on farm programs of more than US$50 billion above the projected baseline spending if the 1996 Farm Act had been continued. This increase was possible because at that time the U.S. budget was—and was expected to continue to be—in surplus, and because farm commodity producers had sufficient political power to defeat competitors for the funds available. This expanded commitment is the most significant—and to some the most shocking—aspect of the 2002 Farm Act.[11]

In addition to the issue of spending levels, the 2002 Act addressed structural issues in terms of the form and scope of farm subsidies. Some farm groups, mainly centered on wheat growing in the Great Plains, wanted to return to supply management, in order to reduce production and increase commodity prices. Environmental groups pushed to have a substantial part of the new spending allocated to conservation and environment-improving programs. As enacted, the 2002 legislation continued the production flexibility payments from 1996

(renamed fixed direct payments). Though supply management was rejected, a new "countercyclical payment program" was added to provide payments that rise or fall inversely with market prices (although the quantity base for payments remained fixed, with an option for one-time updating to 2002, for each farmer). This amounted basically to a reinstitution of pre-1996 deficiency payments, but without annual acreage reduction set-aside requirements and with farmers retaining the planting flexibility introduced in 1996. In addition, earlier production quotas for peanuts were replaced with strengthened support programs similar to the programs for other crops, and a new program of direct support payments for milk was added. Conservation and environmental programs ended up with a substantial share of the new spending, but not as much as the proponents of these programs had argued for.

The Congressional Budget Office (CBO) estimated that the innovations of the 2002 Act would cost an average of US$8 billion over the 10 fiscal years 2002–11.[12] Of this, US$4.5 billion was for direct payments to farmers under either the fixed payments or the mandated new countercyclical payment program. It was estimated that the Act would lead to 10-year spending increases of US$0.5 billion in marketing loans and loan deficiency payments, US$0.5 billion for the new peanut program, US$160 million for the new dairy program, and US$43 million for increasing support in the sugar program, partly offset by savings projected at US$26 million from tightening payment limitation slightly, for a total of a US$5.7 billion spending increase for all commodity programs.

Meanwhile, new initiatives in the Conservation Reserve Program and the Wetlands Reserve Program (both long-term, paid land-idling programs that have enrolled a total of more than 30 million acres since 1990), as well as the Environmental Quality Improvement Program, the Farmland Protection Program, and a new Conservation Security Program were projected to cost US$1.3 billion annually over 10 years (FAPRI 2002). The expanded costs of these programs consisted mostly of payments made to farmers to encourage the use of soil conservation or water quality improvement practices. Some of the practices reduce production, such as replacing cultivated crops near streams or lakes with "filter strips" of grass in the Conservation or Wetlands Reserve Program. Other "working lands" programs are roughly neutral with respect to production or even result in an increase in production, such as the Farmland Protection Program payments to farmers in exchange for their maintaining land in farming rather than selling it for commercial development.

Total outlays in fiscal 2003 and 2004 were lower than projected because higher-than-expected commodity prices resulted in less spending than had been forecast on countercyclical payments and loan deficiency payments. But in fiscal 2005, these payments increased as commodity prices fell.

Overall summary of market-distorting support

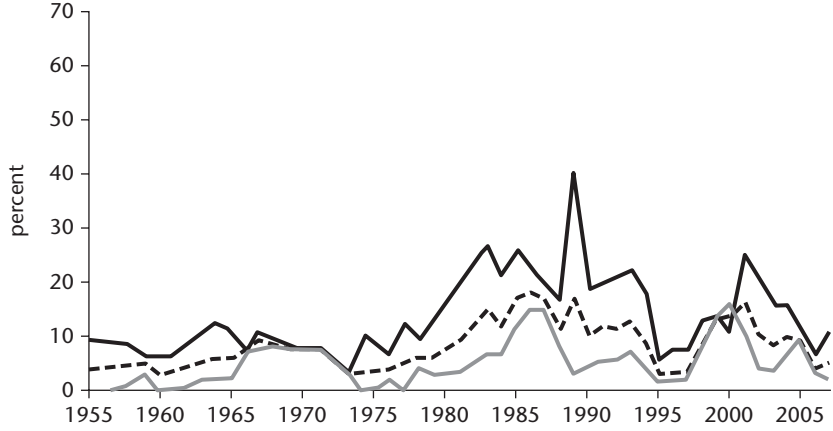
Table 4.2a shows the nominal rates of assistance (NRAs) for key U.S. agricultural products, which are partly based on the OECD's PSE-CSE Database for 1986–2007, and, for years back to 1955, on the author's use of the OECD's method. This measure of NRAs excludes the deficiency, production flexibility and fixed direct payments, and the market loss assistance and countercyclical payments. These various support payments have been at the heart of U.S. farm policies, as described earlier, but have become increasingly decoupled from production decisions and arguably can now be concluded to have minimal or at least small effects on production or trade.[13] The main policies included in the NRAs in table 4.2a are import protection, most notably for sugar, but also for dairy products and meats; export subsidies, most notably the EEP and earlier export subsidies for wheat, but also affecting rice and poultry in some years; and the various loan-related payments to producers that a producer can increase by increasing output, which are closest to a classical production subsidy. Plotting these data separately for exported products and for imported products that compete with U.S. products shows somewhat higher rates of assistance for importables (figure 4.4a). Given the dominance of exportables in overall U.S. production, its line in figure 4.4a is close to the line for all covered products.

NRAs vary greatly across U.S. agricultural commodities, as summarized in the dispersion measure shown in the second-to-last row of table 4.2a, and even more so if the other products that get negligible support are considered (the latter accounting in aggregate for one-third of the value of U.S. agricultural production at undistorted prices, see bottom row of table 4.2a).

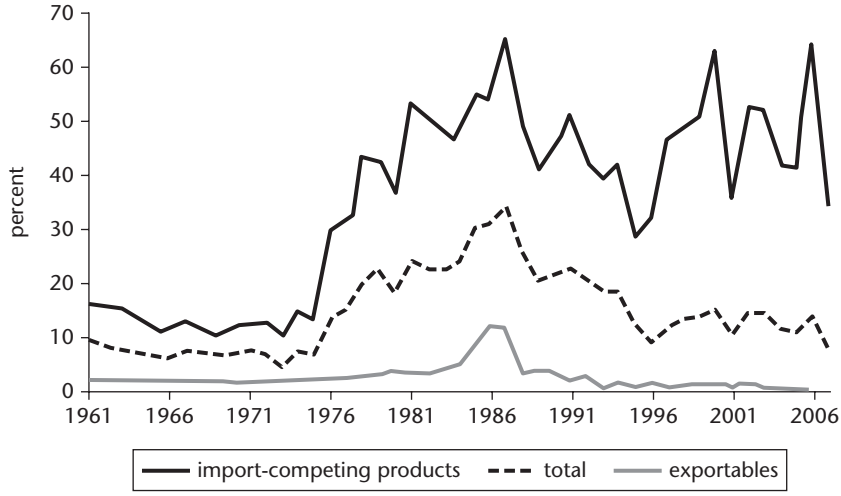
Gardner (2008, appendix table 4.4) describes support through various government payments (including those excluded from table 4.2a, termed here as "decoupled") for the top 25 commodities, accounting for 91 percent of the U.S. farm value of production in 2004. Overall, commodities accounting for 42 percent of production received significant support, with payments amounting to 6.9 percent of the value of production in 2004. Yet 14 of the top 25 commodities, and a total of 58 percent of the value of production, received no significant support. Appendix table 4.5 of Gardner (2008) shows a broader picture of U.S. federal government activity in support of agriculture. In addition to the commodity programs, there are conservation programs, export programs, governmentally underwritten loan programs for farmers, crop insurance, research funding, and marketing and regulatory programs. These additional activities had a price tag of US$15 billion in 2005.[14] The sum of US$34.1 billion for fiscal 2005 amounts to 14 percent of the market value of U.S. farm cash receipts for all crops and livestock.

Figure 4.4. NRAs to Exportable, Import-Competing, and All Covered Agricultural Products, United States and Canada,[a] 1955–2007

a. United States



b. Canada



Source: Anderson and Valenzuela (2008), drawing on authors' spreadsheet.

a. Includes the NRAs shown in table 4.2 and what is termed here as NPS assistance, all of which is attributed to tradables. NPS assistance for 1986–2007 includes payments classified by OECD as based on input use (E1) and miscellaneous payments (H). The total line does not include what here is termed "decoupled" assistance.

Table 4.2. NRAs to Covered Farm Products, United States and Canada,[a] 1955–2007
(percent)

a. United States

	1955–59	1960–64	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–04	2005–07
Exportables	**1.0**	**1.1**	**6.7**	**5.7**	**2.1**	**5.0**	**10.5**	**5.5**	**5.1**	**8.1**	**4.8**
Cotton	5.8	0.2	65.2	43.2	9.2	15.6	32.6	24.6	27.8	70.0	77.0
Eggs	—	—	—	—	4.1	5.8	4.6	8.1	2.2	0.0	0.0
Maize	0.0	1.4	2.4	3.4	0.4	2.6	10.4	0.6	4.8	7.0	6.6
Poultry	0.0	0.0	0.0	0.0	0.0	0.0	7.0	1.3	0.3	0.0	0.0
Rice	0.0	0.0	0.0	0.0	2.6	15.6	38.8	20.1	7.8	52.7	2.2
Sorghum	—	—	—	—	—	37.3	15.0	0.2	4.8	5.5	7.2
Soybeans	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.1	6.6	12.4	0.6
Wheat	0.0	3.6	17.8	14.4	9.6	11.2	29.1	25.5	5.4	4.3	0.2
Import-competing products	**8.8**	**9.4**	**9.4**	**6.6**	**9.8**	**21.1**	**25.2**	**19.9**	**9.5**	**17.5**	**8.9**
Barley	—	—	—	—	—	—	61.9	59.6	4.8	5.3	3.2
Beef	0.0	0.0	2.0	2.0	2.0	2.0	1.3	1.0	0.0	0.1	0.0
Milk	20.2	23.6	21.0	17.0	25.4	61.8	96.9	59.9	78.8	66.5	24.2
Pig meat	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	0.0	0.0	0.0
Sheep meat	—	—	—	—	—	7.1	2.4	1.2	3.4	13.8	9.9
Sugar	50.4	65.9	134.3	18.2	40.3	120.2	158.3	78.8	96.1	115.6	47.6
Wool	—	—	—	—	—	—	1.2	0.9	0.9	16.1	28.2
Nontradables	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
Potatoes	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
All covered products	**4.7**	**4.8**	**7.8**	**5.9**	**5.1**	**11.1**	**16.2**	**11.2**	**6.2**	**11.6**	**6.3**
Domestic market support	0.0	0.0	0.0	0.0	0.1	0.9	2.3	0.4	2.2	3.6	1.0
Border market support	4.7	4.8	7.8	5.9	5.0	10.2	13.9	10.8	4.1	8.0	5.3
Dispersion of NRA of covered products	17.3	23.1	46.6	15.7	14.6	39.8	55.3	27.6	31.4	38.4	23.3
% Coverage at undistorted prices	*66*	*66*	*66*	*69*	*70*	*69*	*66*	*67*	*65*	*66*	*68*

b. Canada

	1961–64	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–04	2005–07
Exportables	**2.5**	**2.4**	**2.2**	**2.8**	**4.3**	**8.2**	**2.4**	**1.4**	**1.4**	**0.4**
Barley	2.0	2.0	2.0	5.8	8.0	10.4	2.5	1.4	2.8	1.0
Beef	1.0	1.0	1.0	1.2	2.6	4.0	3.9	n.a.	n.a.	n.a.
Peas	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pig meat	2.0	2.0	2.0	2.0	2.0	6.3	5.1	3.8	2.0	0.4
Rapeseeds	0.0	0.0	0.0	0.0	0.0	9.6	0.5	0.1	0.1	0.0
Soybeans	n.a.	n.a.	n.a.	n.a.	n.a.	2.8	0.4	0.5	1.2	0.3
Wheat	3.0	3.0	3.0	3.1	5.3	10.4	1.4	0.6	0.6	0.2
Import-competing products	**15.7**	**12.0**	**12.2**	**32.3**	**47.2**	**53.1**	**44.0**	**41.3**	**49.1**	**46.9**
Beef	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	2.0	1.8	0.7
Egg	—	—	—	—	41.1	30.1	33.1	27.7	10.6	64.7
Maize	4.9	4.7	3.5	2.3	2.0	12.8	2.5	3.3	8.7	2.9
Milk	34.4	34.4	34.4	162.8	307.2	314.2	182.6	109.4	125.9	94.4
Poultry	17.0	17.8	33.5	24.4	23.3	23.7	25.2	2.7	2.6	6.9
Soybeans	0.0	0.0	0.0	0.0	0.0	n.a.	n.a.	n.a.	n.a.	n.a.
Sugar	—	—	—	—	32.5	79.5	31.0	17.7	—	—
Nontradables	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Potatoes	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
All covered products	**8.7**	**7.2**	**7.0**	**16.0**	**22.5**	**28.6**	**20.8**	**12.3**	**13.5**	**11.4**
Domestic market support	0.0	0.0	0.0	0.1	0.5	13.2	4.1	1.9	1.4	0.4
Border market support	8.7	7.2	7.0	15.9	22.1	15.4	16.6	10.4	12.1	11.0
Dispersion of NRA of covered products	11.1	11.0	13.8	47.5	84.5	87.2	50.1	31.1	35.9	32.5
% Coverage at undistorted prices	*71*	*76*	*79*	*84*	*86*	*83*	*81*	*79*	*76*	*76*

Source: Anderson and Valenzuela (2008), drawing on author's spreadsheet.

Note: — = not available; n.a. = not applicable.

a. The main U.S. policies included are import protection, export subsidies, and the various loan-rate-related price support and payments to producers. Excludes deficiency, production flexibility and fixed direct payments, and the market loss assistance and countercyclical payments (see text for discussion). Weighted averages use weights based on the unassisted value of production. Dispersion is the standard deviation shown as the simple five-year average of the annual standard deviation around the weighted mean.

Agricultural Policies in Canada

Canada, which remained a British colony during the early period of trade policy examined here, did not introduce substantial tariff protection of manufacturing until the 1870s, and then at less than the U.S. levels (Fowke 1946). Agricultural protection became important earlier, notably with wheat import tariffs directly against U.S. exports (and U.S. duties levied on Canadian grain exports). The significance of particular policy steps has been debated, but a convincing case can be made that "The tariff (of 1843) was a true break in the old colonial system, and was brought about, not by capitalists seeking to establish new industries, but by pioneer farmers trying to exclude outsiders from the local markets" (Jones 1941, p. 537). Thus, while attempts to measure the relative protection of manufacturing and agriculture comparable to those cited above by Irwin for the United States for the 19th century are not available for Canada, it seems clear that agriculture was never implicitly taxed in Canada the way it was in the United States (or in Australia and New Zealand—see Anderson et al. 2009).

With respect to the context of agricultural support, Canadian agriculture varies substantially from east to west in cropping patterns and size of farms, in ways roughly parallel to corresponding U.S. areas south of the border. In those parallel areas, there are many similarities, notably between the Prairie Provinces and the Northern Plains. However, the history of policy and current practices in the two countries are quite distinct in several respects.

The Great Depression of the 1930s hit Canadian farmers as hard as it hit those in the United States. In both countries, the effect was particularly severe in the prairies. The Canadian government provided some debt relief through the Prairie Farm Rehabilitation Act of 1935, but Canada did not introduce an integrated set of programs or make substantial income transfers to farmers as the New Deal did in the United States. Indeed, it is arguable that at that time and still to the present day, while a series of ad hoc programs have been implemented, Canada has no comprehensive farm policy comparable to the omnibus U.S. farm bills. This is attributable in part to Canada's comparably more decentralized political system, under which many policies are carried out at the provincial rather the federal level, notably in marketing, where provinces have set up marketing legislation for fruits and animal products going back to 1926 (see Schmitz, Furtan, and Baylis 2002).

In Canada, the first major federal support similar to that of the United States was provided under the Agricultural Stabilization Act of 1958. This program guaranteed producers 80 percent of the average price over the previous 10 years, by means of payments from the federal government. Only small payments were made, and in 1975 the payment trigger was raised to 90 percent of a five-year moving average price and a mechanism was introduced for compensating farmers for rapid increases in cash costs of production, which "indicated the Canadian

Government's continuing commitment to ensuring short-term solvency in agriculture" (OECD 1978, p. 29).

Canada's agricultural policies for grains and oilseeds have followed a path similar in some respects to those of the United States, but with less reliance on crop supply management through acreage controls and more reliance on collective marketing, most notably through the CWB. The CWB has a legal monopoly on the sales of Canadian wheat and barley into foreign markets—all exports as well as sales of wheat to domestic millers of flour must be sold through the agency. Farmers then receive a pooled price depending on the receipts the CWB is able to earn from the exported and domestically sold commodities. The monopoly powers of the CWB have been challenged in Canadian courts, much as the original U.S. programs of the 1930s were in U.S. courts, on constitutional grounds. In a case brought in 1994, a group of barley growers sued the CWB, arguing that it "breached the rights of individual farmers guaranteed under the Canadian Charter of Rights and Freedoms" (Schmitz and Furtan 2000, p. 145). The plaintiffs' plea was rejected, and following Canadian law, they had to pay court costs of the defendants—the government of Canada.

The year 1995 was a watershed in that, under pressure because of federal budgetary deficits and the URAA's disciplines on export subsidies, transportation subsidies under the Western Grain Transportation Act were ended. These had cost an average of about US$12 per ton of grain, and their elimination was estimated to have saved the federal government about US$400 million in 1995.

With respect to income support for producers, Canada has undertaken far-reaching experimentation in its series of grain programs over the last 30 years. The Western Grains Stabilization Program (WGSP), initially enacted in 1976, made payments from a fund partly financed by growers when their aggregate cash receipts from grains fell below a five-year moving average. After accumulating large deficits without providing satisfactory income protection to producers, the WGSP was abandoned.

The Farm Income Protection Act of 1991 marked an important turning point in Canada's approach to farm support in crop production, when it moved away from policies aimed at particular commodities and toward a whole-farm approach. The 1991 Act introduced the Gross Revenue Insurance Program (GRIP) and the Net Income Stabilization Account (NISA). These programs were tailored to each producer's situation, with the GRIP making crop-specific payments to producers when their production multiplied by the marketwide average market price fell below that producer's established average yield multiplied by a "target" price. The program was packaged as insurance in that each producer paid a premium for this coverage (though approximately two-thirds of the premium cost was paid by a combination of provincial and federal funds).

The GRIP combined features of the U.S. deficiency payment and subsidized crop insurance programs, and its comprehensive approach has attractive features. But it proved to have too little political support from farmers to justify its budgetary costs in the belt-tightening environment of the mid-1990s, and the GRIP expired after 1995. NISA, a more broadly conceived (in that it avoided support of specific commodities) and less costly program, continued for another decade. NISA is essentially a subsidized savings account into which producers may contribute 2 percent of the value of qualifying grain sales, to be matched by 1 percent each from provincial and federal governments. The producer may withdraw funds from the account if either annual farm operating income or family income falls below established triggers (see Huff [n.d.] and Gray and Smith [1997] for further discussion).

In 1998, Canada introduced the Agricultural Income Disaster Assistance (AIDA) program. Under that program, funded 60 percent by federal and 40 percent by provincial governments, anyone who files income tax returns as a farmer qualifies for an indemnity payment if their gross returns fall below 70 percent of the similarly calculated returns over the average of the three preceding years (Schmitz, Furtan, and Baylis 2002). In 2001, the Canadian Farm Income Program (CFIP) replaced AIDA. The experimental nature of farm income support has been intensified since 2004 with the phasing out of NISA and AIDA, and replacement with new and ad hoc programs.

The Canadian Agricultural Income Stabilization (CAIS) Program, introduced in fiscal 2003/04, combines insurance and income support features. It makes payments to producers when a farmer's "production margin" falls below the "reference margin" for the farm, calculated from previous years' experience. The reference margin is a measure of returns minus costs that counts fewer expense items than under previous programs, because "experience with previous farm programs such as the CFIP indicated that including a high number of allowable expenses often resulted in reference margins being low and in many cases negative. This often resulted in producers being ineligible for benefits" (Agriculture and Agri-Food Canada 2006).

In response to the livestock losses resulting from the Bovine Spongiform Encephalopathy (BSE, "mad cow disease") crisis, which devastated the beef export business, and as a "bridge" to the CAIS Program, the Transitional Income Support Program was introduced in 2004 to assist both livestock and grain producers. This program, together with more liberal payouts under the CAIS, raised the costs of farm support in 2003–05 as compared to earlier years. In 2006, the government introduced payments under the Grains and Oilseeds Program that will further increase support.

The 21st-century programs are organized and marketed under the Agricultural Policy Framework, which the government of Canada and the provinces and

territories agreed upon in late 2003 to coordinate agricultural policy in five areas: business risk management, environment, food safety and quality, innovation, and renewal (see Agriculture and Agri-Food Canada 2005). The latter two areas include what are traditionally described as rural development and research and extension programs. Business risk management covers CAIS and the more recent payment programs. All of the programs have notable differences in funding and delivery from province to province.

Unlike for grains, Canada has maintained supply management programs with strong control measures for dairy, poultry, and eggs. This is in sharp contrast to the United States, where supply management in livestock is entirely absent.[15] Canada's supply management history grew out of practices established by provincial marketing boards, which were well established by the 1960s (Schmitz, Furtan, and Baylis 2002). The Canadian Dairy Commission, created in 1966, introduced supply management ideas that culminated in market-share quotas, under which a farmer must have an established quota in order to sell milk. Import quotas (converted to tariff-rate quotas under the URAA) keep milk from entering Canada at the high established retail domestic price, while milk for processed dairy products is sold at lower prices so that it is competitive in world markets. Similar but less complex supply management programs exist for broilers (chickens), eggs, and turkeys.

Overall summary of market-distorting support

Table 4.2b shows the nominal rates of assistance (NRAs) for key Canadian agricultural products, which are partly based on the OECD's database of producer support estimates (PSEs) for 1979–2007, and, for years back to 1961, on the author's use of the OECD's method. The key products cover between 75 and 85 pecent of Canadian agricultural production. The average NRA for those covered products was around 8 percent up to the mid-1970s, rose to 28.6 pecent during the export price war period of 1985–89, and has since come back to around 12 percent. The dispersion in NRAs across the product range rose substantially up to the mid-1980s, though it has more than halved since then. As usual, the estimated NRA for importables is well above that of exportables according to the classification based on trade status presented here—and well above the average importables NRA for the United States.

Agricultural Relative to Nonagricultural Support

To create a more complete picture of the policy distortions to farmer incentives in North America, guesstimates of the NRAs for noncovered products (a weighted average across exportables, import-competing products, and nontradables) are

first provided. NPS support—that is, input subsidies and decoupled support, as measured by certain OECD PSE categories—is then considered over the past three decades. The NRA for tradable farm products (including NPS support but not decoupled payments) is also compared with the NRA for nonagricultural tradables by calculating a relative rate of assistance (RRA). These results are summarized in table 4.3.

Input subsidies and other NPS assistance is of nontrivial importance to the overall NRA for agriculture in North America as compared with the rest of the world, adding between one-quarter and one-third to the sectoral NRA in the United States and only slightly less in Canada. Payments based on input use (OECD E1, as defined in the PSE-CSE Database) and miscellaneous payments (OECD H) are included in this category.

Of even more significance than NPS assistance are decoupled payments, which are assumed to encourage production less than market price support policies. Following certain OECD categories, not only the various commodity income support payments described above as increasingly decoupled from prices and production over time, but also payments made for long-term acreage idling under programs such as the Conservation Reserve Program, are examined here, as well as subsidies for crop insurance and ad hoc annual disaster payments (see note to table 4.3 for the OECD categories included).[16] As can be seen from table 4.3a and figure 4.5a, those decoupled payments nearly doubled the NRA for the United States in the mid-1980s and added about one-third in the 1990s and the present decade. For Canada, decoupled payments have been somewhat less important, although still nontrivial (table 4.3b and figure 4.5b).

As pointed out, it is difficult to summarize the effects of U.S. support programs because of the variety of policy instruments used. Although any estimate is conjectural, the set of most reasonable estimates indicate that in 1999–2005, the marketing loan program has increased U.S. output of grains and soybeans by about 2 percent, the direct payment program (including the 2002 Farm Act changes) by about 1 percent, and crop insurance subsidies by more than 1 percent, for a total effect of 4 to 5 percent more of these commodities being produced than would have been in the absence of commodity support programs. The long-run consequences (on conservation, agricultural research, and technology adoption) of commodity support policies are quite a different matter not considered here.

Looking at the levels of border protection and domestic support payments themselves, overall government support for farmers in the United States rose in the decade or so between the mid-1970s and mid-1980s, after falling over the two decades prior. Support has since fallen back slightly, even when decoupled payments are included, although the level was nearly as high during the period of low

Table 4.3. NRAs to Agricultural Relative to Nonagricultural Industries, United States and Canada,[a] 1955–2007
(percent)

a. United States

	1955–59	1960–64	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–04	2005–07
NRA, covered products	4.7	4.8	7.8	5.9	5.1	11.1	16.2	11.2	6.2	11.6	6.3
NRA, noncovered products	8.0	7.7	6.0	5.0	4.7	6.6	10.9	8.4	8.5	9.6	5.4
NRA, all agriculture (excluding NPS)	5.8	5.8	7.2	5.6	5.0	9.7	14.4	10.2	7.0	10.9	5.2
All importables	8.6	8.9	8.5	6.1	8.4	16.9	20.9	16.4	9.1	15.0	8.7
All exportables	2.7	2.7	6.5	5.5	2.6	5.3	10.6	6.2	5.8	8.4	4.7
All nontradables	8.0	6.8	5.1	4.3	4.2	5.7	9.4	7.2	7.3	8.2	2.3
NPS	7.0	5.2	3.3	1.1	1.2	1.8	2.7	3.7	3.3	4.9	4.3
NRA, all agriculture (including NPS)	12.8	10.9	10.5	6.9	6.2	11.5	17.1	13.9	10.2	15.6	9.8
NRA, decoupled payments	0.0	0.0	0.0	0.0	0.1	5.2	9.3	5.9	6.3	8.4	5.6
NRA, all agriculture (including NPS and decoupled)	12.8	10.9	10.5	6.9	6.3	16.7	26.4	19.9	16.5	24.1	15.3
NRA, all agricultural tradables (including NPS)	12.5	10.8	10.8	7.0	6.2	12.0	18.0	14.4	10.4	16.5	9.9
NRA, all nonagricultural tradables	6.1	7.3	7.4	5.4	3.8	3.5	3.5	3.2	2.1	1.5	1.4
RRA[b]	6.0	3.2	3.2	1.5	2.2	8.2	13.9	10.8	8.1	14.7	8.4

(*Table continues on the following page.*)

Table 4.3. NRAs to Agricultural Relative to Nonagricultural Industries, United States and Canada,[a] 1955–2007 (*continued*)

(percent)

b. Canada

	1961–64	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–04	2005–07
Covered products	8.7	7.2	7.0	16.0	22.5	28.6	20.8	12.3	13.5	11.4
Noncovered products	6.6	5.4	4.9	9.8	12.9	14.9	10.6	6.2	7.1	6.7
All agriculture (excluding NPS)	8.1	6.8	6.5	15.0	21.2	26.3	18.9	11.0	12.0	9.1
All importables	15.1	11.7	12.0	31.1	45.2	50.9	41.8	36.2	42.0	45.0
All exportables	4.3	3.5	3.0	4.6	6.3	10.1	4.8	2.9	3.2	0.9
All nontradables	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NPS	—	4.9	4.0	5.7	9.1	13.2	12.8	7.8	12.1	2.2
Inputs	—	—	—	0.5	0.8	6.9	5.6	2.4	1.8	2.1
Other	—	4.9	4.0	5.2	8.3	6.3	7.2	5.5	10.4	0.1
All agriculture (including NPS)	8.1	11.7	11.0	20.8	30.3	39.7	31.6	18.9	23.9	11.4
Decoupled payments	0.0	0.0	0.0	0.7	4.7	8.6	8.0	5.3	10.3	11.8
All agriculture (including NPS and decoupled)	8.1	11.7	11.0	21.5	35.0	48.3	39.6	24.3	34.2	23.2
All agricultural tradables (including NPS)	8.1	11.7	11.0	20.8	30.3	39.7	31.6	18.9	23.9	11.4
All nonag tradables	9.2	6.9	6.0	5.1	4.8	3.9	2.6	1.1	0.8	0.8
RRA[b]	–1.0	4.5	4.7	14.9	24.3	34.5	28.3	17.6	22.9	10.5

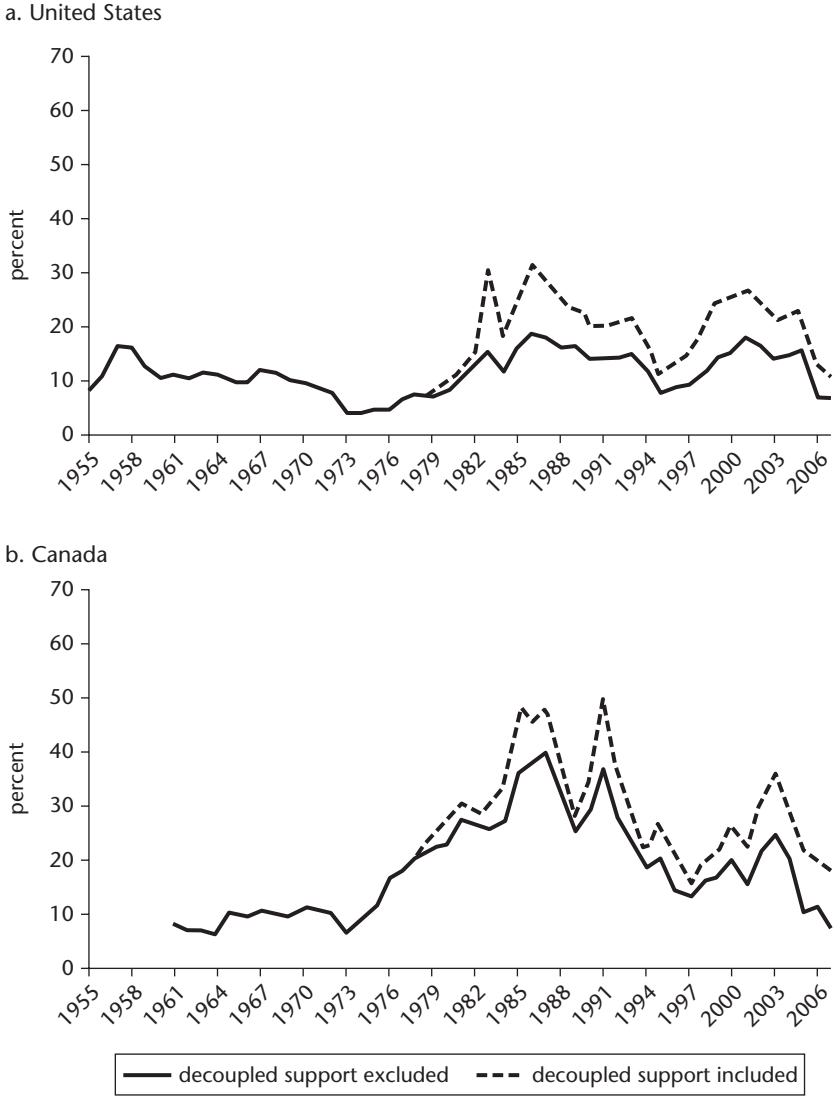
Source: Anderson and Valenzuela (2008), drawing on authors' spreadsheet and OECD (2008 and earlier years).

Note: — = not available.

a. Decoupled support includes "direct payments" in the years 1979–85. From 1986 those payments are specified to comprise the OECD's items C (payments based on area planted/animal numbers), D (payments based on historical entitlements), F (payments based on input constraints), and G (payments based on overall farming income). And for 2005–07, those items replaced by similar but newly defined items C to E. The values of those payments are estimated by the OECD. See text for discussion of NPS support.

b. RRA is defined as $100*[(100 + NRAag^t)/(100 + NRAnonag^t) - 1]$, where $NRAag^t$ and $NRAnonag^t$ are the percentage NRAs for the tradables parts of the agricultural and nonagricultural sectors, respectively.

Figure 4.5. NRAs to All Agriculture without and with Decoupled Support,[a] United States and Canada, 1955–2007



Source: Anderson and Valenzuela (2008), drawing on authors' spreadsheet and OECD (2008).

a. Decoupled support includes "direct payments" in the years 1979–85. From 1986 those payments are specified to comprise the OECD's items C (payments based on area planted/animal numbers), D (payments based on historical entitlements), F (payments based on input constraints), and G (payments based on overall farming income). For 2005–07, those items replaced by similar but newly defined items C to E. The values of those payments are estimated by the OECD. NPS support is also from OECD estimates as defined in the note to figure 4.4 (see text for discussion).

world agricultural prices during 2000–04 as it was when prices were low in the late 1980s (see table 4.3). It dropped substantially after 2005 as international food prices spiked, but this does not represent a change in policy so much as the countercyclical design of some U.S. payments and a reduced need to support farmers because of higher prices. Support for farmers in Canada too rose steeply in the decade or so from the mid-1970s, but has since fallen back even more than in the United States, especially when decoupled payments are taken into account. As in the United States, the NRA for Canada dropped substantially after the early 2000s as international food prices rose.

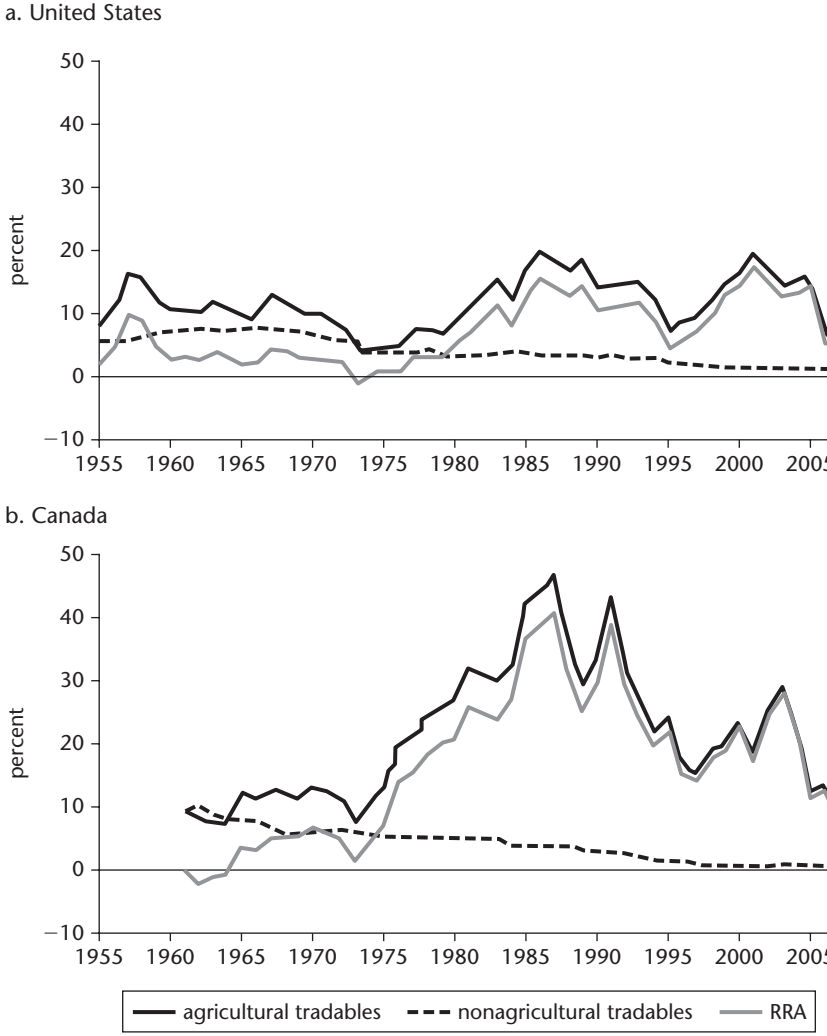
By contrast, assistance to producers of nonagricultural tradable goods has been lower than for farmers throughout this period, and has declined more than for the farm sector. Hence, even leaving decoupled payments aside, the rate of assistance to producers of agricultural products *relative* to those producing nonagricultural goods is now considerably higher than in the early 1960s in the United States, other than in the years of historically high international prices, namely 1995 and 2006–07 (table 4.3a and figure 4.6a). The 2008 Farm Bill left the existing support programs in place and created others that could raise expenditures even if agricultural prices remain higher than they generally were during 1990–2006.[17] Assistance to Canada's producers of nonagricultural tradable goods, too, has been lower than for farmers since the mid-1960s, and has declined more than for Canada's farm sector and more than in the United States. Though the RRA to the farmers became considerably higher in the 1980s than in earlier decades, in the 1990s it returned to levels similar to those in the United States, again with the lowest levels in the years of historically high international commodity prices, namely 1995 and 2007 (table 4.3b and figure 4.6b).

When expressed in real (constant 2000) U.S. dollars rather than percentage price wedges, the decine in border and domestic support recently is much less evident, because over time the value of the farm sector has grown and the number of farmers has declined. The peak real value of support in total dollars was higher in the latter 1980s than this decade, but when expressed on a per farmer basis it was even higher in 2000–04 (before international food prices rose) than in 1985–89. When the market price support component is expressed by product, the lion's share in recent decades has gone to dairy and sugar, which receive more border protection than cotton and maize (table 4.4).

Consumer Tax Equivalents (CTEs)

While much of the support for farmers worldwide comes from border measures, in the case of North America large shares also come from NPS meaures and from payments that are decoupled somewhat from production. Hence,

Figure 4.6. NRAs to All Nonagricultural Tradables, All Agricultural Tradable Industries, and RRA,[a] United States and Canada, 1955–2007



Source: Anderson and Valenzuela (2008), drawing on author's spreadsheet.

a. The RRA is defined as $100*[(100 + NRAag^t)/(100 + NRAnonag^t) - 1]$.

consumers in the region are not taxed to the same extent as producers are assisted—although taxpayers bear additional costs. Because of the differing net trade status of each product, the weighted average of ad valorem CTEs across all covered farm products also differs because consumption rather than production

Table 4.4. GSEs of Assistance to Farmers, by Product, Per Farm Worker and Total, United States and Canada, 1955–2007

a. By covered product (*constant 2000 US$ millions, excluding NPS and decoupled payments*)

	1955–59	1960–64	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–04	2005–07
Barley	—	14	19	44	97	141	518	392	48	53	20
Beef	0	25	442	555	541	549	388	307	53	69	25
Cotton	458	19	1,573	1,541	593	792	1,170	1,030	1,094	1,692	2,442
Eggs	—	—	—	—	395	495	302	432	174	34	167
Maize	0	273	509	998	163	848	1,927	152	825	1,316	1,081
Milk	3,365	4,253	4,116	3,829	7,775	13,778	12,986	9,875	3,761	8,125	6,666
Peas	—	0	0	0	0	0	0	0	0	0	0
Pig meat	0	31	41	56	55	52	124	297	68	46	12
Potatoes	—	0	0	0	0	0	0	0	0	0	0
Poultry	0	105	127	248	222	197	791	363	68	38	90
Rapeseeds	—	0	0	0	0	0	68	4	1	2	0
Rice	0	0	0	0	54	212	261	219	76	344	33
Sheep meat	—	—	—	—	40	40	14	5	12	40	28
Sorghum	—	—	—	—	436	636	261	4	40	40	36
Soybeans	0	0	0	0	0	0	91	18	734	1,274	90
Sugar	515	594	995	476	711	1,015	1,173	800	759	824	552
Wheat	0	317	1,308	1,266	1,248	1,689	2,108	1,737	333	240	16
Wool	—	—	—	—	—	—	1	1	0	3	5

b. Per person engaged in agriculture (*constant 2000 US$, including NPS but not decoupled payments*)

	1961–64	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–04	2005–07
Total, North America	3,115	3,739	3,445	4,181	6,720	8,222	7,370	5,580	9,165	7,364
United States	3,383	3,886	3,431	3,728	6,303	7,710	6,831	5,185	8,795	7,279
Canada	1,590	2,914	3,524	6,478	8,857	11,412	11,379	8,591	12,056	8,034

c. Total (*constant 2000 US$ millions*)

	1961–64	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–04	2005–07
North America, covered products	**5,632**	**9,130**	**9,014**	**12,331**	**20,445**	**22,185**	**15,636**	**8,044**	**14,142**	**11,264**
United States	4,708	8,115	7,731	9,029	16,177	18,088	12,781	6,195	12,227	9,109
Canada	924	1,015	1,283	3,302	4,268	4,096	2,856	1,850	1,915	2,156
North America, covered and noncovered products	**9,886**	**12,539**	**12,345**	**15,387**	**25,132**	**28,745**	**20,788**	**13,195**	**19,816**	**12,985**
United States	8,552	11,263	10,821	11,816	20,473	24,224	17,599	11,100	17,591	10,717
Canada	1,334	1,276	1,524	3,570	4,659	4,521	3,188	2,095	2,225	2,268
North America, NPS	**7,658**	**6,192**	**3,399**	**4,077**	**5,822**	**6,863**	**8,580**	**6,999**	**10,228**	**10,166**
United States	7,658	5,269	2,417	2,678	3,815	4,548	6,397	5,491	7,974	9,598
Canada	0	923	981	1,399	2,007	2,315	2,182	1,508	2,254	568
North America, including NPS	**17,544**	**18,731**	**15,743**	**19,464**	**30,954**	**35,608**	**29,368**	**20,194**	**30,044**	**23,151**
United States	16,210	16,533	13,238	14,494	24,288	28,772	23,997	16,590	25,564	20,315
Canada	1,334	2,199	2,505	4,970	6,666	6,836	5,371	3,603	4,480	2,836
North America, decoupled payments	**0**	**0**	**0**	**529**	**11,199**	**16,979**	**11,526**	**11,012**	**15,598**	**14,795**
United States	0	0	0	352	10,193	15,529	10,177	9,990	13,657	11,826
Canada	0	0	0	177	1,006	1,451	1,349	1,022	1,941	2,970
North America, NPS and decoupled payments	**17,544**	**18,731**	**15,743**	**19,993**	**42,153**	**52,587**	**40,894**	**31,205**	**45,643**	**37,947**
United States	16,210	16,533	13,238	14,846	34,481	44,301	34,174	26,580	39,222	32,141
Canada	1,334	2,199	2,505	5,147	7,672	8,286	6,720	4,625	6,421	5,806

Source: Anderson and Valenzuela (2008) based on author's spreadsheet.

Note: — = not available.

weights are used. There are also direct consumer subsidies in the United States, notably through the food stamp program, and in some years for some products those direct subsidies more than offset the tax component of the trade measures used there to support producer prices, resulting in negative CTEs. The rises and falls in the degree of distortion on the consumption side of the market can be seen in table 4.5.

Table 4.5b shows how trivial these transfers from or to food consumers in North America have been on a per capita basis. Even in Canada, they amount to only US$154 or less per capita per year. This, together with the free rider problem associated with collective action, helps explain why consumers in that region do not counterlobby farmers over farm support programs. It also means the trade and national economic welfare effects of U.S. programs are less than programs delivering the same NRA for farmers in other countries via trade measures that generate a CTE equal to the NRA.

The Politics of United States and Canadian Policies

Explaining the political forces behind United States and Canadian agricultural policies requires qualitative rather than quantitative analysis, but the contrasts between the political treatment of commodities within and between the two countries suggests hypotheses in several areas: (a) historical legacies of commodity producer cooperation, (b) the importance of supply-chain participant cohesion and the link of that cohesion with technological change, (c) the role of budgetary pressures, and (d) the inherent weakness of opposition to agricultural support. There are economic and cultural factors behind each of these.[18]

The importance of a historical legacy of producer cooperation was emphasized by Olson (1985). He noted the traditional and continuing strength of the dairy industry and traced that back to the long-standing organization of producers into marketing cooperatives. Olson's underlying point is that lobbying is a voluntary collective activity of precisely the kind highly susceptible to free-rider problems, that this is in fact the chief hurdle to an interest group obtaining subsidies, and that cooperative organizations have already solved this problem sufficiently to permit effective lobbying. This hypothesis fits well with what would otherwise be perhaps the chief puzzle in Canadian as compared to U.S. agricultural support, namely why poultry has had a well entrenched support system via supply control and import protection in Canada but receives virtually nothing in the United States. As Schmitz, Furtan, and Baylis (2002) explain, supply control measures grew out of cooperative activity in those commodities by provincial producer organizations. But there were no such corresponding poultry organizations in the United States.

Table 4.5. CTEs of Policies Assisting Farmers, Covered Products, Total and Per Capita and by Product, United States and Canada, 1960–2005

a. Aggregate CTE (*percent*)

	1960–64	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–04	2005
Total, North America	**5.7**	**8.4**	**6.1**	**7.2**	**12.6**	**9.8**	**1.9**	**−4.7**	**−2.4**	**−6.3**
United States	5.4	8.4	5.9	5.8	11.0	7.5	−0.4	−6.8	−4.2	−8.5
Canada	10.1	8.2	7.8	19.1	27.3	31.0	24.6	14.1	15.6	14.1

b. CTE per capita (*constant 2000 US$*)

	1960–64	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–04	2005
Total, North America	**27**	**41**	**36**	**44**	**68**	**42**	**8**	**−18**	**−9**	**−26**
United States	26	40	34	35	58	32	−2	−26	−16	−35
Canada	50	47	54	127	154	134	95	54	54	56

(*Table continues on the following pages.*)

Table 4.5. CTEs of Policies Assisting Farmers, Covered Products, Total and Per Capita and by Product, United States and Canada, 1960–2005 (*continued*)

c. CTE by covered product (*constant 2000 US$ millions*), United States, 1960–2005

	1960–64	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–04	2005
Barley	—	—	—	—	—	89	99	−100	−95	−89
Beef	0	426	547	531	475	−776	−1,529	−1,806	−1,813	−1,976
Cotton	16	1,489	1,284	482	657	1,028	865	965	1,320	1,955
Eggs	—	—	—	−20	−9	−79	−54	−308	−409	−519
Maize	246	435	822	95	566	−1,320	−2,947	−3,257	−3,702	−4,374
Milk	3,398	3,304	3,056	5,140	10,134	9,039	5,777	1,738	4,264	1,005
Pig meat	0	0	0	0	0	−1,142	−1,748	−2,253	−2,362	−3,122
Potatoes	0	0	0	0	0	0	0	0	0	0
Poultry	0	0	0	0	0	−134	−1,076	−1,263	−1,328	−1,657
Rice	0	0	0	25	100	−46	−138	−201	−199	−357
Sheepmeat	—	—	—	29	5	6	6	13	53	57
Sorghum	—	—	—	0	0	−143	−189	−185	−163	−161
Soybeans	0	0	0	0	0	−199	−337	−365	−376	−483
Sugar	1,011	1,683	791	965	1,051	1,421	1,018	926	992	593
Wheat	147	591	572	449	546	88	−126	−917	−859	−1,293
Wool	—	—	—	—	—	2	1	1	0	0
United States	**4,819**	**7,929**	**7,073**	**7,696**	**13,525**	**7,835**	**−378**	**−7,010**	**−4,677**	**−10,422**

d. CTE by covered product (*constant 2000 US$ millions*), Canada, 1961–2005

	1961–64	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–04	2005
Barley	11	15	29	68	86	17	16	0	0	0
Beef	26	41	52	54	108	70	54	6	5	0
Eggs	—	—	—	70	127	98	121	89	33	141
Maize	17	23	27	23	23	22	1	0	0	0
Milk	709	682	749	2,542	3,185	2,847	2,137	1,471	1,641	1,663
Peas	0	0	0	0	0	0	0	0	0	—
Pig meat	31	41	54	56	45	7	0	0	0	0
Potatoes	0	0	0	0	0	0	0	0	0	0
Poultry	105	127	245	227	203	271	361	30	31	30
Rapeseeds	0	0	0	0	0	22	1	1	1	0
Soybeans	0	0	0	0	0	8	1	2	5	6
Sugar	—	—	—	44	39	43	31	25	—	—
Wheat	28	25	37	38	55	152	42	−3	−6	0
Canada	**927**	**954**	**1,194**	**3,122**	**3,871**	**3,557**	**2,767**	**1,622**	**1,710**	**1,841**

Source: Anderson and Valenzuela (2008) based on author's spreadsheet.

Note: — = not available.

Of course the efficacy of lobbying depends not only on getting organized to make one's case, but also on the legislators' listening and acting favorably. It is almost axiomatic that legislators have an interest in listening to their electorate, who hire and fire them. But a legislator cannot act in accord with the requests of all his or her constituents. Why do agricultural commodity interests get heard well in so many cases? Traditionally, U.S. farmers were said to have a political advantage because of the structure of Congress, which has two Senators for every state, or one Senator for each 300,000 residents of the Dakotas, Wyoming, and Montana compared to one for each 20 million residents of California. However, recent efforts at reform (such as taking payments away from producers who have more than US$1 million in off-farm income) have been defeated in the House of Representatives (where each Representative equally has about 600,000 resident constituents) as soundly as in the Senate.

The general principal of representation is that, whenever possible, a legislator provides constituents what they ask for. Complicating the efficacy of this system in the United States, however, is that constituents often request conflicting policies. A strength of cotton growers is that they present a unified position of the supply chain, including growers, ginners, shippers, and millers, to the agriculture committees of Congress. This has led to policies such as the "step two" payments to cotton textile millers that compensate them for paying prices for cotton that exceed the low world prices that trigger payments to cotton growers. (This was stopped, however, to comply with a WTO ruling.) Similarly, a strength of corn growers is that they have powerful agribusiness allies who support ethanol subsidies, while a former weakness of the grain producers was their asking for acreage control measures that restricted raw material supplies for such agribusiness (former because the 1996 Farm Act revoked the authority of the Secretary of Agriculture to administer annual acreage reduction programs that until the 1990s were a key feature of grains policy). Cross-commodity dispute is a related problem, arising, for example, on the part of fruit and vegetable growers excluded from decoupled payment programs. A political strength of sugar import restrictions is that high sugar prices have created a large market for corn-based sweeteners.

Monetary contributions help in getting an interest group's case heard by political leaders. Though farmers are not notably profligate donors, agricultural political action committees (PACs) have been important in the United States. Table 4.6 summarizes PAC donations to politicians or candidates reported during the 2006 election cycle (November 2004–October 2006). These data are from the legally required reporting of PACs for donations of more than US$100,000 and do not capture all political spending. Though the US$6.7 million they donated may seem a large sum, there were 1,200 nonagricultural PACs that spent more than US$100,000 in the United States during this period, and their aggregate spending

Table 4.6. PAC Disbursements during the Election Cycle, United States, November 2004–October 2006
(US$ millions)

Sugar Alliance	1.2
Farm Credit Council	1.0
Dairy	0.8
Texas Farm Bureau	0.5
Cotton Council	0.3
Sugar	0.3
Cattlemens Beef	0.3
Dairy	0.3
Broiler Chickens	0.3
FLA sugar	0.2
Indiana Farm Bureau	0.2
Sugar beets	0.2
Farmers' Group	0.2
Peanuts	0.2
Eggs	0.2
Michigan Farm Bureau	0.2
Farmer Coop	0.1
Sugar beets	0.1
Beef	0.1
Total	**6.7**

Source: Political Moneyline, http://www.tray.com.

was US$800 million. The largest agricultural PAC, the Sugar Alliance, ranked 154th of the 1,200. Agriculture's share of the spending, US$6.7 million or just under 1 percent of the US$800 millon total, is about the same as agriculture's share of national GDP. Overall spending by PACs in the broad Standard Industrial Classification code for agriculture was US$15 million, but the majority of this was from agribusiness firms—notably Deere, Deans Foods, the International Dairy Foods Association, Cargill, Tysons, Archer-Daniel-Midlands, Conagra, and Heinz Foods. These companies have interests that are often the same as the commodity producers' interests, but not always, and what the agribusiness firms focus on in their lobbying is more typically their own specific issues of concern. In short, it does not appear likely that money is the source of farmers' exceptional political influence.

Technical or other exogenous economic changes create diverse interests within a commodity group that can make policy making aimed at benefiting the group as a whole unattractive to legislators. This happened most notably in the case of a formerly important commodity program that disappeared completely, the U.S. potato

price support program. During 1945–50, the potato program became highly contentious and eventually died because the Western potato growers were able to produce profitably at prices lower than the prevailing support levels, and they saw their market potentially capped by restraints needed to control the costs of the support system (which at the time relied heavily on production control for the main supported commodities). Similarly, the long-standing marketing order pricing systems for California oranges and lemons was ended in the 1990s, mainly because of intraindustry disagreement about its operation, while differing interests of peanut and tobacco farmers with and without quotas to produce for the high-priced domestic market contributed to demise of these quota program earlier this decade.

One might expect consumer interests to oppose farm legislation that would increase food prices, but this has only rarely surfaced as a significant political force (the notable case being U.S. grain export embargoes of the 1970s). This lack of opposition seems to be associated with longstanding positive feelings that the general public has about farmers and farming. A broad-based source of resistance to agricultural support that has been effective is budgetary pressure at times when fiscal discipline is perceived to be a high priority. In both the 1985 and 1990 farm legislation, reductions in payments were enacted so that farm bills could meet overall Congressional budget limits. The 1996 farm legislation was also designed to limit subsidy expenditures, but that budget discipline quickly broke down.

As noted earlier, the Farm Security and Rural Investment Act of 2002 covering crops planted in 2002–07 increased spending well above baseline levels from continuation of the legisltation it replaced. This Act was popular in Congress, having passed in the House of Representatives by a vote of 280 to 141 and in the Senate by 64 to 35. The Bush Administration did not raise serious objections, and the bill was signed into law with praise from farm-group representatives.[19] However, small-farm and environmental advocacy groups were unhappy that amendments that would have imposed more stringent payment limits on large farms, redirected some commodity program payments to conservation and environmental programs, and imposed various regulatory restraints on agribusiness failed. Outside the community of U.S. agricultural interests, the 2002 Act has been widely reviled, as mentioned earlier.[20] Just after the Act was passed, three western provinces of Canada, along with a dozen Canadian farm groups, asked for Can$1.3 billion to offset the effects of the new U.S. payments. Since that time, Canada has raised its payments to producers too, as herein described.

Prospects for Reform

Both the United States and Canada have enacted agricultural support programs that have distorted their domestic commodity markets. Considering how similar the countries are in many respects, there are some notable differences between

the policy approaches in the two countries in the choice of policy instruments. But the similarities are more fundamental, and several of them bear on the prospects for reform: (a) strong political resilience of support for farmers, (b) weak political expression of consumers' interests, (c) trends toward less reliance on measures that seek to control prices in particular markets (via stockpiling, supply management, and import tariffs), (d) trends toward more reliance on whole-farm income support (especially in Canada) and payments under commodity programs that are delinked from current production (in the United States), (e) acceptance of multilateral liberalization of agricultural trade, but only with maintenance of protection for some producer interests, (f) modest increases in political influence of environmental protection, and (g) episodic political strength of taxpayer interests in cutting farm-support spending, under circumstances that give general budget reduction. As a result of these forces and trends, real spending on agricultural support has not diminished over time even as the share of the agricultural sector in the overall economy has diminished greatly, while at the same time both the United States and Canada have moved since the early 1990s in the direction of reduced directly market-distorting policies. In the face of historically low commodity prices 1998–2002, the United States maintained policies that forestalled output reductions that these low prices would otherwise have induced.

What options does the preceding summary suggest for reform? First, the best prospects remain international negotiations, most notably the Doha Round of the WTO, despite the failure of the negotiations to make much progress thus far. Nonetheless, it remains the case that the United States and Canada would sign on to such an agreement if it involved provisions that reform proponents could point to as offsetting gains in agricultural export markets. Second, there remain prospects that a combination of environmental and taxpayer interests could shift agricultural support spending toward public-good provision in ways that would be less market-distorting than current policies.[21] Reforms in this direction were formulated and promoted by several organized coalitions of interests in preparation for the 2008 U.S. Farm Bill, mainly by environmentalists, farmland preservationists, and internationally oriented agribusiness groups. Third, while it is not in the cards now, it is possible that there will a resurrection of a general predisposition to economic liberalism, as occurred in Australia and New Zealand (Anderson et al. 2009). Not so long ago, this predisposition in North America served to limit the scope of market-distorting legislation considerably, and could again, as the recent legal debate in Canada on the CWB's authorities illustrates, despite its outcome. The ascent of free-market Republicans in the 1980s suggested this might be a real possibility for the United States. But the policy salience of this strain of opinion has been thwarted by that the party's embrace of muscular nationalism, military internationalism, and cultural conservatism. Similarly, once-prominent free-trade

advocacy by Democrats has been swamped by the wave of industrial protectionism allied with antitrade prairie populism the party has undertaken in recent political campaigns.

The prospects for each of the preceding openings to reform—a liberalizing WTO agreement, conservation and environmental pressures, and a resurgence of deregulatory policy dispositions—would be enhanced with the traditional economist's recipe of compensating the losers from policy changes with nondistorting transfers. Though the direct payments under the U.S. 1996 and 2002 Farm Acts are a move in this direction, what is really required are one-time payments, or buyouts. U.S. policy has carried out three notable experiments in buyouts since 1980: in dairy, peanuts, and tobacco. The dairy buyout (Dairy Production Termination Program) was implemented in 1986–87, at a time when milk surpluses were chronic, and was introduced following the calculation that having dairy farmers agree to sell their herds and leave dairying would reduce budgetary outlays. Farmers made offers to the government stating the price per hundred pounds of milk producing capacity of their herds at which they would be willing to leave the business. Producers who participated had to sell all their female cattle and agree to remain out of dairy farming for five years, and attempts were made to ensure that cattle sold were slaughtered or exported and not sold to another dairy farm. The program is estimated to have reduced U.S. milk production by about 7 percent in the short term but to have had no long-term effect (Dixon, Susanto, and Berry 1991). The positive lesson of the program, however, is that buyouts can be successfully implemented by USDA as a means of getting farmers to participate in policy reform.

Buyouts to permanently remove producers from certain commodity support programs have been undertaken for peanuts and tobacco since 2000. The 2002 Farm Act authorized payments to peanut producers to buy their production quotas, which had well-defined values under preexisting programs. Premiums over market values of quota had to be paid, but again the approach was proven feasible. Similarly, tobacco quotas and the entire tobacco price support program were terminated in 2005. However, whether buyouts would be feasible for commodities without production-limiting quotas or where program-created assets are not so precisely defined is questionable. An approximation to a buyout was, in the minds of some proponents of production flexibility, the contract payments in the 1996 Farm Act. But this legislation did not formally end the preexisting support structure and, in fact, did not end the support programs. Rather, the approach enabled additional payments to farmers. While students of the prospects for this approach remain cautious (see Orden 2006 and Orden, Blandford, and Josling 2009), something like it coupled with changes of approach as outlined above are the most likely feasible avenue to future reform.

Notes

1. This chapter's coverage of the United States draws to some extent on Gardner (2002).

2. There is one category of farms in the USDA classification, called "limited resource farms," that has low incomes both from farming and from off-farm sources. There were an estimated 199,000 such farms in 2004, or 10 percent of all farms; their average household income was US$7,700. Their average farm earnings was a loss of US$5,900. Apart from these farms, the other 90 percent of U.S. farm households are doing well economically, either from farm or off-farm income sources. The data underlying this and subsequent information about farm household economics are developed by the Economic Research Service of the USDA, using the organization's annual Agricultural Resource Management Survey of about 10,000 farms.

3. For 2001–05, the annual net income per farm that yields the Can$11,000 average are, respectively: Can$11,000, Can$6,000, Can$11,100, Can$16,400, and Can$10,600 (Statistics Canada 2006).

4. The Court changed its view in decisions of Mulford v. Smith (1939) and Wickard v. Filburn (1942), which upheld, respectively, tobacco and wheat marketing controls enacted in legislation of 1938. The reasoning was that agricultural production affected by such programs influenced national markets and so could be legislated under constitutional powers to regulate interstate commerce.

5. An earlier wheat agreement, in 1933, created a schedule of quotas limiting the shipments of wheat by exporting countries, but this proto-OPEC broke down and the agreement was allowed to expire in 1935 (Gale and Zaglits 1949). Explicit export subsidies on Northwestern U.S. wheat were also implemented for a time early on in the New Deal (Nourse, Davis, and Black 1935).

6. Irwin's estimate of a net subsidy rate of 15 pecent is less than the tariff protection rate of 30 percent primarily because of the effect of the higher prices of import-competing goods on increasing the cost of production of nontraded goods.

7. It was such political successes of agriculture in tariff legislation that led H. L. Mencken to pillory farmers in one of his famous diatribes: "Has anyone heard of a farmer practising or advocating any political idea that was not absolutely self-seeking—that was not, in fact, deliberately designed to loot the rest of us to his gain? . . . There has never been a time, in good seasons or bad, when his hand were not itching for more . . . One might almost argue that the chief, and perhaps even only aim of legislation in These States is to succor and secure the farmer" (Mencken 1958, pp. 158–60).

8. For estimates of effects of U.S. wheat export subsidies, see Gardner (1996). On the effects of grain export embargoes, see USDA (1986).

9. The U.S. government's fiscal year runs from October 1 of the previous calendar year to September 30 of the current calendar year. Thus, fiscal year 2005 represents the time period October 1, 2004 to September 30, 2005.

10. The spike in spending relative to payments in 2000 is an artifact of government budgetary spending being reported on a fiscal year basis while payments to farmers are reported on a calendar year basis. In 2000, an election year, Congress rushed to get payments to farmers that would normally have gone out after October 1 before October 1, resulting in payments that would normally have occurred in two fiscal years occurring in one calendar year.

11. A *Washington Post* editorial termed the bill "The Mother of All Pork." *Business Week* magazine opined: "It's a dreadful piece of legislation-bad for most farmers, bad for consumers, and horrendous for taxpayers" (May 7, 2002). *The New York* Times editorialized against the Act on several occasions, notably in a piece entitled "The Hypocrisy of Farm Subsidies" (December 1, 2002).

12. Ten-year projected spending was estimated in accordance with Congressional budgetary procedures, even though the Act only authorized programs for the six years 2002–07. The "baseline budget scoring" assumption is that those programs will be reauthorized to cover the 10-year period.

13. This argument is more difficult to make for the 1980s, when these payments were tied to significant annual land-idling requirements. It also ignores wealth effects, insurance effects, and remaining production restrictions, as discussed in the appendix to Gardner (2008). Whether any of these effects are quantitatively important is an empirical question. While impossible to estimate with precision from the data available, the analysis to date suggests these effects are small.

14. "Price tag" is a vague term and is used because the figures are not all derived from a consistent set of U.S. budgetary concepts. Most notably, the export credit guarantees are not the expenditures of the government on these guarantees; rather, they are the value of loans guaranteed. Unless there are defaults on these loans (funds borrowed by foreign importers to buy U.S. exports are not repaid to the U.S. lenders), the actual outlays on these programs is negligible. In fact, defaults are rare. In U.S. budgetary parlance, the value of loans guaranteed is the "program level," as shown in the USDA budget summary.

15. In the original programs of the 1930s, there were U.S. supply control efforts in livestock. The only significant such program since 1955, however, is the Dairy Herd Buyout Program of the mid-1980s.

16. Neither the categories "NPS" nor "decoupled" presented here correspond directly to use of these terms in WTO domestic support notifications or as has occurred in dispute settlement arguments. To illustrate, the NPS for 1986-2007 herein includes diesel fuel tax exemptions not reported by the United States to the WTO under the URAA category of NPS, while it excludes crop and revenue insurance subsidies that are reported as WTO NPS support. The "decoupled" category herein includes not only the "decoupled income support" as defined in URAA annex 2 as WTO green box (which is how the United States reports its fixed direct payments); countercyclical payments that the United States reports as NPS are also included in this category. Subtleties in distinguishing between these categories of payments are discussed in the appendix to Gardner (2008). Both classifications are subject to WTO dispute settlement litegation. The decoupled support herein also includes conservation payments (both for long-term land-idling and working lands) that are reported to the WTO by the United States as green box and the crop and revenue insurance subsidies reported to the WTO as NPS support. The use of these terms herein also differs from common classifications in U.S. farm bill discussions and budgets that, for example, often clearly separate commodity support from conservation expenditures.

17. See Orden, Blandford, and Josling (2009) for discussion of the 2008 U.S. Farm Act.

18. For more on the political economy of U.S. farm policy, see Gardner (2002) and Orden, Paarlberg, and Roe (1999).

19. As a reminder that U.S. presidents do not always accept what Congress delivers in support of agriculture, President Reagan in 1985 vetoed a farm bill on budgetary grounds, in the midst of the farm crisis of the 1980s. Congress could not muster the two-thirds majorities needed to override the veto, so the president's action was decisive.

20. It is also notable that the more market-oriented members of Congress, even if they represent agricultural constituencies, opposed the bill. Among the opponents were not only the House Republican leadership, but also members of the Agriculture Committee, such as Boehmer (Republican-Ohio) and Dooley (Democrat-California), who jointly wrote a *Washington* Post opinion piece entitled "This Terrible Farm Bill" (May 2, 2002). Similarly strong opposition was voiced in the Senate by Richard Lugar (Republican-Indiana), the senior Republican on the Senate's Agriculture Committee.

21. Even if these policies were more market-distorting, as they could possibly become, they would more likely be of the kind that would reduce agricultural output rather than increase it.

References

Agriculture and Agri-Food Canada. 2005. "Agricultural Policy Framework: Federal-Provincial-Territorial Programs." Program Planning, Integration, and Management Directorate, Ottawa. http://www.agr.gc.ca/progser/index_e.phtml.

_____. 2006. "The Canadian Agricultural Income Stabilization (CAIS) Program." Program Planning, Integration, and Management Directorate, Ottawa. http://www.agr.gc.ca/caisprogram/factsheets/faq_margins.html.

Anderson, K., R. Lattimore, P. J. Lloyd, and D. MacLaren. 2009. "Australia and New Zealand." Chapter 5 in this volume.

Anderson, K., and E. Valenzuela. 2008. "Estimates of Global Distortions to Agricultural Incentives, 1955 to 2007." Core database at http://www.worldbank.org/agdistortions.

Benedict, M. R. 1953. *Farm Policies of the United States, 1790–1950*. New York: Twentieth Century Fund.

Carter, S. B., ed. 2006. *Historical Statistics of the United States: Colonial Times to 1970*, New York: Cambridge Uinversity Press.

Davis, L., J. R. T. Hughes, and D. M. McDougall. 1965. *American Economic History*. Homewood, IL: Richard D. Irwin Inc.

Dixon, B., D. Susanto, and C. R. Berry. 1991. "Supply Impact of the Milk Diversion and Dairy Termination Programs." *American Journal of Agricultural Economics* 73 (3): 633–40.

FAPRI (Food and Agricultural Policy Research Institute). 2002. "Farm Security and Rural Investment Act of 2002: Preliminary FAPRI Analysis." Unpublished paper, FAPRI.

Fowke, V. C. 1946. *Canadian Agricultural Policy: The Historical Pattern*. Toronto: University of Toronto Press.

Furtan, W. H. 2006. "Canadian Agriculture and Food Policy." Saskatchewan Agrivision Corp., Saskatoon.

Gale, E. G., and O. Zaglits. 1949. "Intergovernmental Agreements Approach to the Problem of Agricultural Surpluses." In *Readings on Agricultural Policy*, ed. O. Jesness, 306–27. Philadelphia: Blakiston.

Gardner, B. L. 1996. "The Political Economy of U.S. Export Subsidies for Wheat." In *The Political Economy of American Trade Policy*, ed. A. Krueger, 291–331. Chicago: University of Chicago Press.

_____. 2002. *American Agriculture in the Twentieth Century: How It Flourished and What It Cost*. Cambridge, MA: Harvard University Press.

_____. 2008. "Distortions to Agricultural Incentives in the United States and Canada." Agricultural Distortions Working Paper 62, World Bank, Washington, DC.

Gray, R., and V. Smith. 1997. "Harmonization and Convergence of Canadian and U.S. Grains and Oilseeds Policies." Policy Issues Paper 4, Montana State Univerity, Bozeman, Montana.

Huff, H. B. n.d. "Changing Role of Public Policy in Canadian Agriculture." Unpublished paper.

Irwin, D. A. 2006. "Historical Aspects of U.S. Trade Policy." *NBER Reporter* http://www.nber.org/reporter/summer06/irwin.html.

Johnson, D. G. 1950. *Trade and Agriculture.* New York: McGraw Hill.

Jones, R. L. 1941. "The Canadian Agricultural Tariff of 1843." *Canadian Journal of Economics and Political Science* 7: 528–37.

Josling, T. 2009. "Western Europe." Chapter 3 in this volume.

Mencken, H. L. 1958. *Prejudices: A Selection*. New York: Vintage Books.

Nourse, E., J. Davis, and J. Black. 1935. *Three Years of the Agricultural Adjustment Administration*. Washington, DC: Brookings Institution.

OECD (Organisation for Economic Co-operation and Development). 1978. *Recent Developments in Canadian Agricultural Policy*. Paris: OECD.

OECD PSE-CSE Database (Producer and Consumer Support Estimates, OECD Database 1986–2007). Organisation for Economic Co-operation and Development. http://www.oecd.org/document/59/0,3343,en_2649_33727_39551355_1_1_1_1,00.html.

Olson, M. 1985. "Space, Agriculture, and Organization." *American Journal of Agricultural Economics* 72 (3): 928–37.

Orden, D. 2006. "Feasibility of Farm Program Buyouts." Presented at North American Agrifood Market Integration Workshop, Alberta, Canada, May 31–June 2.

Orden, D., D. Blandford, and T. Josling. 2009. "Determinants of Farm Policies in the United States, 1996–2008." Agricultural Distortions Working Paper 89, World Bank, Washington, DC. http://www.worldbank.org/agdistortions. Forthcoming in *Political Economy of Distortions to Agricultural Incentives,* ed. K. Anderson.

Orden, D., R. Paarlberg, and T. Roe. 1999. *Policy Reform in American Agriculture: Analysis and Prognosis.* Chicago: University of Chicago Press.

Schmitz, A., and H. Furtan. 2000. *The Canadian Wheat Board*. Regina, Saskatchewan: Canadian Plains Research Center.

Schmitz, A., H. Furtan, and K. Baylis. 2002. *Agricultural Policy, Agribusiness, and Rent-Seeking Behavior*. Toronto: University of Toronto Press.

Statistics Canada. 2006. CANSIM table. http://www40.statcan/101/cst01/prim10.htm.

Taussig, F. W. 1931. *The Tariff History of the United States*. New York: G. P. Putnam's Sons.

U.S. Department of Agriculture. 1986. "Embargoes, Surplus Disposal, and U.S. Agriculture." Economic Research Service, Agricultural Econonomics Report 564, U.S. Department of Agriculture, Washington, DC.

_____. 2006. "Budget Summary and Annual Performance Plan." Office of Budget and Program Analysis, U.S. Department of Agriculture, Washington, DC. http://www.obpa.usda.gov/budsum/2007/fy07budsum.pdf.

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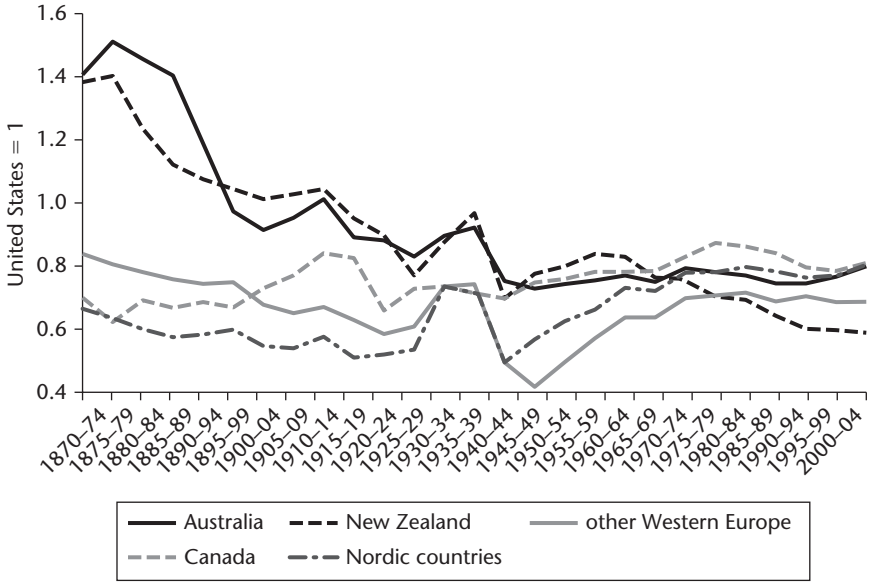
AUSTRALIA AND NEW ZEALAND

*Kym Anderson, Ralph Lattimore, Peter J. Lloyd, and Donald MacLaren**

Following its gold rush in the 1850s, Australia surpassed the United Kingdom in having the highest per capita income in the world, and New Zealand was not far behind. Both countries suffered from depressions in the 1890s before recovering their equal-first ranking just prior to World War I, though for the following seven decades their incomes lagged those of the United States and some other developed economies (figure 5.1).[1] The middle of the 20th century brought a brief recovery in ranking thanks in part to the Korean War–induced boom in wool prices, when Australia and New Zealand were ranked equal second after the United States. But since then their rankings have continued to slide as the economies of Western Europe, Canada, and Japan grew faster than the United States, while Australia—and especially New Zealand—grew slower (Anderson, Lloyd, and MacLaren 2007). By 2004, these two antipodean economies were ranked 25th and 37th respectively, according to the World Bank Atlas method of measuring gross national product (GNP) per capita (World Bank 2006). By that standard, at least, the long-term economic performance of both the Australian and New Zealand economies over the 100 years to the 1970s has to be described as relatively poor. During the past three decades, by contrast, these two small economies (with just 20 million and 4 million people, respectively) outperformed most other

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Figure 5.1. Real GDP Per Capita in Australia, New Zealand, and Other High-Income Countries Relative to the United States, 1870–2004



Source: Based on 1990 international Geary-Khamis dollars from Maddison (2003), shown relative to the United States, which is set as the numeraire at 1.00. "Nordics" include Denmark, Finland, Norway and Sweden; "other Western Europe" includes all countries with data from 1870, namely Belgium, France, Germany, Italy, Netherlands, Portugal, Spain, Switzerland, and the United Kingdom.

high-income countries, with their per capita incomes growing half as fast again as the Organisation for Economic Co-operation and Development (OECD) average.

The marked difference between recent and earlier relative performance in Australia and New Zealand is due to major economic policy reforms, in particular the belated opening of their economies, first to each other and then to the rest of the world. Having been more protectionist toward manufacturing than other OECD countries for most of the 20th century (Anderson and Garnaut 1987) and having not participated in the industrial trade policy reforms agreed to by other General Agreement on Tariffs and Trade (GATT) contracting parties in the first seven rounds of multilateral trade negotiations (1947 to 1979), Australia and New Zealand have since undergone a remarkable degree of opening up of their current and capital accounts. This liberalization reversed the downward trend in their trade as a share of gross domestic product (GDP), particularly for other OECD countries (including the United States, in which the share trebled over the past three decades) while accelerating the downward trend in their average import tariff (Anderson et al. 2008). The fact that increased openness in Australia and New Zealand was accompanied

by many domestic microeconomic and macroeconomic reforms, and that it coincided with a long period of rapid global economic growth that was stimulated by the information and communication technology revolution and by the opening up of other world economies (especially nearby resource-poor countries in East Asia) added to the scope for boosting gains from freeing their international trade and investment and floating their currencies.

Another difference between the economies of Australia and New Zealand and most other OECD countries is that they are relatively well endowed with agricultural land per worker. Coupled with the development of valuable production and marketing technology, this endowment provides Australia and New Zealand with a significant comparative advantage in agricultural products. The advantage is especially strong for New Zealand, which, unlike Australia, does not contain an abundance of mineral and energy resources. Trade protectionism in these economies thus meant restrictions on imports of manufactured goods, making their trade policy regimes similar to those of developing countries. True, in some decades they also had periods of agricultural subsidies, but overall the trade policy regime in both countries has long involved an antiagricultural bias. The fact that those agricultural subsidies have been virtually eliminated over the past two decades also makes Australia and New Zealand an interesting political economy study, given the extreme difficulties other OECD countries have experienced in reforming their farm support programs (see Gardner 2009; Josling 2009; and Honma and Hayami 2009).

This chapter examines the extent to which the antiagricultural bias in Australia and New Zealand has changed since World War II, identifying the forces that caused the policy evolution in each case. It begins by summarizing the structural changes that have accompanied economic growth in both countries since the 1950s. It then describes the emergence of manufacturing protection and some agricultural subsidies, and, after the 1970s, the dramatic dismantling of those interventions. The analysis is conducted by compiling a new time series of nominal rates of protection for both agriculture and manufacturing, stretching back to the mid-1940s for Australia and to the mid-1950s for New Zealand. The reasons for these policy choices are also explored—first, the gradual growth in market interventions to the 1970s and then their relatively rapid dismantling thereafter. The chapter concludes by discussing prospects for further policy reform and lessons for both other high-income countries and resource-rich developing economies.

Growth and Structural Changes since 1950

The growth performance of Australia and New Zealand for most of the 20th century is in stark contrast with that since the late 1980s, when the two countries outperformed many other advanced economies in terms of GDP per capita growth

(World Bank 2006). The past two decades have also been a period of especially rapid total factor productivity (TFP) growth in Australia and New Zealand (Parham et al. 1999; Dowrick 2001; Statistics New Zealand 2006), mostly due to growth in employment and hours worked per worker (Card and Freeman 2004), in contrast to the United Kingdom, for example. Australia's annual TFP growth rate accelerated a full percentage point during the 1990s (Parham 2004), while New Zealand's rose four-fifths of a percentage point. Since that was not the experience of other OECD countries, Parham asserts that domestic factors must explain a major part of the increase, an important one being the comparatively greater openness of the Australian economy to trade and investment.[2]

A more recent econometric study by Diewert and Lawrence (2006) demonstrates that productivity growth has been the dominant contributor to the growth in real welfare in Australia since 1960, with the terms of trade playing only a very minor role. Certainly prices in international markets for primary products relative to manufactures have been on a downward trend over the past century, but the decline has averaged less than 0.5 percent per year. But the difference between recent and earlier performance in Australia and New Zealand is also due very substantially to economic policy reforms of the past three decades. The belated freeing of markets in the two economies not only has arrested the decline in per capita income ranking in the two countries, but is having a remarkable influence on their patterns of production and trade.

For these natural-resource-rich, relatively lightly populated economies,[3] the most appropriate theory of comparative advantage is a blend of two core models developed in the 20th century: the Heckscher-Ohlin-Samuelson model, which assumes all factors of production are mobile between sectors, and the Ricardo-Viner model, which assumes some factors are sector-specific. Such a blend is provided by Krueger (1977) and explored further by Deardorff (1984). They consider two tradable sectors each using intersectorally mobile labor plus one sector-specific factor (natural-resource capital or industrial capital). Assuming that labor exhibits diminishing marginal product in each sector, and that there are no services or nontradables and no policy distortions, then at a given set of international prices the real wage is determined by the aggregate per worker endowment of natural-resource and industrial capital. The commodity composition of a country's trade—that is, the extent to which a country is a net exporter of primary or industrial products—is determined by its endowment of natural relative to industrial capital compared with that ratio for the rest of the world.

Leamer (1987) develops this model further and relates it to paths of economic development. If the stock of natural resources is unchanged, rapid growth by one or more economies relative to others in the availability of industrial capital per worker would cause those economies to strengthen their comparative advantage

in nonprimary products. However, a discovery of minerals or energy raw materials would strengthen that country's comparative advantage in mining and weaken its comparative advantage in farm and other goods, ceteris paribus. It would also boost national income and, hence, the demand for nontradables, which would cause mobile resources to move into the production of nontradables, further reducing farm and industrial production (Corden 1984).

Domestic or foreign savings can be invested to enhance the stock and to improve the quality not only of industrial capital but also of labor or natural resources, and to provide capital to the nontradables sector. Any such increase in the net stock of produced capital per worker will put upward pressure on real wages. That will encourage, in all sectors, the use of more labor-saving techniques and the development and importation of new technologies that are less labor intensive.

Which types of capital expand fastest in a free-market setting depends on their expected rates of return. The more densely populated, natural-resource-poor a country is, the greater the likelihood that the highest payoff would be in expanding capital stocks for nonprimary sectors. At early stages of development of such a country, when it has a relatively small stock of natural resources per worker, wages would be low and the country would have a comparative cost advantage in unskilled labor-intensive, standard-technology manufactures. As the stock of industrial capital grows, there would be a gradual move toward exporting more capital- and skill-intensive manufactures. Natural-resource-abundant economies such as Australia and New Zealand, however, would develop a comparative advantage in manufacturing at a late stage of development, and their industrial exports would be relatively capital intensive. In New Zealand, with lesser mineral and energy resources per worker and poorer climatic conditions for broadacre cropping than in Australia, agricultural comparative advantages would be stronger in aggregate but less focused on cereal and oilseed cropping than in Australia.

The above theory of changing comparative advantages has been used successfully to explain the evolving pattern of exports of Australia and its Asian trading partners (Anderson and Garnaut 1980, 1987; Anderson and Smith 1981; Anderson 1998), and is also consistent with New Zealand's trade pattern. It can be used also to explain shocks to that evolutionary pattern, as with mining booms; and it is consistent with the larger shares of farm revenue from livestock and horticultural crops compared with grains, oilseeds, sugar, and cotton for New Zealand relative to Australia.

But the evolving pattern of a country's production and trade specialization also depends on policy choices and their changes over time. In the case of Australia and New Zealand, their long history of industrial protectionism (reflected in the relatively high implicit tariffs) resulted in a smaller share of GDP traded than would be expected for economies of their size.[4] Protectionism also ensured a bigger manufacturing sector than would have emerged under free trade, which was

possible in their full-employment setting only at the expense of other sectors. In both countries, the proportion of GDP accounted for by manufacturing in the early 1960s were close to the OECD average of around 30 percent, even though Australia and New Zealand have always been lightly populated and so have weak comparative advantage in manufactures.

The removal of the ban on key mineral raw material exports in the early 1960s and the tariff reforms of the 1970s and 1980s, however, corrected that distortion for Australia. Between 1960 and 2005, manufacturing's share of GDP fell much more rapidly for Australia than for the average OECD country, to just 11 percent, while the mining sector's share trebled (Anderson, Lloyd, and MacLaren 2007). The share of Australian exports accounted for by mining, meanwhile, more than trebled between the early 1960s and early 1980s, helped by the dramatic rises in energy raw material prices during the 1970s.[5] Even though that trend lowered agriculture's *relative* contribution, the share of exports in the gross value of farm production increased considerably, from around 55 percent in the early 1960s to 75 percent after the mid-1970s (Anderson et al. 2008). Moreover, the growth in agricultural exports came from an increasing range of farm products as farmers diversified away from the traditional wheat and sheep enterprises to beef, cotton, sugar, dairy products, wine, and rapeseed.

Natural-resource-based products were not the only exportables discouraged by protectionist measures in Australia and New Zealand, however. Export industries within the manufacturing sector, as well as services exports, were also affected. Together, those two sectors represented one-twelfth of Australia's exports in the early 1950s. By 1980, their contribution was barely above one-quarter, but by 1990 it had risen to one-third and by 2005 to 44 percent, or 22 percent for each sector, the first time either sector surpassed the 21 percent share of exports represented by agriculture.

The transformation in New Zealand was similar, despite the absence of the mineral resources with which to create a mining boom. Furthermore, New Zealand was impacted much more than Australia by the coming into force from 1983 of the Australia New Zealand Closer Economic Relations Trade Agreement (ANZCERTA): its lower wages allowed it to rapidly expand exports of manufactures and services to the much bigger Australian economy under that preferential arrangement. Together with the virtual elimination of manufacturing protection, these forces brought to a halt the decline in agriculture's share of New Zealand's GDP, in fact raising it from a low of 7 percent in the late 1980s to 9 percent in the early 2000s—notwithstanding the abolition of nontrivial agricultural subsidies in the 1980s. Over that same period the share of food and agricultural products in New Zealand's exports have fallen somewhat, to the benefit of other manufactures and services. With the decade-long buildup and then removal in the mid-1980s of subsidies to agricultural exporting industries (see next section), agricultural and

processed food as a percentage of the gross value of primary agricultural production expanded and contracted somewhat substantially, though it has since been stabilized despite the growth in exports of nonagricultural goods and services during the past two decades.

Policy Evolution

This section begins with a brief history of policies up to the early 1970s and then moves to a discussion of the changes in the next dozen years before reforms accelerated in the mid-1980s. Since there were relatively few agricultural subsidies or farm import barriers (other than quarantine restrictions) through most of the past century, the story in both Australia and New Zealand is more about the *indirect* antiagricultural bias that resulted from the protection of manufacturing. Nonetheless, policies that directly distorted various agricultural markets post–World War II are also examined.[6]

We know that it is *relative* prices, and hence relative rates of government assistance, that affect incentives. In a two-sector model an import tax has the same effect on the export sector as an export tax (the Lerner symmetry theorem); this carries over to a model that includes a third sector producing only nontradables (Vousden 1990). For that reason the average nominal rate of assistance (NRA) for the tradable parts of the agricultural sector is reported, based on NRA estimates for individual agricultural industries, along with the average NRA for the tradable parts of all nonagricultural sectors. The NRA is the equivalent of the percentage by which government policies have raised the producer price above what it would be without the government's intervention.[7] With those two sectoral NRAs a relative rate of assistance (RRA) can be calculated. The RRA is defined as $100[(1 + NRAag^t/100)/(1 + NRAnonag^t/100) - 1]$, where $NRAag^t$ and $NRAnonag^t$ are the average percentage NRAs for the tradables parts of the agricultural and nonagricultural sectors, respectively. Since the NRA must be greater than -100 percent if producers are to earn anything, so too must the RRA. The usefulness of this measure is that if it is below zero, it indicates the extent to which the policy regime has an antiagricultural bias. The converse applies when RRA is positive.

The cost of government policy distortions to incentives, in terms of resource misallocation, increases with the degree of substitution in production. In the case of agriculture, which involves the use of farmland that is sector-specific, the greater the variance of NRAs across industries within the sector, the higher the welfare cost of market interventions. A simple, if crude, index of that cost is the standard deviation of industry NRAs within agriculture. The weighted mean NRA for the sector (using the values of production at unassisted prices as weights), along with the standard deviation around that mean each year, is thus reported here.

Prior to the early 1970s

The long history of industrial protectionism in Australia and New Zealand has its roots in the formation in 1901 of the Australian Federation, which New Zealand decided not to join, instead becoming separately independent of the United Kingdom. At that time, tariff revenue accounted for almost one-fifth of government revenue in both countries, a very high share for what at the time were the world's highest-income economies (the share of tariff revenue typically declines as per capita income rises) and twice that of the Nordic countries, for example, even though per capita incomes in those countries was barely half that in Australia and New Zealand (Anderson et al. 2008). Tariffs on manufactures rose steadily in the decades that followed (Lloyd 2008). They were supplemented by quantitative import restrictions first imposed in the late 1930s (as "wartime measures" in Australia and as industry protection in New Zealand), and then rose even further in the 1960s when they substituted for the import licences as the latter were removed (in 1960, with minor exceptions, in the case of Australia).[8] This trend over the 1950s and 1960s contrasted strongly with what other high-income countries were doing at that time, which was lowering tariffs on manufactures as part of multilateral trade negotiation under the GATT.[9] By the early 1970s, the average manufacturing tariff in Australia and New Zealand exceeded that of any other OECD country (Anderson and Garnaut 1987).

Meanwhile, the governments of Australia and New Zealand intervened in numerous markets for farm products, but the subsidies and protection they provided to agricultural industries was only a modest offset to the indirect disincentives caused by manufacturing protection during this era. In the immediate post–World War II period, Australia's agricultural programs were directly taxing the farm sector. Most of that was removed by the end of the Korean War, however, at which time farmers enjoyed a boom in export prices that spurred the highest inflation in Australia since its gold-rush era of the 1850s. Farm assistance then rose gradually, such that by the end of the 1960s the NRA averaged 17 percent in Australia, whereas in New Zealand it averaged little more than 2 percent until the mid-1970s. The standard deviation of agricultural NRAs also rose during that period, indicating increasing misallocation of resources within the agricultural sectors of these two countries (tables 5.1 and 5.2).

A striking feature of agricultural assistance in Australia and New Zealand at that time was that it applied to export industries as much as to import-competing ones (figure 5.2). Export industries in New Zealand, including wool, dairy products, and meat, were assisted by so-called stabilization schemes (Sandry and Reynolds 1990). Similar schemes in Australia assisted wheat, manufactured dairy products, sugar, and dried vine fruit. The Australian schemes often also contained so-called home consumption price schemes, whereby domestic consumers were

Table 5.1. NRAs to Covered Farm Products, Australia, 1946–2007

(percent, for fiscal years starting July 1)

	1946–49	1950–54	1955–59	1960–64	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–04	2005–07
Exportables	**−7.5**	**0.9**	**6.4**	**7.0**	**10.0**	**7.6**	**3.6**	**4.6**	**5.6**	**4.8**	**3.0**	**0.0**	**0.0**
Rice	−3.2	−1.1	11.4	15.0	14.8	22.0	20.4	15.2	10.6	2.5	2.3	1.7	1.9
Wheat	−24.2	−8.4	1.9	6.1	10.1	7.2	−0.4	2.6	3.8	2.1	1.1	0.0	0.0
Barley	−14.1	−5.8	4.1	3.1	4.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Oats	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Grapes, total	10.5	4.5	5.6	9.7	18.7	39.7	19.2	21.3	18.3	13.3	4.9	0.0	0.0
Sugar	−8.2	0.7	12.8	15.9	32.8	7.6	−6.2	4.6	12.4	5.8	1.7	0.0	0.0
Cotton	0.8	2.0	26.7	52.1	73.9	53.4	17.6	4.4	2.0	0.0	0.0	0.0	0.0
Wool	0.0	0.0	0.0	0.0	0.0	6.0	1.4	1.0	1.0	5.4	0.7	0.0	0.0
Beef and veal	0.0	0.0	0.0	0.0	0.0	1.4	1.8	1.4	1.2	0.3	0.0	0.0	0.0
Mutton and lamb	0.0	0.0	0.0	0.0	0.4	1.6	1.8	1.4	1.8	0.9	0.0	0.0	0.0
Pig meat	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Milk	2.1	18.7	46.9	43.1	74.5	32.8	35.8	32.2	39.6	23.8	19.3	0.0	0.0
Apples	—	—	6.0	6.0	6.0	9.0	5.4	3.4	1.2	0.4	0.1	0.0	0.0
Sunflowers	—	—	—	—	—	—	—	5.6	1.4	0.0	0.0	0.0	0.0
Import-competing products	**0.0**	**10.1**	**13.4**	**12.5**	**13.1**	**18.3**	**11.6**	**8.0**	**3.7**	**1.8**	**0.4**	**0.1**	**0.0**
Maize	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sorghum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.6	2.0	0.0	0.0	0.0	0.0
Oilseeds	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tobacco	0.0	34.2	51.0	46.9	51.3	250.0	122.2	56.4	37.6	48.5	19.8	0.0	0.0
Poultry	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

(*Table continues on the following page.*)

Table 5.1. NRAs to Covered Farm Products, Australia, 1946–2007 (*continued*)

(percent, for fiscal years starting July 1)

	1946–49	1950–54	1955–59	1960–64	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–04	2005–07
Bananas	—	—	0.0	0.0	0.0	0.0	0.0	4.8	1.0	0.1	0.0	0.0	0.0
Olives	—	—	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Oranges	—	—	25.0	25.0	25.0	25.8	32.8	38.2	13.0	2.7	0.7	0.6	0.6
Soybeans	—	—	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0
Nontradables	**−1.2**	**12.6**	**31.4**	**41.6**	**78.1**	**25.3**	**19.5**	**24.2**	**12.2**	**1.8**	**0.2**	**0.0**	**0.0**
Eggs	−1.7	14.7	43.7	61.8	141.2	35.0	26.0	35.8	18.4	3.4	0.4	0.0	0.0
Potatoes	0.0	8.0	8.0	8.0	8.0	7.2	7.2	8.0	3.2	0.0	0.0	0.0	0.0
Weighted average of covered products	**−7.0**	**1.8**	**7.8**	**8.5**	**12.3**	**8.8**	**4.6**	**5.4**	**5.7**	**4.4**	**2.6**	**0.0**	**0.0**
Domestic market support	—	—	1.4	1.6	2.5	1.0	0.8	0.9	0.5	0.4	0.2	0.0	0.0
Border market support	—	—	6.5	7.0	9.8	7.8	3.9	4.6	5.2	4.0	2.5	0.0	0.0
Dispersion of covered products	7.4	12.2	17.3	21.3	36.1	54.0	27.9	16.9	12.2	10.9	5.8	0.4	0.4
% Coverage (at undistorted prices)	*91*	*84*	*82*	*86*	*87*	*84*	*85*	*86*	*75*	*82*	*80*	*80*	*80*

Source: Anderson and Valenzuela (2008), drawing on authors' spreadsheet.

Note: — = not available.

a. Weighted averages, with weights based on the unassisted value of production (actual back to 1966, and the average for 1966–69 for earlier years). Dispersion of NRAs is their standard deviation of the simple five-year average of the annual standard deviation around the weighted mean.

Table 5.2. NRAs to Covered Farm Products, New Zealand, 1955–2007

(percent)

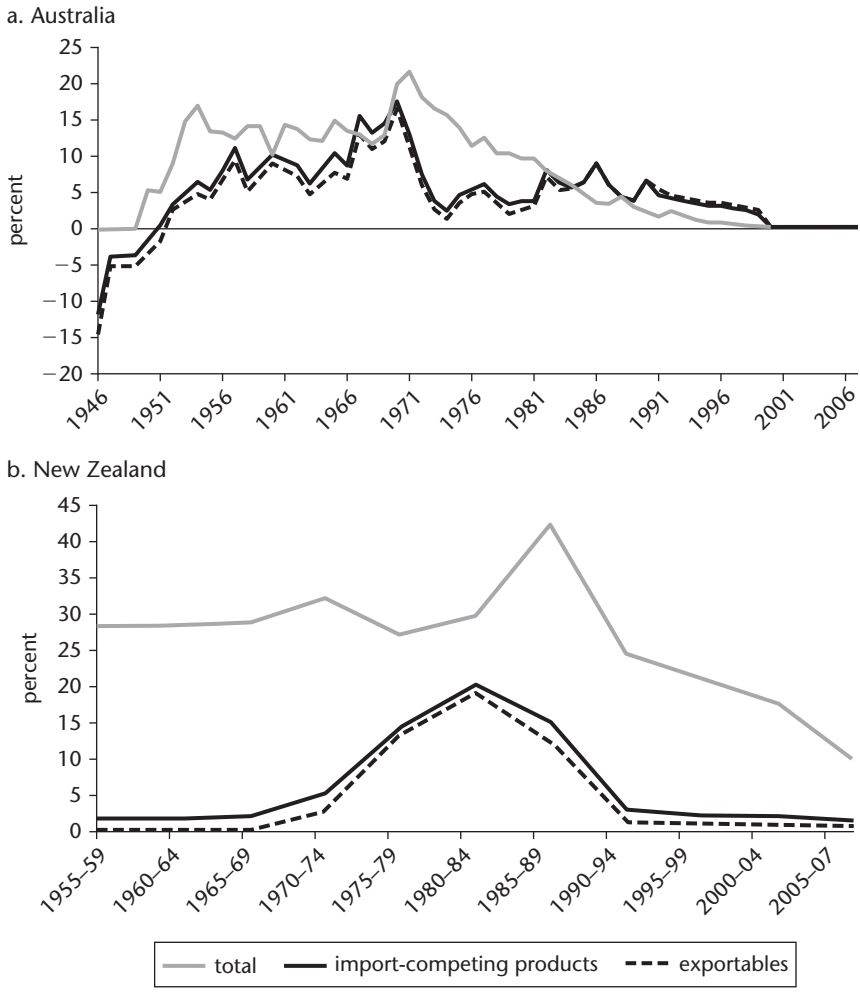
	1955–59	1960–64	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–04	2005–07
Exportables	**0.1**	**0.1**	**0.2**	**2.8**	**13.1**	**18.8**	**11.8**	**1.2**	**0.8**	**0.9**	**0.6**
Barley	—	—	—	—	—	10.6	1.8	0.0	0.0	0.0	0.0
Beef	0.1	0.1	0.3	5.0	10.0	15.6	11.0	1.4	1.0	1.0	0.3
Coarse grains	4.0	4.0	4.0	4.0	4.0	4.0	2.2	0.4	0.0	0.0	0.0
Other fruits and vegetables	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Maize	—	—	—	—	—	12.0	2.2	0.0	0.0	0.0	0.0
Milk	0.2	0.2	0.2	−1.0	16.0	18.0	11.6	1.4	1.0	1.0	0.3
Oats	—	—	—	—	—	9.2	2.4	0.0	0.0	0.0	0.0
Other crops	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sheep meat	0.1	0.1	0.3	5.0	19.0	32.9	27.8	1.8	1.0	1.0	0.3
Wool	0.0	0.0	0.0	5.0	11.0	19.0	10.2	1.4	1.0	1.0	0.3
Import-competing	**28.3**	**28.3**	**28.8**	**32.0**	**27.0**	**28.1**	**41.1**	**22.5**	**19.6**	**15.8**	**8.9**
Eggs	59.0	59.0	59.0	59.0	59.0	59.0	80.2	38.2	50.4	36.4	25.0
Pig meat	2.0	2.0	2.8	5.4	−19.9	10.3	−2.8	0.0	0.0	0.2	0.3
Poultry	31.0	31.0	31.0	31.0	31.0	31.0	61.6	57.0	40.8	34.6	28.3
Wheat	11.0	11.0	11.0	11.0	11.0	11.0	6.6	0.6	0.0	0.0	0.7
Mixed trade status											
Grapes	120.0	120.0	134.0	106.0	53.8	23.2	23.8	5.0	5.0	5.0	5.0
All covered	**1.8**	**1.8**	**1.9**	**5.0**	**14.3**	**20.0**	**14.9**	**2.9**	**2.1**	**2.0**	**1.3**
Domestic market support	0.0	0.0	0.0	0.0	0.0	0.2	2.0	0.0	0.0	0.0	0.0
Border market support	1.8	1.8	1.9	5.0	14.3	19.8	12.9	2.9	2.1	2.0	1.3
Dispersion of NRA of covered products	40.7	40.7	44.5	36.3	23.2	17.4	27.1	17.5	17.3	14.0	9.8
% Coverage at undistorted prices	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*80*

Source: Anderson and Valenzuela (2008), drawing on authors' spreadsheet.

Note: — = not available.

a. Weighted averages, with weights based on the unassisted value of production (actual back to 1966, and the average for 1966–69 for earlier years). Dispersion of NRAs is their standard deviation of the simple five-year average of the annual standard deviation around the weighted mean.

Figure 5.2. NRAs to Exportable, Import-Competing, and All[a] Covered Products, Australia and New Zealand, 1946–2007



Source: Anderson and Valenzuela (2008), drawing on authors' spreadsheet.

a. The total NRA can be higher than both the exportable and importable averages because nontradables assistance is also included.

forced to pay more than the export price (Sieper 1982; Edwards 2006). These schemes, which required the pooling of domestic and export returns, could only be implemented with the support of the Australian state governments.[10] All other policy measures combined—fertilizer subsidies, income tax incentives, rural credit measures, subsidies to agricultural research and extension, and public

investment in land and water development and rural infrastructure—added the equivalent of no more than 2 percent to Australian farmers' gross income as of the early 1970s (table 5.3).

The net effect of farm and nonfarm policies on agricultural incentives is summarized in table 5.3 and illustrated in figure 5.3. For Australia, the negative effect on incentives from agricultural policies in the 1940s was trivial compared with that from nonagricultural ones, mostly import protection for manufacturers. Together, those policies effectively reduced farmers' gross returns by more than 20 percent. Price stabilization and other agricultural policies gradually provided more direct assistance to Australian farmers over the 1950s and 1960s, when manufacturing protection remained steady, so that degree of overall taxation fell from 27 percent to just under 10 percent by 1965–69, as measured by the RRA. Of that decline, about two-thirds is due to changes in nonagricultural policies and only one-third to changes in direct assistance to farmers. New Zealand farmers, meanwhile, were effectively taxed an average of more than 20 percent until 1972–73. The degree of antiagricultural bias in the two countries to the early 1970s was thus very similar to that of many developing countries in those decades. Meanwhile, by the late 1960s, home consumption price schemes imposed tax equivalents of over 100 percent on Australian consumers of butter, cheese, sugar, and eggs. These distortions are unusual in that the imposition they imposed on consumers or users of exportables was greater than the price impact on producers—something that does not arise from standard trade barriers.

Reforms of the early 1970s

Disenchantment with interventionist trade and related economic policies gradually spread in the 1960s. At the 1968 National Development Conference in New Zealand, policy makers nearly agreed to simultaneously reduce import protection and tariff compensation to agriculture. But it was not until the 1970s that tariff reductions began in both countries. In Australia, a 25 percent across-the-board cut in July 1973, preceded by some minor cuts in 1970–71, started the tariff reform process. It was accelerated in the 1980s and continued through the 1990s. As a result, the average NRA to Australian manufacturing fell from 23 to 3 percent, and the effective rate from 36 to 5 percent over those three decades. In the 1990s alone, both the mean and the standard deviation of Australia's import tariffs on goods halved, bringing the average tariff for manufactures down to 4.2 percent in 1999.[11] Currently, the only manufacturers with significant tariff protection are motor vehicles and parts, textiles, clothing, and footwear. Excluding those products, the average effective rate of assistance to Australian manufacturing is just 3 percent (Productivity Commission 2000a).[12]

Table 5.3. NRAs to Agricultural Products Relative to Nonagricultural Industries, Australia and New Zealand, 1946–2007

(percent, for fiscal years starting July 1)

a. Australia

	1946–49	1950–54	1955–59	1960–64	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–04	2005–07
NRA, covered products	−7.0	1.8	7.8	8.5	12.3	8.8	4.6	5.4	5.7	4.4	2.6	0.0	0.0
NRA, noncovered products	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NRA, all agriculture (excluding NPS)	−6.4	1.5	6.3	7.4	10.7	7.6	3.9	4.6	4.4	3.7	2.1	0.0	0.0
All importables	—	—	3.8	4.5	4.9	7.4	4.9	3.5	1.2	0.8	0.2	0.0	0.1
All exportables	—	—	5.7	6.4	9.3	7.0	3.3	4.2	4.8	4.3	2.6	0.0	0.0
All nontradables	—	—	31.4	41.6	78.1	25.3	19.5	24.2	12.2	1.8	0.2	0.0	0.0
Trade bias index	—	—	0.02	0.02	0.04	0.00	−0.02	0.01	0.04	0.03	0.02	0.00	0.00
NPS	0.6	1.2	1.8	2.1	2.0	2.1	1.4	1.1	0.9	0.7	0.8	0.5	2.2
Inputs	—	—	—	—	—	—	1.2	0.7	2.0	3.0	3.3	2.8	2.8
Other	—	—	—	—	—	—	1.4	1.1	−1.1	−2.3	−2.5	−2.3	−0.6
NRA, all agriculture (including NPS)	−5.7	2.7	8.1	9.5	12.7	9.4	5.3	5.8	5.3	4.4	2.9	0.5	2.2
NRA, decoupled assistance	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9	1.4	1.2	1.2	2.3	2.6
NRA, all agricultural products (including NPS and decoupled assistance)	−5.7	2.7	8.1	9.5	12.7	9.4	5.4	6.6	6.6	5.6	4.1	2.8	4.8
NRA, all agricultural tradables (including NPS)	−5.9	2.3	7.3	8.4	10.9	8.9	4.9	5.2	5.1	4.5	3.0	0.5	0.2
NRA, all nonagricultural tradables	28.0	23.5	19.6	20.7	20.7	16.8	12.0	11.1	8.2	5.3	2.6	2.0	2.0
RRA	−26.3	−17.1	−10.3	−10.2	−8.2	−6.8	−6.4	−5.3	−2.9	−0.7	0.4	−1.5	−1.8

b. New Zealand

	1955–59	1960–64	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–04	2005–07
NRA, covered products	1.8	1.8	1.9	5.0	14.3	20.0	14.9	2.9	2.1	2.0	1.3
NRA, noncovered products	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	—
NRA, all agricultural products (excluding NPS)	1.8	1.8	1.9	5.0	14.3	20.0	14.9	2.9	2.1	2.0	1.2
All importables	28.3	28.3	28.8	32.0	27.0	29.6	42.1	24.3	20.7	17.6	9.8
All exportables	0.1	0.1	0.2	2.8	13.1	18.9	12.0	1.2	0.8	0.9	0.6
All nontradables	—	—	—	—	—	—	—	—	—	—	—
Trade bias index	−0.22	−0.22	−0.22	−0.22	−0.11	−0.08	−0.21	−0.18	−0.16	−0.13	−0.07
NRA, NPS	—	—	—	—	—	—	5.5	0.5	0.6	0.4	0.3
Inputs	—	—	—	—	—	—	4.6	0.5	0.6	0.4	0.3
Other	—	—	—	—	—	8.9	0.9	0.0	0.0	0.0	0.0
NRA, all agriculture (including NPS) 1.8	1.8	1.9	5.0	14.3	28.9	20.9	3.4	2.6	2.4	1.4	
NRA, decoupled assistance	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.1
NRA, all agricultural products (including NPS and decoupled assistance)	1.8	1.8	1.9	5.0	14.3	28.9	20.9	3.5	2.6	2.4	1.5
NRA, all agricultral tradables (including NPS)	1.8	1.8	1.9	5.0	14.3	28.9	20.9	3.4	2.6	2.4	1.4
NRA, all nonagricultural tradables	21.3	24.0	34.3	30.0	21.7	20.3	16.6	10.8	6.5	3.8	3.3
RRA	−16.1	−17.8	−24.1	−19.0	−6.0	7.1	3.5	−6.7	−3.6	−1.3	−1.8

Source: Anderson and Valenzuela (2008), drawing on authors' spreadsheet.

Note: — = not available; n.a. = not applicable.

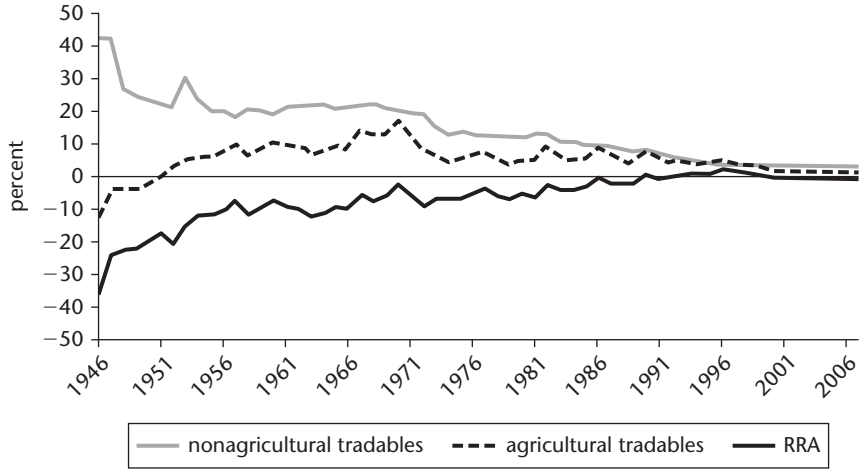
a. Before including Non-Product Specific (NPS) assistance.

b. Total of assistance to primary factors and intermediate inputs divided by the total value of primary agriculture production at undistorted prices (percent).

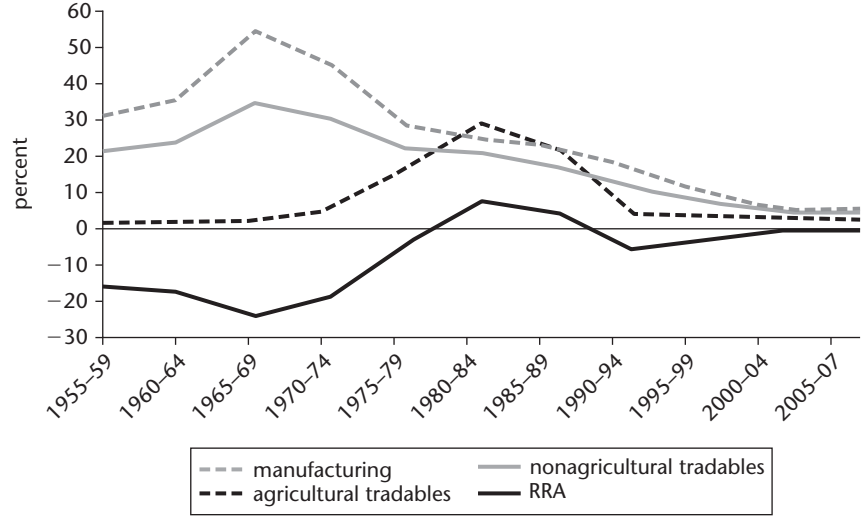
c. RRA = $100[(1 + NRAag^t/100)/(1 + NRAnonag^t/100) - 1]$, where $NRAag^t$ and $NRAnonag^t$ are the average percentage NRAs for the tradable parts of the agricultural and nonagricultural sectors, respectively.

Figure 5.3. NRAs to Manufacturing, All Nonagricultural Tradables, All Agricultural Tradable Industries, and RRA,[a] Australia and New Zealand, 1946–2007

a. Australia



b. New Zealand



Source: Anderson and Valenzuela (2008), drawing on authors' spreadsheet.

a. The RRA is defined as $100 \times [(100 + NRAag^t)/(100 + NRAnonag^t) - 1]$.

Australia's agricultural subsidies and regulatory interventions also have been close to eliminated over those 35 years. The average NRA to the farm sector has fallen from 16 percent in the early 1970s to less than 2 percent at present, and the standard deviation has fallen from almost 60 percent to less than 1 percent. The process was piecemeal[13] and gradual, often involving a series of partial steps, but it was persistent, beginning in 1972 with milk and then two to four years later with cotton and tobacco. It took another decade, though, for supports for rice and eggs to begin to be dismantled, and almost a further decade for assistance to the grape industry to be cut. The process also experienced a significant reversion—the introduction of the reserve price scheme for wool in 1973—that took until the early 1990s to unravel.[14] There were just two farm groups still benefiting significantly from government programs in the latter 1990s: tobacco and milk producers, each with an NRA of more than 20 percent in 1997. Deregulation of tobacco marketing arrangements began in 1995 and was completed in 2000, bringing effective assistance to tobacco growing down from 30 to 2 percent over that period. As from July 1, 2000, the remaining impediments to a free domestic market in fluid milk began to be dismantled, for which an untied, one-off compensation grant (providing a total of around US$1.5 billion, or US$110,000 per dairy farm) has been paid, funded by a consumer levy at the retail level over 2000–08. Contrary to some pessimistic forecasts at the time, dairy output has continued to increase as production from those leaving the industry (17 percent over the first three years) has been more than compensated by output and productivity improvements on remaining farms (Harris 2005a, 2005b).

In New Zealand, the antiagricultural bias declined in the 1970s as the result of a modest reduction in manufacturing protection and a big boost to beef, sheep, and dairy farmer assistance. In these two steps, the effective taxation of agriculture (the negative of the RRA) fell from 22 to 14 percent, and then to less than 7 percent. It fell further over the next dozen years as agricultural assistance increased slightly and manufacturing protection continued to fall slightly, then rose a little from the late 1980s as assistance to farmers fell faster than that to manufacturing, and finally fell to just 1 percent as the last of the interventions were removed from the late 1990s (figure 5.3).

Thus, distortionary government assistance to both manufacturing and agriculture, and hence the overall antiagricultural bias, has now all but disappeared in both Australia and New Zealand after being in place for more than seven decades.[15] Over the past 35 years, it was nonagricultural policy that overwhelmingly contributed to the improvement of farmers' incentives in Australia and New Zealand—in fact, the decline in manufacturing protection was sufficiently large enough to more than offset the decline in direct assistance to farmers from the late 1960s. Farmers also have benefited from the fact that service sectors too have not

been spared reform in these countries. Banking; post and telecommunications; ports; higher education; health; and rail, air, and sea transport have been opened up. In addition, there has been progressive outsourcing of many government services; and substantial reforms to competition policy and practice, including privatization and the corporatization and demonopolization of numerous government enterprises, are well advanced.[16] Moreover, by 1985 both currencies were floating and foreign investment flows began to be freed up. That complemented financial sector reform and contributed to foreign direct investment, equity and foreign currency transactions growing at several times the pace of GDP. Even the previously highly unionized labor markets have undergone considerable reform. Households have gained substantially from these widespread reforms, including consumers of food who for most of the past two decades have faced tax equivalents of well below 10 percent on their food purchases (compared with the OECD average of between 23 and 36 percent over that period—see OECD 2008).

Reasons behind the Policy Evolution

In the early postwar years, successive Australia and New Zealand governments sought to expand the output of the agricultural sector in order to improve the balance of trade position in the context of a fixed exchange rate regime. There were numerous factors in common, but since some were country-specific, it is better to consider the two countries separately.

Australia

In the Great Depression years of the 1930s, and even more so in the two decades following World War II, agricultural policy instruments were introduced in profusion, including price stabilization schemes implemented through buffer funds, guaranteed prices and deficiency payments, home-consumption price schemes for wheat, dairy, sugar, and fruits and vegetables; input subsidies on fuel, fertilizers and interest rates; import subsidies; tax concessions; publicly funded research and development; publicly funded extension services; land development schemes; and the provision of rural infrastructure (Godden 1997; Mauldon 1990).

For some commodities—for example, sugar and wheat—there were national-level statutory marketing authorities (SMAs) or, in the language of the GATT and, later, the World Trade Organization (WTO), state trading enterprises (STEs). This instrument was also used by state governments across a wide range of commodities. It often took the form of a producer-controlled board, with compulsory monopsony or monopoly powers in order to effect "orderly marketing" and sometimes used in conjunction with marketing quotas. Frequently, the SMAs

were linked with regulations that required the shipment and storage of grain to be handled by state-owned enterprises. This form of intervention by Commonwealth and state governments began in the 1920s and became central to marketing policy (Mauldon 1990).[17, 18]

In 1973, the Australian Labor Party won office and, as a political party with few roots in rural areas, set about establishing a review of the objectives and instruments of agricultural policy in order to define a set of principles that would underpin intervention. The result was the so-called Green Paper (Harris et al. 1974). The approach adopted by the authors was that of applied welfare economics: market failure provides a reason for government intervention to be potentially beneficial through improving economic efficiency. Some years later, Sieper (1982) argued that the public choice or private interest explanations fit better with reality, and particularly with the choice of policy instruments, than those provided by the public interest approach. Although the insights provided by that set of theories were not entirely new, Sieper's use of them provided fresh and powerful insights into the Byzantine world of Australian agricultural policy as it existed up to the late 1970s.

In 1974, the Industries Assistance Commission (IAC) was established from the then-existing Tariff Board. The IAC was designed to act as a forum for public discussion of economic policy by undertaking reviews and evaluation of economy-wide government intervention and regulation. During the 1970s and 1980s, it produced reports on wheat, sugar, dairy, dried vine fruits, rural adjustment, and income stabilization (Edwards 1987). This development signalled the government's intention that policies should be evaluated from the viewpoint of the public interest rather than, or perhaps as well as, the private interests of farm groups and regions. In other words, the year 1973 marked a watershed: applied welfare economic analysis would be used to analyse the effects of various policy instruments and the recommendations of that analysis would be treated objectively, even if not always implemented in full (or, in a few cases, at all).

In 1982, the Balderstone Report set out the agricultural policy options for the 1980s (Balderstone 1982). The basic thrust was that of reduced protection, not just in agriculture but throughout the entire economy. The authors supported the position that the agricultural sector should receive compensation on the grounds of equity (but not efficiency as discussed in the 1970s; see Martin [1990]) for having to pay tariffs on imported inputs. In the report, the authors adopted an incrementalist approach that supported the continuation of many of the then-existing instruments—for example, input subsidies and price discrimination between domestic and export markets. They also suggested that the objective of price stabilization should be achieved through price underwriting linked to market conditions rather than through existing instruments such as buffer funds.

In 1988, the Commonwealth government issued a policy statement stating that the agricultural policy objectives were to be, among other things, enhancing productive capacity through balanced management of natural resources, development of human skills and improved research; developing a more productive industry structure through an economywide approach to policy reform with lower and more balanced assistance; responding to the international environment through better marketing of agricultural produce and reductions in international trade distortions; and offering positive assistance for structural adjustment (see Godden 1997). With this, it was obvious that the policy objectives of the earlier postwar years had been substantially altered.

The Australian Wheat Board lost its monopoly in the domestic food wheat market in 1989, as had been recommended by the IAC in 1984, but it retained (and continues to retain) its export monopoly. In 2000, the single export desk for wheat was reviewed under the National Competition Policy and, in the absence of strong evidence one way or the other, the government accepted the recommendation that the export monopoly be retained until 2010. Reviews under National Competition Policy of the single export desk for rice and for sugar also recommended their continuation, based on a national interest test.

In 1991, a review of the statutory arrangements for the marketing of agricultural products (Industry Commission 1991) was published. The investigation focused on the economic effects of these arrangements, in particular the effects on efficient resource allocation. The Commission concluded that although many of the arrangements were beneficial to producers and to society generally, there were instances where this was not so. The SMAs did not operate in the public interest when they had powers to require producers to participate (that is, the compulsory acquisition of product), when potential producers were excluded from entry (for example, when there are nontradable quotas in place), or where prices were raised for users and consumers (for example, price discrimination between the domestic and export markets). In these instances, it was concluded that efficiency of resource use was not achieved.[19] The outcome of this review has been the disappearance of most, but not all, SMAs.

From its beginnings in the latter 1970s, the leadership of the National Farmers Federation (NFF, and before it the Grains Council) adopted an economy-wide approach to economic issues. The activities of the NFF also encouraged the development of a free-market faction in the Liberal Party in the late 1970s (Anderson and Garnaut 1987). That approach was to be the hallmark of much of the rigorous computable general equilibrium analysis conducted by the IAC over the decade to 1989 on matters both agricultural and more general. Early in that period, the government had convinced the farm sector of the need for rationalization of the sector. As a quid pro quo, the government would introduce measures

to improve efficiency in the sectors supplying inputs to agriculture as well as the infrastructure required for distribution—for example, rail, storage, and the wharves. However, some commodity groups within the NFF complained that the leadership of the organization had turned its back on protecting its constituents from harsh economic conditions (for example, drought and the vagaries of international markets) and from the deregulatory zeal of the government (including through one of its main sources of advice on agricultural matters, namely, the IAC/IC).

The objectives and the instruments of agricultural policy that existed from the early postwar years until the late 1980s reflected not only the supply of assistance to producers through government from consumers (users) and taxpayers but also the demand for assistance from producer groups. As shown by Anderson (1978), the interaction between the two sides of the political market generated a wide dispersion of support from the late 1960s to the mid-1970s. His findings are consistent with the interest group theory of political economy, or public choice theory: the land-intensive subsectors such as cereals and livestock were found to be lightly supported, whereas the labor-intensive subsectors such as milk production and horticulture were heavily supported. Martin (1990) outlined several models in the literature on public choice theory and evaluated the extent to which each was relevant to the developments in agricultural policy that occurred in the 1980s. In assessing the role of the IAC, he concluded that "the establishment of the IAC also appears to have had a remarkably strong influence on the policy process, and to have been associated with and contributed to the change in ideas about industry assistance measures" (p. 198). MacLaren (1992) argues, in a comparison of the processes of agricultural policy reforms in Australia and the European Community (EC), that the IAC proved significant in the reform of Australian agricultural policy because it altered the political economy of policy making. No other industrial country has a body with the functions of the IAC, and the lack of such a body may help to explain why reductions in agricultural protectionism in other industrial countries, with the exception of New Zealand, have been very difficult to achieve.

Over the past 25 years, much of the intervention in both agriculture and manufacturing in Australia has disappeared. In agriculture, the focus of government policy on incomes and prices has given way to concerns about the quality of the resources used by the agricultural sector and the efficiency with which they are used. During the same period, the principal farm lobby groups have acquiesced to the view that markets can perform better than governments in the provision of an economically healthy sector. Subsectors that traditionally were heavily supported have accepted the benefits of reduced market-based intervention. In 2000, even the dairy sector accepted total deregulation of the prices of both market and

manufacturing milk. The subsequent free interstate trade in market milk led to better exploitation of regional comparative advantages. The bribe paid to secure acceptance by all regions was an adjustment assistance scheme financed by consumers who will continue to pay a high price for milk during the transition period of eight years.[20] This acceptance of reduced government involvement in the markets for agricultural products contrasts markedly with the situation in most other OECD countries, and in many developing countries, as confirmed by the continuing difficulties in defining modalities for domestic support and market access in the Doha Round.

New Zealand

Well into the 1960s, New Zealand continued an isolationist economic policy (import selection through licensing) that had been introduced just after the Great Depression. Import selection effectively prohibited imports of competing goods by using a system of import licensing underpinned with high tariffs. Import prohibitions remained in place for selected food products, the most notable of which was for margarine, which could be purchased only with a doctor's certificate! Price supports, coupled with import licensing, increasingly protected the domestic wheat industry. At the other extreme, export prohibitions on coarse grains tended to lower the price of feed wheat, barley, and oats to poultry and pork producers and other users.

For a short period around 1955, the import licensing regime was liberalized (Rayner and Lattimore 1991), but a balance of payment crisis in 1957 (falling dairy product prices) caused a policy reversal. In this strong import-substitution environment, exports were heavily concentrated in meat, wool, and dairy products—the industries in which New Zealand had its strongest comparative advantage and to which the government provided the least assistance (table 5.2). Until the mid-1950s, these "pastoral" exports represented nearly 95 percent of total merchandise exports from New Zealand. At that point, nonagricultural exports began to grow, so that by 1969 agriculture's share of merchandise exports fell to 84 percent, in part due to the advent of the highly selective New Zealand–Australia Free Trade Agreement that began in 1966.

The New Zealand economy suffered a series of domestic and international economic shocks over the seven-year period starting in 1967 (Dalziel and Lattimore 2004). In 1967, export earnings were severely reduced by a fall in international wool prices, leading to the exchange rate being devalued. Furthermore, New Zealand was beginning to import inflation via its fixed exchange rate policy and the expanding U.S. fiscal deficit surrounding the Vietnam War. Domestically, an increase in the rate of inflation led to a breakdown in the national wage-setting

mechanism, resulting over the next few years in large wage increases. The government then began increasing farm input subsidies to counteract the drop in income.

Another terms-of-trade shock came in 1972–73, when meat prices rose to high levels as part of a general agricultural commodity price boom. Though New Zealand revalued its exchange rate to counteract the macroeconomic effects, the United Kingdom joined the European Economic Community (EEC) in 1973, reducing New Zealand's longstanding preferential access to this very profitable agricultural export market.[21] The first oil crisis came close on the heels of these occurrences, causing an additional major adverse terms-of-trade shock. New Zealand's economic policies changed rather dramatically as a result. In an attempt to maintain consumption in the face of drastic falls in the terms of trade, a command economy approach was adopted, under which industries, prices, interest rates, wages, and foreign exchange rates were more heavily regulated. High inflation and large fiscal and current account deficits ensued.

Foreign borrowing increased significantly during this period, and was used in part to finance major energy projects in an attempt to reduce New Zealand's reliance on imported fuel. In order to finance this debt, agricultural output subsidies on exportables were used for the first time in an attempt to generate additional export earnings. Farm development subsidies also were increased substantially. The sheep and wool industries were the favored targets because they were the largest agricultural and export sectors, but export subsidies were also provided for some nontraditional export products. The result was a large increase in the NRA offered to the exportable sector and a closing of the historically large gap between rates of assistance to the import-competing and export sectors for about a decade (figure 5.2b). The NRA on outputs in exportable primary agriculture rose to 19 percent over 1980–84 (table 5.2).

During the reform period from the mid-1980s, output assistance to exportable primary agriculture was abruptly removed and the rate of assistance fell to almost zero in less than a decade. The sharp rises within exportable primary agriculture in the early 1980s included 24 percent for beef in 1982 and 59 percent for mutton and lamb production in 1984. Output assistance was nearly as high for raw milk and wool production. No significant output subsidies applied to the other exportable subsectors, such as fruit and vegetables and deer production, nor to import-competing subsectors such as grains and oilseeds. Output assistance for other animal products appears to be the result of high nontariff phytosanitary barriers on pig meat (during the 1980s), poultry, and eggs.

The NRAs for favored exportables (sheep, beef, wool, and dairy) all reached a peak in the 1975–84 period, although not in the same years because the deficiency payments were tailored to the different world price levels for each year. Most of

the importable NRAs were zero because New Zealand does not produce sugar, cotton, soybeans, or rice.

The first agricultural adjustments occurred in 1981 in wheat, tobacco, and meat processing. Tobacco growers were offered a production quota buyout of NZ$7,000 per hectare. These quotas resulted from local-content regulations, which prescribed that half of tobacco leaf used for processing by the two firms (Wills and Rothmans) had to be grown in New Zealand. Around two-thirds of the producers accepted the grant and relinquished their production rights. The remaining producers continued in production. Wills ceased operations in New Zealand in 1987 but Rothmans continued until 1994, paying NZ$6.52 per kilogram for dried leaf grown in New Zealand even though the import price (and over-quota price) was around NZ$4 per kilogram. The NRA on tobacco at this time was, accordingly, 63 percent.

In 1983, New Zealand entered into a new and much more comprehensive free trade agreement with Australia (ANZCERTA). This arrangement was the first vehicle, after 1955, used to begin the process of removing the 1938 import licensing system and reducing import tariffs. In the same year, under some pressure from the United States, it was announced that the agricultural output subsidies would be abolished.

Wide-ranging macroeconomic and microeconomic reforms were introduced in 1984. They included monetary and fiscal policy reform and reductions in industry regulation and support. The process of removing almost all agricultural subsidies was begun by abolishing agricultural output subsidies and phasing out agricultural input subsidies—a process that was completed by 1990. Policies affecting nontradables also were important, as they promoted greater macroeconomic stability and resource mobility, both of which increased the effectiveness of changes in trade policies. The government did not remove the export monopoly rights of agricultural marketing boards over this period, and while it did signal in a general way that such action was on the agenda, it nonetheless introduced a new marketing board with monopoly export rights (for kiwifruit). Furthermore, winegrape growers were given a subsidy to replace old varieties with newer ones.

Import licenses for Australian goods were increasingly tendered and then abolished once tender premia had fallen to low levels. This was followed by the removal of all other import licenses; the last ones (on textiles, clothing, and footwear) were removed in the early 1990s. Tariffs were progressively reduced from 1986 until 2000. Further tariff reductions were then halted, as import tariffs had fallen to around the average of those in other high-income countries.

Monetary policy in New Zealand was reformed in 1989, followed by liberalization of labor market legislation and fiscal policy constraints. These initiatives completed the liberalization of the capital account begun earlier with the conversion to

a floating exchange rate regime; full currency convertibility; and the removal of interest rate, price, and wage controls. In this environment, the New Zealand macroeconomy gradually stabilized over the period from 1984–91. The notable exception was unemployment, which continued to rise, to around 11 percent by 1991 (Evans et al. 1996). The unemployment rate did not fall to less than 4 percent, where it had been in 1984, until 2003.

From 1990, the major change to agricultural policy was the removal of export monopoly rights administered by some agricultural marketing boards (for example dairy, meat, apples, and pears) and, in some cases such as dairy, the abolition of the marketing board itself. This process was complicated by the existence of bilateral import quotas—especially for exports to the European Union, United States, Canada, and Japan. In the case of dairy quotas, the import quota rights were given to the three export dairy companies. The largest of the three, Fonterra, subsequently bought those rights from the smaller ones. In the case of meat, a regulatory body was retained within Meat New Zealand (the marketing and research organization that developed from the old New Zealand Meat Producers Board) to allocate bilateral quota use rights. Under pressure from trading partners in the Doha Round, Fonterra's quota rights are to be removed and allocated in an alternative fashion that is yet to be decided.

By 1990, government assistance to New Zealand agriculture was limited to biosecurity, adverse events relief, research and development subsidies, export market development assistance, and product quality control programs. The direct rate of assistance to exportable agriculture had fallen to around 1 percent. The consumer tax equivalent (CTE) for exportable food products was down to a similarly low level, and comprised mainly the import-export parity differential that can be gained by large export firms in dairy, meat, and forestry products. The CTE for importable food products is somewhat higher because there are still import tariffs on some of these import-competing items, although typically they are still within the range of 5–7 percent. The exceptions are poultry and eggs, imports of which are strictly controlled on animal health grounds. Accordingly, domestic prices of these items are significantly higher than world market prices. Because the OECD considers these phytosanitary restrictions nontariff barriers, they are analyzed here as elements of nominal assistance to outputs (even though part of that protection may be correcting for a market failure).

By 2005, the rate of assistance to manufactured food products was in single digits. However, the traditional pattern of tariff escalation remains, in that tariffs on unrefined exportable products and noncompeting imported food components tend to be zero while higher value-added foods have tariffs in the 5–7 percent range. In the nonfood manufacturing sector, NRAs on output have fallen from 24 and 42 percent (on exportables and importables, respectively) in 1982 to 4 percent

in 2009. Following the removal of the last import licensing program in 1993, tariffs were reduced continuously until 2000, when the most favored nation (MFN) tariff reduction programs were halted. One reason for this policy change was to create bargaining chips in the pursuit of bilateral and plurilateral free trade agreements that New Zealand embarked on vigorously—most recently with China, the United States, and ASEAN (Association of Southeast Asian Nations) Plus Three. There were some larger, one-off tariff reductions over the period, though: early in the reforms the tariff on computers was reduced from 40 percent to zero, and in 1997 the last remaining MFN tariff on new cars (25 percent) was abolished.

Prospects for Further Policy Reform

Notwithstanding the huge amount of agricultural trade policy reform over the past two decades, plenty of policy issues remain on the table, predominantly in the natural resource and environmental areas. Three are illustrated here.

The first is food and agricultural import restrictions for the protection of plants, animals, and human health, though the economic protection from import competition that this provides farmers has not been fully captured in the Productivity Commission's NRA estimates for Australia, especially for horticultural products. While some of that protection may well be warranted on externality grounds, some (such as a complete ban on imports of certain fruits from all countries) may be excessive from a national welfare viewpoint. The Australian government, mainly in response to pressure from other WTO members seeking greater market access, is slowly examining whether various measures are excessively restrictive. Typically, consumer costs are not included in such assessments, nor are any of the cheaper ways of reducing costs associated with the importation of disease (James and Anderson 1998). New Zealand, in particular, would be a beneficiary of a more liberal quarantine policy regime in Australia.

Second, neither Australia nor New Zealand has so far allowed the commercial growing of genetically modified (GM) varieties of farm products, with the sole exceptions of cotton and carnations in Australia. While the Office of the Gene Technology Regulator in Australia has approved the commercial growing of GM canola, the state governments have placed moratoria on plantings. GM food can be sold only if strict labelling standards are adhered to (FSANZ 2007). These restrictions may or may not be in economies' and consumers' interests, depending on their impact on market access abroad for Australian and New Zealand farm products and on human health and the environment at home (Anderson and Jackson 2005), but emotion has played a larger role in formulating these policies than has sound technical and economic analysis, especially in the growing of GM crops.

Third, environmental policy has become a very important issue in agriculture in Australia and New Zealand (Vitalis 2005). Water policy, for example, which was

already becoming a major economic and political issue, was brought to a head in Australia during 2006 following the country's worst drought on record. Though there has been substantial reform in water policy reform in Australia in recent years, much remains to be done to make the most of this resource, particularly in rural areas, where the majority of water is used and proposals for reform and several national enquiries are underway (see, for example, Productivity Commission 2006). More efficient pricing of water may lead to substantial reallocation of resources within the agricultural sector, with possible declines in Australian production of cotton, rice, and milk as horticultural industries (and urban areas) bid away water from farmers.[22]

The remaining major frontier for policy reform that would boost farm incomes in Australia and New Zealand is the dismantling of agricultural subsidies and import protection abroad. A successful conclusion to the Doha Round of negotiations in the WTO provides the greatest promise for achieving that outcome. According to global Linkage Model results reported in Anderson, Martin, and van der Mensbrugghe (2006), removing all merchandise trade barriers and agricultural subsidies globally would raise agricultural value added or net farm incomes in Australia and New Zealand by 26 percent. Even using the Global Trade Analysis Project (GTAP) Model, in which supply response elasticities are lower than in Linkage, a similar study by Anderson and Valenzuela (2007) reports that agricultural value added in Australia and New Zealand would rise by 15 percent, compared with a rise of just 2 percent in value added by nonagricultural industries.

Policy Lessons for Other Economies

By way of conclusion, two lessons are worth emphasizing from the Australia and New Zealand experiences. For agricultural-subsidizing countries, these case studies show that removing even the largest and longest-lasting farm subsidies is possible. Even where that was done by providing generous adjustment assistance, support was time-bound. In the Australian case, adjustment assistance was able to be financed simply by delaying the rewards to domestic consumers and thereby creating a gap between the producer and consumer price, rather than through outlays from (and hence resistance by) the treasury.[23]

For developing countries still effectively taxing their agricultural sectors, these two case studies offer hope that good policy analysis and advisory institutions will be able to alter the political economy sufficiently to remove that taxation. More than that, the Australia and New Zealand cases illustrate the growth dividend that can come from reforming such distortionary policies. Having now dismantled virtually all their import protection and agricultural subsidy policy distortions, and having undertaken major domestic macroeconomic and microeconomic reforms over more than two decades, the outcomes of those undertakings are

beginning to be reaped. The impact on overall living standards was mentioned at the outset, but an indicator within the agricultural sector is the acceleration it has given to farm productivity growth.

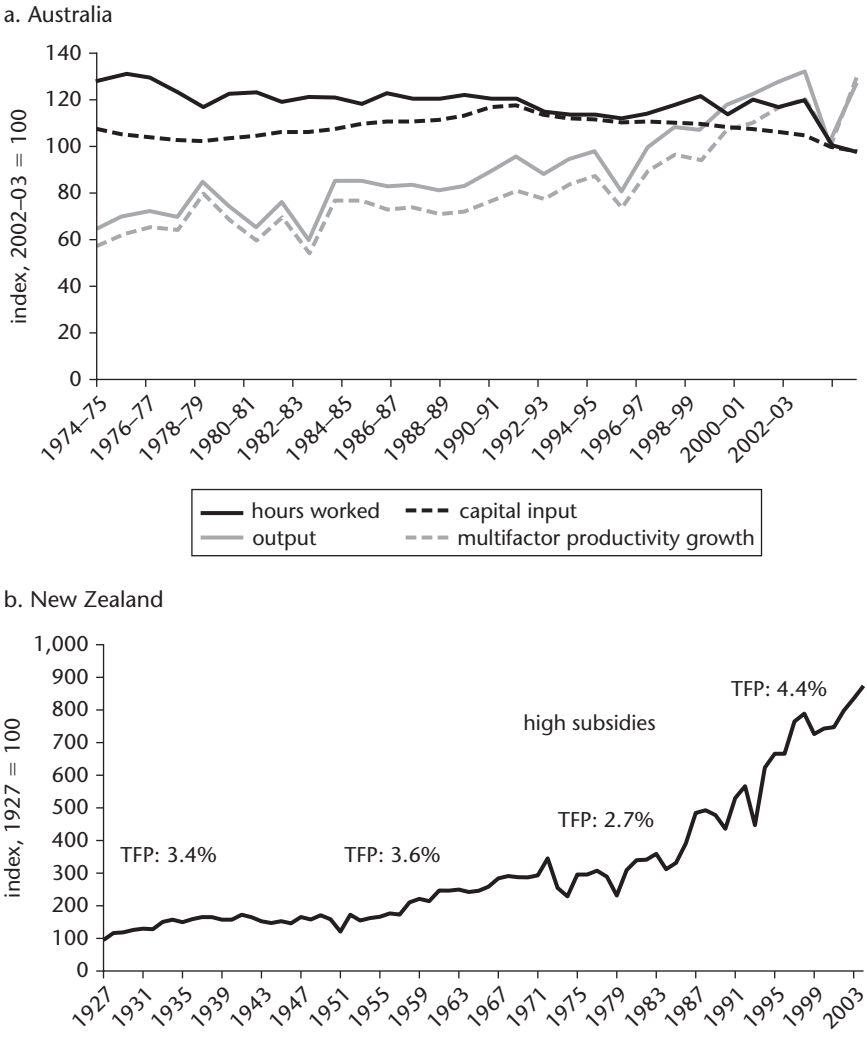
It needs to be borne in mind that farmers in Australia and New Zealand have not been immune from the standard problem facing small farms that requires them to "get big or get out" as the economy develops. It is true that farm sizes in Australia and New Zealand were large relative to those in most other market economies in the early post–World War II years, and that the "wool boom" of the early 1950s provided massive incomes for woolgrowers. Nonetheless, as wages grew in other sectors of the two economies, the need to adjust was felt strongly.[24] Adjustment manifested itself in the same way as in other countries—that is, with farmers funding agricultural research and adapting and adopting the new technologies it generated as appropriate, and with the number of farms and farmers declining steadily to lower the labor intensity of the sector even as output expanded.[25]

Within that context, the removal of the antiagricultural policy bias over the past 30 years has substantially boosted, albeit with a not-unexpected delay, the rate of growth of farm productivity in Australia and New Zealand. Figure 5.4 shows that in New Zealand, TFP growth *slowed* during the dozen or so years of high agricultural subsidies, and only increased to its previous rate after those subsidies, along with manufacturing protection, were removed. This pattern has been reflected in farmland prices: after initially halving when the subsidy cuts were announced in the early 1980s, they more than recovered in real terms by the turn of the century as farmers profitably adjusted to the new deregulated, level-playing-field domestic economic environment (figure 5.5).

In Australia, farm multifactor productivity (MFP) growth increased following the international price hikes in 1973–74, but then plateaued during the next decade until the reforms from the mid-1980s began to have an effect (figure 5.4). In the 1983–93 period, farm MFP grew at just 1.4 percent per year, low in comparison to the 4.1 percent growth rate seen in 1993–2000 (Productivity Commission 2005). Similar results are reported in Parham (2004): less than 1.5 percent during 1974–88, then 2.6 percent in 1988–93, and 4.3 percent in 1993–98.[26] His estimates show that even that earlier rate of 1.5 percent compares favorably with that for the other sectors of Australia's economy, the MFP of which was well below 1 percent during 1973–93 (and only 1.8 percent in 1993–98).

Clearly, farmers are capable not only of surviving without subsidies, but of becoming more productive after their removal—and without a noticeably faster rate of decline in the total number of farmers or farms than occurs with normal economic growth.[27] The cases of Australia and New Zealand, in fact, contradict a popular view in the economic growth literature that natural resource abundance (including a comparative advantage in agriculture) is a curse rather than a blessing.[28]

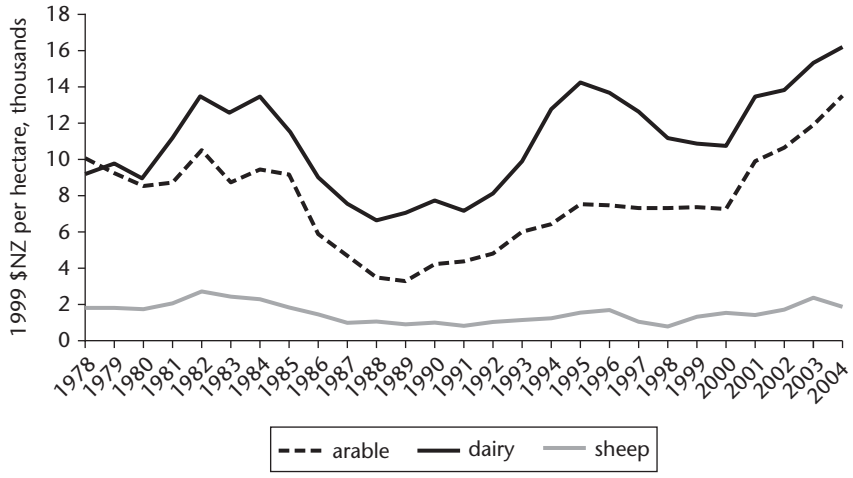
Figure 5.4. Real Agricultural Total/Multifactor Productivity Growth, Australia and New Zealand, 1927–2004



Sources: Productivity Commission (2005) and Lattimore (2006).

Three important aspects of the agricultural reform success in Australia and New Zealand need to be underlined. One is that it helps if assistance to nonagricultural sectors is cut at the same time. In Australia and New Zealand, those other microeconomic and macroeconomic reforms made it easier for farmers to adjust and raise their productivity. This is relevant for the many developing countries that still have industrial protection and behind-the-border restrictions on domestic

Figure 5.5. Real Farmland Prices, New Zealand, 1978–2004



Source: Lattimore (2006).

market activities. For other high-income countries, where manufacturing protection rates are already low and the macroeconomy is well managed, the reduction of high agricultural supports would be more painful unless coupled with adjustment assistance measures. Both sets of countries may benefit by following Australia's lead in the adoption of rural research and development corporations to manage research investments funded by a levy on farmers matched dollar for dollar by a grant from the federal government. Introduced in 1989, this innovative funding model, together with a similar model for the generic promotion of Australia's farm products,[29] arguably has contributed significantly to the increased international competitiveness of Australian agriculture (see CIE 2003; Productivity Commission 2007).

Second, adjustment to agricultural assistance cuts is easier when heterogeneity within the agricultural sector is greater. This can take at least two forms. Heterogeneity in rates of industry assistance within the sector, as captured by the standard deviation of farm industry NRAs shown near the bottom of tables 5.2 and 5.3, ensures that as high rates of assistance are lowered, resources will find it profitable to move to lightly assisted farm industries. Such transfers are far easier than shifting mobile resources to other sectors, and involve much less reduction in the value of sector-specific assets, particularly farmland. For Australia, the standard deviation was very high when the cuts in farm assistance began in the early 1970s, whereas for a country such as Norway, the support levels are very similar across farm industries, allowing much less scope for adjustment within the sector.

The other form of heterogeneity has to do with firm efficiency within each industry. If some farmers are much more efficient than others, then a cut in assistance to agriculture typically leads to the less efficient being bought out by the more efficient (who often are also more innovative and export-oriented). The productivity effects of that tendency could be substantial (Melitz 2003; Baldwin 2005; and Long, Raff, and Stahler 2007). In the case of the Australian dairy industry, it indeed seems to have been powerful (Harris 2005a). Productivity effects may also help explain the rapid rise in exports relative to domestic sales for a number of Australia's agricultural industries since the 1980s, including beef, canola, wine, and cotton. Four other indicators of the increasing globalization of agriculture in these two countries, two of which also indicate growth in intrasectoral trade, are: an increasing share of consumption being imported even though the self-sufficiency indicator is rising, and a slightly declining ratio of net exports to exports plus imports of agricultural products (Anderson et al. 2008).

The third important aspect of the agricultural reform success in Australia and New Zealand is the scope and quality of public institutions. Both countries had strong institutional arrangements that facilitated the development of policy advice, provided policy coordination, and administered the policy changes. The legal, accounting, and media systems ensured relatively transparent and informed policy debate, and assisted in resolving a host of firm-level complications that arose during policy implementation. The lesson for countries wishing to replicate the reform experience of Australia and New Zealand, especially in a developing-country context, is to not underestimate the importance of strong, pro-market, transparent, corruption-free institutions. Looking ahead in Australia and New Zealand, meanwhile, getting domestic policies right in the food safety, natural resource (especially water), and environmental areas, along with securing tariff and subsidy cuts abroad from the WTO's Doha Development Agenda, have the potential to yield even further productivity growth for farmers. But those are stories for the future.

Notes

1. Two recent analyses by economic historians point to successful exploitation of natural resources as the key explanation of Australia's relatively high per capita income prior to World War I (Broadberry and Irwin 2007; McLean 2007).

2. However, there is now evidence that the rate of growth of productivity in Australia has since slipped behind that of several OECD countries (Dolman, Parham, and Zheng 2007).

3. New Zealand has around five times the global average of both agricultural land per capita and arable land per worker, and Australia has around 25 times as much (Sandri, Valenzuela, and Anderson 2006). Of course the quality of farmland and associated water, rainfall, sunshine, etc. also matter, but even adjusting for these leave Australia and New Zealand are relatively very well endowed in agricultural resources per worker.

4. In terms of population, Australia is somewhat smaller than Argentina and Canada but similar in terms of arable land, while New Zealand is similar in population, arable land, and other agricultural attributes to the Nordic countries. But the antipodean location of Australia and New Zealand

compared with those other countries leads one to expect them to have traded less (and be specialized in more storable and less bulky exports) than these comparator countries, at least prior to East Asia's trade-led growth takeoff.

5. Mining was also an important export earner for Australia in the latter half of the 19th century, but due almost entirely to gold. Gold's share of total exports, 49 percent in 1861, fell to about one-sixth in the 1980s, returning to 28 percent in 1900. During 1961–90, wool and gold together accounted for almost three-quarters of all exports (Butlin 1962).

6. The portion of what follows that is focused on Australia draws on Anderson, Lloyd, and MacLaren (2007).

7. It is thus a generalization of the nominal rate of border protection due, for example, to an import tariff, which is the percentage by which the domestic price is raised above the import unit value.

8. The first major tariffs for the Australian Federation were imposed in 1907. According to the indexes constructed by Carmody (1952), by the 1920s the decade average of the general tariff on Australia's imports of items other than food beverages and tobacco was double that 1907 level, and by the 1930s it averaged 60 percent higher than in the 1920s. The Vernon Committee (Committee of Enquiry 1965) reports averages for tariffs above 12.5 percent for the period from 1938 to 1963: though they dipped somewhat in the late 1940s/early 1950s when import licences became the binding constraint, by the early 1960s they were back to the level of the late 1930s. The annual average level of protection since World War II is indicated by carefully constructed customs duty rates (Anderson, Lloyd, and MacLaren 2007).

9. The GATT came into effect in 1948. Even though Australia and New Zealand were founding signatories to that agreement, they both chose not to join the commitments to cut manufacturing tariffs—out of frustration with the unwillingness of other GATT contracting parties to commit to lowering their agricultural protection rates (Arndt 1965; Snape 1984; and Capling 2001).

10. That pooling was inefficient in at least two senses: it led to excessive volumes of production because producers received the average rather than the marginal price; and because there was little differentiation in terms of quality and variety, producers were discouraged from seeking out niche markets by differentiating their products. Additional stabilization schemes were implemented by individual states, such as for fresh milk and eggs, and these led to different incentives in the various states. These were possible because the states agreed not to trade across state borders, in contravention of Section 92 of the Constitution, which says there shall be no barriers to interstate trade.

11. This rate is still higher than that for other OECD countries (World Bank 2006). And WTO-bound tariffs average more than twice the applied rates. However, Australia uses nontariff import barriers less frequently than other OECD countries, apart perhaps from antidumping duties (Productivity Commission 2000a, 2000b, 2004).

12. Tariffs on motor vehicle imports fell from 40 to 15 percent over the 1990s and were cut again to 10 percent in 2005. For clothing, the decline over the 1990s was from 55 to 25 percent, and for footwear from 45 to 15 percent, with cuts to 17.5 and 10 percent in 2005, respectively. Further cuts, to as little as 5 percent, are scheduled for 2010 (Productivity Commission 2000a).

13. By contrast, the reductions in manufacturing protection were more systematic: the 1973 across-the-board tariff cut, a tariff review program begun in 1971 by the Tariff Board and subsequently conducted by its successors (the Industries Assistance Commission, Industry Commission, and Productivity Commission), and the preannounced phased reductions in tariffs on textiles, clothing, footwear, and motor vehicles and parts from 1988.

14. This stabilization scheme operated conservatively for 15 years until the government transferred the power to set the reserve price to growers in 1987. Growers promptly raised that reserve price, which operated on the world market, by 71 percent. Predictably, this encouraged growers to expand wool production and international buyers to reduce purchases (since the Australian Wool Corporation could then stockpile wool and thereby save the buyer the cost of storage). The scheme collapsed in 1991, following which the Australian Wool Corporation had to dispose of 4.75 million bales, at expense to the government and, even more, to woolgrowers (Richardson 2001).

15. Effective assistance to the mining sector is still slightly negative, as it was two decades ago (Industry Commission 1992; Productivity Commission 2004), although that will be less so when the government eases the current quantitative restrictions on exports of uranium and its derivatives.

16. In addition, a comprehensive program of review of government regulations at all levels in Australia has been under way since the mid-1990s, with the aim of reducing/removing regulations that unjustifiably impede economic activities (Productivity Commission 2000b). For an early assessment of Australia's domestic microeconomic reforms, see Forsyth (1992, 2000). All Productivity Commission reports on the myriad reforms are downloadable at http://www.pc.gov.au. Recent research on barriers to trade in a wide range of services in almost 40 countries found that services markets in Australia, relative to those in the other countries in the study, are now ranked as either very liberal (banking, distribution services, telecoms, engineering, and professional services) or moderately restrictive (other professional services and maritime services)—see Productivity Commission (2000c).

17. Even as recently as the late 1980s, there were some 10 Commonwealth and more than 50 state SMAs (Piggott 1990).

18. Agricultural SMAs were exempt from the regulation of competition under the Trade Practices Act 1974, although later on they were subject to assessment under the National Competition Policy.

19. In the course of its investigations, the Commission located more than 100 marketing arrangements at the state and territory level, though not all of which were SMAs.

20. The evidence suggests that the retail price of milk fell after deregulation as the supermarkets were able to exercise buying power with the milk processors, which, in turn, were able to exert downward pressure on the farmgate price that was no longer supported by state governments.

21. Unlike Australia, however, New Zealand continued to receive some nonreciprocal preferential access to the EEC market.

22. The impact of past underpricing of water for agriculture on farm returns has not been incorporated in the NRA estimates reported in this paper.

23. For detailed descriptions of Australia's adjustment and adjustment assistance programs, see Harris (2005b).

24. In the first half of the 1950s, farm incomes averaged more than 20 percent above nonfarm self-employed incomes and more than twice those of male wage and salary earners. In the next dozen years, though, farm incomes fell to 5 percent below nonfarm self-employed incomes and to just 30 percent above those of male wage and salary earners (McKay 1967). The gap between farm and nonfarm incomes and spending power grew especially rapidly in between 1963 and 1973 (Glau 1971).

25. Australia's dairy industry saw several changes over the 25 years to 2004: the number of dairy farmers more than halved (from 22,000 to 10,000), the average herd size increased 2.5 times (from 85 to 210) average annual yield per cow nearly doubled (from 2,850 to 4,900 liters) and average annual milk production per farm quadrupled, from 0.25 to 1.05 million liters (Productivity Commission 2005; Harris 2005a). In addition, the dairy processing industry has become significantly more productive (Balcombe, Doucouliagos, and Fraser 2007). Overall, the number of farmers in Australia has fallen by more than one-third over the past half-century (ABARE 2007).

26. See also the results since the mid-1970s in Fleming (2007), who shows that MFP growth in Australia's farms enabled producers to cope with the fact that, over the past three decades, the prices they paid for their inputs grew 1.6 percent more per year than the prices they received for their products.

27. Adjustment has been sharper within individual industries, of course, especially those that faced dramatic cuts in subsidies such as Australia's dairy industry (see previous footnote).

28. On this literature in general and its applicability to Latin America, see Lederman and Maloney (2006). See also Anderson (1998).

29. On the basic economics of these supply and demand shifting investments in the presence of spillovers, see, for example, Levin and Reiss (1988).

References

ABARE (Australian Bureau of Agricultural and Resource Economics). 2007. *Australian Commodities Statistics 2006.* http://www.abare.gov.au.

Anderson, J. E. 1995. "Tariff Index Theory." *Review of International Economics* 3 (2): 156–73.

Anderson, K. 1978. "On Why Rates of Assistance Differ between Australia's Rural Industries." *Australian Journal of Agricultural Economics* 22 (2): 99–114.

Anderson, K. 1998. "Are Resource-Abundant Economies Disadvantaged?" *Australian Journal of Agricultural and Resource Economics* 42 (1): 1–23.

Anderson, K., and R. Garnaut. 1980. "ASEAN Export Specialisation and the Evolution of Comparative Advantage in the Western Pacific Region." In *ASEAN in a Changing Pacific and World Economy*, ed. R. Garnaut, 374–412. Canberra: ANU Press.

_____. 1987. *Australian Protectionism: Extent, Causes and Effects.* Boston, London, and Sydney: Allen and Unwin.

Anderson, K., and L. A. Jackson. 2005. "GM Crop Technology and Trade Restraints: Economic Implications for Australia and New Zealand." *Australian Journal of Agricultural and Resource Economics* 49 (3): 263–81.

Anderson, K., R. Lattimore, P. Lloyd, and D. MacLaren. 2008. "Distortions to Agricultural Incentives in Australia and New Zealand." Agricultural Distortions Working Paper 09, World Bank, Washington, DC.

Anderson, K., P. J. Lloyd, and D. MacLaren. 2007. "Distortions to Agricultural Incentives in Australia Since World War II." *The Economic Record* 83 (263): 461–82.

Anderson, K., W. Martin, and D. van der Mensbrugghe. 2006. "Distortions to World Trade: Impacts on Agricultural Markets and Incomes." *Review of Agricultural Economics* 28 (2): 168–94.

Anderson, K., and B. Smith. 1981. "Changing Economic Relations between Asian ADCs and Resource-Exporting Developed Countries." In *Trade and Growth in the Advanced Developing Countries*, ed. W. Hong and L. Krause, 293–338. Seoul: Korea Development Institute Press.

Anderson, K., and E. Valenzuela. 2007. "Do Global Trade Distortions Still Harm Developing Country Farmers?" *Review of World Economics/Weltwirtschaftliches Archiv* 143 (1): 108–39.

_____. 2008. *Global Estimates of Distortions to Agricultural Incentives, 1955 to 2007*. Core database at http://www.worldbank.org/agdistortions.

Arndt, H. W. 1965. "Australia – Developed, Developing or Midway?" *The Economic Record* 41 (95): 418–40.

Balcombe, K., H. Doucouliagos, and I. Fraser. 2007. "Input Use, Output Mix and Industry Deregulation: An Analysis of the Australian Dairy Manufacturing Industry." *Australian Journal of Agricultural and Resource Economics* 51 (2): 121–35.

Balderstone, J. S., et al. 1982. "Agricultural Policy: Issues and Options for the 1980s." Working Group Report to the Minister for Primary Industry, Australian Government Publishing Service, Canberra.

Baldwin, R. E. 2005. "Heterogeneous Firms and Trade: Testable and Untestable Properties of the Melitz Model." NBER Working Paper 11471, National Bureau of Economic Research, Cambridge, MA.

Broadberry, S., and D. A. Irwin. 2007. "Lost Exceptionalism? Comparative Income and Productivity in Australia and the UK, 1861–1948." *The Economic Record* 83 (262): 262–86.

Butlin, N. G. 1962. *Australian Domestic Product, Investment and Foreign Borrowing, 1861–1938/39.* Cambridge, U.K.: Cambridge University Press.

Capling, A. 2001. *Australia and the Global Trade System: From Havana to Seattle*. Cambridge, U.K.: Cambridge University Press.

Card, D., and R. B. Freeman. 2004. "What Have Two Decades of British Economic Reform Delivered?" In *Seeking a Premier Economy: The Economic Effects of British Economic Reforms, 1980–2000,* ed. D. Card, R. Blundell, and R. B. Freeman, 9–20. Chicago: University of Chicago Press.

Carmody, A. T. 1952. "The Level of the Australian Tariff: A Study in Method," *Yorkshire Bulletin of Economic and Social Research* 4: 51–65, January.

CIE (Centre for International Economics). 2003. *The Rural Research and Development Corporations: A Case Study of Innovation,* Canberra: Centre for International Economics.

Committee of Enquiry (The Vernon Committee). 1965. *Report of the Committee of Enquiry*. Melbourne: Wilke and Co.

Corden, W. M. 1984. "Booming Sector and Dutch Disease Economics: Survey and Consolidation." *Oxford Economic Papers* 36 (3): 359–80.

Dalziel, P., and R. Lattimore. 2004. *The New Zealand Macroeconomy: Striving for Sustainable Growth with Equity*. Melbourne: Oxford University Press.

Deardorff, A. V. 1984. "An Exposition and Exploration of Krueger's Trade Model." *Canadian Journal of Economics* 5 (4): 731–46.

Diewert, W. E., and D. Lawrence. 2006. "Measuring the Contributions of Productivity and Terms of Trade to Australia's Economic Welfare." Consultancy Report, Productivity Commission, Canberra.

Dolman, B., D. Parham, and S. Zheng. 2007. "Can Australia Match US Productivity Performance?" Staff Working Paper, Productivity Commission, Canberra.

Dowrick, S. 2001. "The Australian Productivity Miracle." In *Creating an Environment for Australia's Growth*, ed. J. Nieuwenhuysen, P. J. Lloyd and M. Mead, 33–49. Cambridge, U.K. and Sydney: Cambridge University Press.

Edwards, G. W. 1987. "Agricultural Policy Debate: A Survey." *The Economic Record* 63: 129–43.

_____. 2006. "Fifty Years of Agricultural Policy." Presented at the 50th Annual Conference of the Australian of the Australian Agriculture and Resource Economics Society, Sydney, 8–10 February.

Evans, L., A. Grimes, B. Wilkinson, and D. Teece. 1996. "Economic Reform in New Zealand: The Pursuit of Efficiency." *Journal of Economic Literature* 34 (4): 1856–1902.

Fleming, E. 2007. "Use of the Single Factorial Terms of Trade to Analyse Agricultural Production." *Australian Journal of Agricultural and Resource Economics* 51 (2): 113–19.

FSANZ (Food Standards Australia New Zealand). 2007. "Assessing the Safety of New Foods and Technologies." FSANZ, http://www.foodstandards.gov.au/foodmatters/gmfoods/assessingthesafetyof387.cfm.

Forsyth, P., ed. 1992. *Microeconomic Reform in Australia*. London and Sydney: Allen and Unwin.

_____. 2000. "Microeconomic Policies and Structural Change." In *The Australian Economy in the 1990s*, ed. D. Gruen and S. Shrestha. Sydney: Reserve Bank of Australia.

Gardner, B. 2009. "The United States and Canada." Chapter 4 in this volume.

Glau, T. E. 1971. "The Cost–Price Squeeze on Australia Farm Income." *Australian Journal of Agricultural Economics* 15 (1): 1–19.

Godden, D. 1997. *Agricultural and Resource Policy: Principles and Practice*. Melbourne: Oxford University Press.

Harris, D. 2005a. *Industry Adjustment to Policy Reform: A Case Study of the Australian Dairy Industry,* RIRDC Publication 05/110, Rural Industries Research and Development Corporation, Canberra.

_____. 2005b. *Rural Industry Adjustment to Trade Related Policy Reform,* RIRDC Publication 05/173, Rural Industries Research and Development Corporation, Canberra.

Harris, S. F., J. C. Crawford, F. H. Gruen, and N. Honan, 1974. *The Principles of Rural Policy in Australia: A Discussion Paper*, Canberra: Australian Government Publishing Service.

Honma, M., and Y. Hayami. 2009. "Japan, Republic of Korea and Taiwan, China." Chapter 2 in this volume.

Industry Commission. 1991. "Statutory Marketing Arrangements for Primary Products." Report 10, AGPS, Canberra.

Industry Commission. 1992. *Annual Report*. Canberra: AGPS.

James, S., and K. Anderson. 1998. "On the Need for More Economic Assessment of Quarantine/SPS Policies." *Australian Journal of Agricultural and Resource Economics* 42 (4): 525–44.

Josling, T. 2009. "Western Europe." Chapter 3 in this volume.

Krueger, A. O. 1977. "Growth, Distortions and Patterns of Trade Among Many Countries." *Princeton Studies in International Finance Section* 40: 1–45.

Lattimore, R. 2006. "Farm Policy Reform Dividends." Paper presented to the North American Agrifood Market Integration Consortium Meetings, Calgary, 1–2 June.

Leamer, E. E. 1987. "Paths of Development in the Three-Factor, n-Good General Equilibrium Model." *Journal of Political Economy* 95 (5): 961–99.

Lederman, D., and W. Maloney, eds. 2006. *Natural Resources: Neither Curse nor Destiny*. Stanford, CA: Stanford University Press for the World Bank.

Levin, R. C., and P. C. Reiss. 1988. "Cost-Reducing and Demand-Creating R&D With Spillovers." *Rand Journal of Economics* 19 (4): 538–56.

Lloyd, P. 2008. "100 Years of Tariff Protection in Australia." *Australian Economic History Review* 48 (2): 99–145.

Long, N. V., H. Raff, and F. Stahler. 2007. "The Effects of Trade Liberalization on Productivity and Welfare: The Role of Firm Heterogeniety, R&D and Market Structure." Economics Discussion Paper 0710, University of Otago, Dunedin.

MacLaren, D. 1992. "The Political Economy of Agricultural Policy Reform in the European Community and Australia." *Journal of Agricultural Economics* 43 (3): 424–39.

Maddison, A. 2003. *The World Economy: Historical Statistics*. Paris: OECD Development Centre.

Martin, W. 1990. "Public Choice Theory and Australian Agricultural Policy Reform." *Australian Journal of Agricultural Economics* 34 (2): 189–211.

Mauldon, R. 1990. "Price Policy." In *Agriculture in the Australian Economy*, ed. D. B. Williams, 310–28. Sydney: Sydney University Press.

McKay, D. H. 1967. "The Small-Farm Problem in Australia." *Australian Journal of Agricultural Economics* 11 (2): 33–52.

McLean, I. 2007. "Why Was Australia So Rich?" *Explorations in Economic History* 44 (4): 635–56.

Melitz, M. 2003. "The Impact of Trade on Intra-industry Reallocations and Aggregate Industry Productivity." *Econometrica* 71 (6): 1695–725.

OECD. 2008. OECD PSE-CSE Database (Producer and Consumer Support Estimates, OECD Database 1986–2007). Organisation for Economic Co-operation and Development. http://www.oecd.org/document/59/0,3343,en_2649_33727_39551355_1_1_1_1,00.html.

Parham, D. 2004. "Sources of Australia's Productivity Revival." *The Economic Record* 80 (249): 239–57.

Parham, D., T. Cobbold, R. Dolamore, and P. Roberts. 1999. *Microeconomic Reforms and Australian Productivity: Exploring the Links*. Canberra: Productivity Commission.

Piggott, R. 1990. "Agricultural Marketing." In *Agriculture in the Australian Economy*, ed. D. B. Williams, 287–309. Sydney: Sydney University Press, 1990.

Productivity Commission. 2000a. *Review of Australia's General Tariff Arrangements*. Canberra: Productivity Commission.

_____. 2000b. *Regulation and its Review 1999–00*. Canberra: Productivity Commission.

_____. 2000c. *Trade and Assistance Review 1999–2000*. Canberra: Productivity Commission.

_____. 2004. *Trade and Assistance Review 2003–04*. Canberra: Productivity Commission.

_____. 2005. "Trends in Australian Agriculture." Research Paper, Productivity Commission, Canberra.

_____. 2006. *Rural Water Use and the Environment: The Role of Market Mechanisms*. Canberra: Productivity Commission.

_____. 2007. "Public Support for Science and Innovation." Research Report, Canberra.

Rayner, A. and R. Lattimore. 1991. "New Zealand." In *Liberalising Foreign Trade,* ed. D. Papageorgiou, M. Michaely, and A. Choksi. Cambridge, MA: Basil Blackwell.

Richardson, B. 2001. "The Politics and Economics of Wool Marketing, 1950–2000," *Australian Journal of Agricultural and Resource Economics* 45 (1): 95–115.

Sandri, D., E. Valenzuela, and K. Anderson. 2006. "Compendium of National Economic and Trade Indicators by Region, 1960 to 2004." Agricultural Distortions Working Paper 01, World Bank, Washington, DC. http://www.worldbank.org/agdistortions

Sandry, R. and R. Reynolds, eds. 1990. *Farming without Subsidies: New Zealand's Recent Experience.* Wellington: GP Books.

Sieper, E. 1982. *Rationalising Rustic Regulation*. Sydney: Centre for Independent Studies.

Statistics New Zealand. 2006. *Productivity Statistics 1988–2005.* Wellington: Statistics New Zealand.

Snape, R. H. 1984. "Australia's Relations with GATT." *The Economic Record* 60 (168): 16–27.

Vitalis, V. 2005. "The New Zealand Experience." In *Subsidy Reform and Sustainable Development: Economic, Environmental and Social Aspects*, ed. Lori Ridgeway and others. Paris: OECD.

Vousden, N. 1990. *The Economics of Trade Protection*. Cambridge, U.K. and New York: Cambridge University Press.

World Bank. 2006. *World Development Indicators*. Washington, DC: World Bank.

PART III

EVOLUTION OF DISTORTIONS IN EMERGING ECONOMIES

6

EASTERN EUROPE AND CENTRAL ASIA

*Kym Anderson and Johan Swinnen**

In a recent survey of European economic growth since 1950, Crafts and Toniolo (2008) conclude that incentive structures have been a crucial influence on comparative growth rates of the economies of Eastern and Western Europe. Predating that, a 2006 report on trade performance and policies in Eastern Europe and Central Asia included as one of its key recommendations the need to reduce the mean and variance of the tariff equivalents of trade barriers, in particular the need to reduce unilaterally governments' antiexport bias, especially in countries exporting primary products (Broadman 2006). To carry out such reform in Europe's transition economies efficiently and effectively—and to see how recent policies align with those of the European Union (EU)—requires better information on the extent of reform during the past two decades and of current policy influences on incentives within and between sectors. Immediately prior to their transition to market economies, policies in the region greatly distorted producer and consumer incentives, especially for agricultural products. Those distortions have been reduced substantially in several countries, but large variations remain across the region and distortions appear to be increasing again in some countries. Now is thus an opportune time to examine how policies affecting agriculture are evolving in the region, particularly as part of the adjustment to EU accession for 10 of the countries.

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To assist that process, the study presented here assesses the changing landscape of agricultural protection or taxation patterns in Europe and Central Asia. It is based on a sample of 18 countries, including 11 Central and Eastern European (CEE) countries—the 10 new EU members (Bulgaria and Romania joined in January 2007 and the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, the Slovak Republic, and Slovenia joined in May 2004), plus Turkey—and seven Commonwealth of Independent States (CIS) countries (Kazakhstan, the Kyrgyz Republic, the Russian Federation, Tajikistan, Turkmenistan, Ukraine, and Uzbekistan). Together, these 18 countries accounted in 2000–04 for 89 percent of the region's agricultural value added, 91 percent of its population, and 95 percent of total gross domestic product (GDP). Some key characteristics of those economies are shown in table 6.1, drawn from the detailed compendium of indicators provided in the Sandri, Valenzuela, and Anderson (2007). Analyses of politically feasible agricultural subsidy and trade policy reforms, and of policy options for coping with structural changes such as the recent boom in energy raw material prices that has intersectoral Dutch disease effects, need to be based on a clear understanding of the recent and current extent of policy interventions and the politico-economic forces behind their evolution. This study thus also seeks to better understand the political economy of distortions to agricultural incentives in Europe and Central Asia. With that better understanding, the study's third purpose is to explore prospects for further reducing distortions to agricultural incentives and their implications for agricultural competitiveness and trade of the different countries in the region, including those that have recently joined the EU.

The great diversity within the group of European and Central Asian countries—in terms of relative resource endowments and comparative advantages; stages of development and transition; agricultural and trade policy regimes; and memberships of the EU, World Trade Organization (WTO), OECD, and regional trading agreements—make the set of countries chosen a rich sample for comparative study. Turkey and the CEE countries that are now EU members differ substantially from the rest of the former Union of Soviet Socialist Republics (USSR) that are now members of the CIS in that they have higher per capita income (three-quarters of the global average, compared with one-third for the CIS) and higher population density (half the global average land per worker and 70 percent of the global average agricultural land per capita, compared with 3.4 and 2.5 times, respectively, for the CIS).

Growth and Structural Changes during Transition

Before examining policy changes, it is helpful to review the economic growth and intersectoral changes that have taken place in Europe's various transition economies over the past two decades. The initial years of transition from central

Table 6.1. Key Economic and Trade Indicators, Eastern European and CIS Countries, 2000–04

	Percent of world:			National relative to world (world = 100)					
	Population	Total GDP	Agricultural GDP	GDP per capita	Agricultural land per capita	RCA,[a] agriculture and food	Trade specialization index[b]	Poverty[c]	Gini index[d]
Slovenia	0.03	0.07	0.04	216	32	52	−0.68	0	—
Czech Republic	0.16	0.22	0.19	135	52	61	−0.44	0	26
Hungary	0.16	0.20	0.14	122	72	90	0.40	0	27
Estonia	0.02	0.02	0.03	102	78	199	−0.38	1	36
Poland	0.62	0.57	0.47	93	57	105	−0.39	0	34
Slovak Republic	0.09	0.07	0.09	92	57	57	−0.50	0	—
Lithuania	0.06	0.04	0.08	80	125	176	−0.21	1	36
Latvia	0.04	0.03	0.03	76	132	364	−0.51	0	38
Turkey	1.12	0.62	1.97	55	70	131	0.09	3	44
Romania	0.35	0.15	0.49	41	84	74	−0.06	1	31
Bulgaria	0.13	0.05	0.15	39	86	143	0.37	0	29
CEE sample	**2.75**	**2.05**	**3.67**	**74**	**70**	**98**	**−0.09**	**1**	**37**
Russian Federation	2.34	1.10	1.58	47	186	53	−0.46	0	40
Kazakhstan	0.24	0.08	0.18	33	1737	76	—	1	34
Ukraine	0.78	0.13	0.46	17	107	112	—	0	28
Turkmenistan	0.07	0.01	0.06	18	881	92	—	5	41
Uzbekistan	0.41	0.03	0.27	8	134	—	—	0	37
Kyrgyz Republic	0.08	0.00	0.05	6	268	390	—	0	30
Tajikistan	0.10	0.00	0.03	4	85	192	—	7	33
CIS sample	**4.02**	**1.37**	**2.62**	**34**	**270**	**—**	**0.02**	**0**	**37**
Other CEE/Central Asia	0.64	0.19	0.61	29	82	166	0.41	1	—
All CEE/Central Asia	**7.43**	**3.60**	**6.90**	**48**	**179**	**—**	**−0.06**	**0**	**37**

Source: Sandri, Valenzuela, and Anderson (2007), compiled from World Bank (2007).

Note: — = not available.

a. RCA is the index of revealed comparative advantage = share of agriculture and processed food in national exports as a ratio of that sector's share of global exports

b. Primary agriculture trade specialization index = (X − M)/(X + M), 2000–02 (world average = 0).

c. Percentage of population living on < US$1/day, from Chen and Ravallion (2007).

d. Gini index for the most recent year during 2000–04, from Chen and Ravallion (2007).

planning to a more market-based economy saw production fall in the majority of sectors, before it recovered at varying rates from the mid-1990s. Real GDP for the Eastern Europe and Central Asia region as a whole fell by almost 6 percent per year during 1990–94. The decline for the CEE sample was only 0.6 percent, while for the CIS sample it was 11 percent and for the residual nonstudied countries of the CIS 12 percent. By contrast, annual GDP growth over 1995–2004 averaged 2.7 percent: the CIS sample was slowest (2.2 percent), the CEE sample somewhat higher at 3.2 percent, and the residual enjoyed 5.1 percent.

Within those economies, agricultural value added measured at constant prices appears to have declined less rapidly than nonagricultural GDP in the early years of transition, but also to have grown less rapidly in the subsequent decade. The domestic terms of trade (the prices of their outputs relative to the prices of purchased inputs) apparently fell even more for farmers than for nonfarmers, however, because agriculture's share of GDP measured in current prices declined even in the early transition period. Unlike in the central planning period, this did not allow faster industrialization but rather an expansion in the services sector, which increased from less than half the economy prior to 1993 to two-thirds by 2004.

The halving of agriculture's share of GDP in Europe and Central Asia between 1992 and 2004 was accompanied by only a one-quarter decline in agriculture's share of employment, according to Food and Agriculture Organization (FAO) statistics, which are not always consistent with national data because of definitional differences. In all three subgroups of countries, the share of the latter averaged three times the former by 2004, or five times in the case of the CEE-8 countries that joined the EU in 2004. This suggests much lower labor productivity on farms than in other employment.

The share of farm and food products in total merchandise exports also has fallen, by as much as half in some countries in the region. When expressed as a ratio of that share for the world as a whole (an agricultural-revealed comparative advantage index), it becomes evident that most countries of the region have lost comparative advantage in farm products over the transition period. That index varies greatly across the region though, from a low of less than 0.5 for mineral-rich Russia and densely populated Slovenia to more than 3 for Latvia and the Kyrgyz Republic.

The region as a whole, however, has become more open as a consequence of moving from a planned to a market economy, notwithstanding the continuation of numerous barriers to trade. A common indicator is the value of goods and services expressed as a percentage of GDP. For most countries, that percentage is now above the average for Western European countries (37 percent in 2004), with several countries approaching 60 percent by 2004.[1]

With this as background, the evolution of policy under Communism is briefly reviewed, followed by an examination of how sectoral and trade policies have

changed in Europe and Central Asia in response to, or as contributors to, the macroeconomic and structural changes.

Quantifying the Distortions to Agricultural Incentives

The main focus of the present study's methodology is government-imposed distortions that create a gap between domestic prices and what they would be under free markets. Since it is not possible to understand the characteristics of agricultural development with a sectoral view alone, the project's methodology not only estimates the effects of direct agricultural policy measures (including distortions in the foreign exchange market), but also generates estimates of distortions in nonagricultural sectors for comparative evaluation. Specifically, nominal rates of assistance (NRAs) for farmers are computed, including any input subsidies and non-product-specific (NPS) forms of assistance or taxation. It also generates a production-weighted average NRA for nonagricultural tradables, for comparison with that for agricultural tradables via the calculation of a relative rate of assistance (RRA; see Anderson et al. 2008a, 2008b). This approach is not well suited to analysis of policies of planned economies prior to their reform era, as prices then played only an accounting function and currency exchange rates were enormously distorted. During their reform era, however, starting in 1992, the price comparison approach provides as valuable a set of indicators for European and Central Asian countries as for other market economies of distortions to incentives for farm production, consumption, and trade, and of the income transfers associated with interventions.

While most of the focus is on agricultural producers, the extent to which consumers are taxed or subsidized is also considered. To do so, a consumer tax equivalent (CTE) is calculated by comparing the price consumers pay for their food and the international price of each food product at the border. Differences between the NRA and the CTE arise from distortions in the domestic economy that are caused by transfer policies and taxes or subsidies that cause the prices paid by consumers (adjusted to the farmgate level) to differ from those received by producers.

To obtain dollar values of farmer assistance and consumer taxation, estimates of NRAs are multiplied by the gross value of production at undistorted prices to obtain an estimate in current U.S. dollars of the direct gross subsidy equivalent (GSE) of assistance to farmers. These GSE values are calculated in constant dollars, and are also expressed on a per-farm-worker basis. They (and their equivalent on the consumption side) can be added up across products for a country, and across countries for any or all products, to get regional aggregate transfer estimates for the studied economies.

To keep the task manageable, the sample of countries for which empirical estimates are provided below is limited to the 10 Central and Eastern European countries that joined the EU in 2004 or 2007 plus Turkey and the three biggest CIS economies (Kazakhstan, Russia, and Ukraine).[2] Nonquantitative policy assessments are undertaken for the other economies of Central Asia. Reliable price data are available only from 1992 to 2005 or 2007 or, in the case of Kazakhstan, for just 2000–04.

The worst of the exchange rate distortions in the formerly planned economies were removed in the early 1990s, prior to the start of the period under study here. Since there were no reliable indicators of any remaining secondary market price for foreign currency, this study follows the practice of the OECD Secretariat in using official exchange rates in making price comparisons.[3] Additionally, it is not possible to estimate the sectoral assistance equivalent of soft credits provided for some farms (and other enterprises). Throughout, there is no attempt to assess whether some interventions may have been warranted on national economic welfare grounds because of the presence of externalities, or failures in the markets for such things as land and credit, or policy failures such as underinvestment in public infrastructure in rural areas.[4]

The Communist era

Incentives for agricultural producers and food consumers were massively distorted under Communist central planning, which was imposed from the 1920s until 1991 in the former Soviet Union and from the 1950s until the fall of the Berlin Wall in 1989 in Central and Eastern Europe. Distortions included collective farm property rights; centrally controlled organization of production allocation, processing, input provision, and marketing; price setting unrelated to demand-supply conditions (leading to rationing); and state-controlled trading and exchange rate systems. Land and farms were put under central planning and, in most countries (with the exception of Poland and former Yugoslavia), farming was forcibly organized in collective and state farms. In the former Soviet Union, this collectivization process and the associated forced migration (and worse) of many landowners and farmers contributed to massive incidence of hunger and death before World War II. From Lenin to Stalin and through most of the Khrushchev regime, agriculture was heavily taxed, and capital was drained from an impoverished countryside to finance urban industrial growth (Ellman 1988).[5]

All of this changed at the end of the Khrushchev regime, particularly under Brezhnev, when the leadership of the USSR decided to increase agricultural production, with a strong emphasis on livestock, a policy also followed by many of the Eastern European countries of the Soviet bloc (Liefert and Swinnen 2002). From

the mid-1950s onward, and especially in the 1970s and 1980s, large amounts of support and investment were directed to agriculture. By 1980, almost 30 percent of total Soviet investment was going into agriculture (Gray 1990). At the same time, consumer prices were set low and producer prices high, with the gap covered by direct subsidies to processing and trading companies or by soft budget constraints. Consequently, from 1970 to 1990, livestock herds and output in these countries grew by between 40 and 60 percent. The rise in feed requirements for the growing herds stimulated the crop sector. In the late 1980s, the average annual output of feed grain in Hungary and Poland increased by half and one-quarter, respectively, compared with output in the late 1960s. In the USSR, livestock feed requirements were so high that the country also became a substantial importer of feed commodities.

By 1990, per capita consumption of livestock products and foodstuffs in general compared favorably with many OECD countries, even though per capita incomes in Central and Eastern Europe were much lower than the OECD average. This "achievement" came at a cost: large state subsidies, to both producers and consumers, were necessary to maintain the high levels of production and consumption. For example, by the end of the 1980s, direct budgetary subsidies to the agriculture and food economy were about 10 percent of GDP in the USSR and between 5 and 10 percent of GDP in most CEE countries. The bulk of these subsidies went to the livestock sector.[6]

Calculating the net transfers to farmers and to consumers under the Communist regime is very difficult because of the large number of distortions caused by the state regulation of prices, production, consumption, exchange rates, and marketing organizations, along with the indirect nature of some of the subsidies. While it is generally true that producers of farm products were strongly subsidized by price setting toward the end of the Communist regime (in sharp contrast to the 1930s, when farmers were highly discriminated against), the complexity of the distortions led sometimes to offsetting effects. For example, while agricultural producers in the latter 1980s were supported by high output prices and low input prices, at the same time overvalued exchange rates effectively taxed agricultural (and other) exporters. Correcting for this overvaluation leads to significantly lower protection indicators. In addition, agriculture was not alone in being subsidized, as most (heavy) industry was also subsidized or at least protected from import competition. Available fragments of empirical evidence indicate that, in aggregate and real terms, there was substantial net subsidization of agriculture relative to all other sectors as a group, although much more so for livestock producers than for grain and oilseed farmers. This might suggest food consumers were taxed substantially, but under the central planning system wholesalers were told to sell their food to retailers below their production costs, for which they received

state subsidies. Overvalued exchange rates, which effectively taxed exports and subsidized imports, also lowered domestic consumer prices of tradable products. However, by restricting foreign imports and regulating trade, the Communist regime prevented its consumers from accessing higher-quality food products. Huffman and Johnson (2004) estimate that these welfare losses were equivalent to 50 percent to 75 percent of the direct subsidy benefits of consumers under the Communist regime.

The reform era

After 1989, the CEE-8 countries (those Central and Eastern European countries that joined the EU in 2004: the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, the Slovak Republic, and Slovenia) moved first and most rapidly toward market-based systems. Reforms in the Balkan countries, such as Romania and Bulgaria, were initially half-hearted and involved many inconsistencies during most of the 1990s, with government interventions continuing to heavily distort incentives. In the large CIS countries (Kazakhstan, Russia, and Ukraine), governments continued important controls of the agricultural economy through interventions such as regional trade controls, input supply controls, and the continuation of soft budget constraints. While the Kyrgyz Republic liberalized relatively quickly, other Central Asian countries moved more slowly, and some have undertaken far less reform and liberalization. Major controls are still in place in countries such as Turkmenistan and Uzbekistan.

International trade was strongly regulated under the centrally planned system. Communist countries were integrated in the Council of Mutual Economic Assistance (CMEA) system, a planned, intercountry trading regime that traded mainly with other Communist countries. (One could think of the CMEA as the international version of a domestic centrally planned economy.) The CEE countries were less integrated than the Soviet republics, but still a large part of their trade volume went through the CMEA system. When the CMEA system collapsed in the early 1990s with the liberalization of the macroeconomy and of trade policies, important changes in trade and financial flows resulted. Trade liberalization reinforced the reallocation of production activities caused by the abolishment of central planning. Traditional international production allocations were no longer possible when trade had to be financed by hard currencies and when inputs were accounted for at real costs. It also allowed the importation of high-quality Western agricultural products that previously had been restricted. At the same time, the liberalization of exchange rates removed discrimination against the sectors producing tradables.

Trade liberalization led to a major international reorganization of production activities. Initially this had a very negative impact on the region's producers, as the

traditional export markets dwindled due to a lack of hard currency and because Western countries remained closed to the region's agricultural exports. At the same time, the reduction of import constraints opened regional markets to imports from the West. Combined, these forces caused a worsening of the region's agricultural trade balance in the first half of the 1990s. Later on, however, agri-food trade intensified and growing exports (also to Western markets) contributed to the region's recovery. An important development was the shift from centrally imposed extreme specialization (for example, dairy production in the Baltics and cotton production in Central Asia) to more diversified production systems and less dependence on single commodities in those countries.

Trade effects were only part of the international effects in the agri-food systems. Possibly even more important was the massive inflow of foreign direct investment to food processing industries, which contributed to a major restructuring and to improvements in food quality and productivity enhancements and investments in agriculture (Dries and Swinnen 2004). Most recently, the wave of foreign investments in the retail sector caused further restructurings of the agri-food system, with important implications for both producers and consumers (Dries, Reardon, and Swinnen 2004).

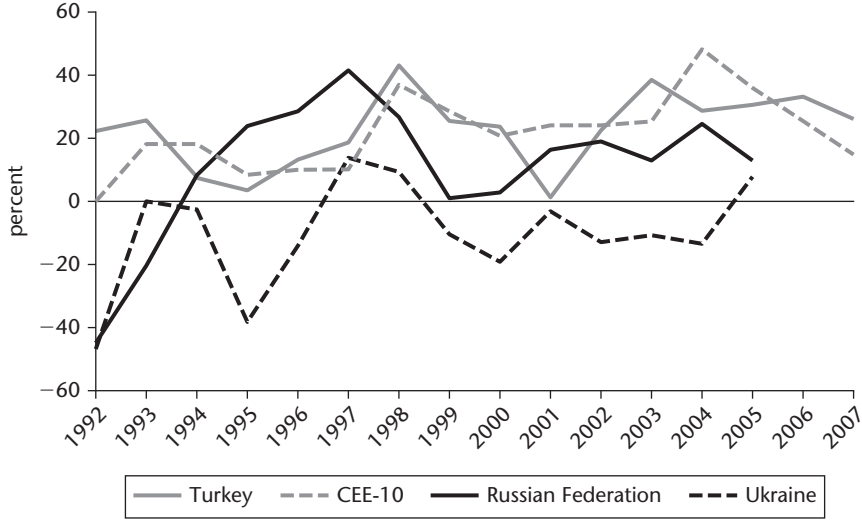
Progress in market reforms is not always correlated with the extent of distortions. On the one hand, Slovenia, which was a front runner in liberalization and developing a market economy, has a very high level of farm producer support that in 2004 was well above the average EU-15 rate. On the other hand, much slower reformers such as Bulgaria, Kazakhstan, and Ukraine have much lower—even negative—NRAs. Turkey, which has never been under Communist rule but nonetheless had a highly state-controlled food system (including price regulations and state processing companies), especially prior to the 1990s, maintained among one of the highest levels of support within Europe and Central Asia during 2004–05, despite the fact that there was a major policy reform after 2000, including a shift in assistance from market price support toward direct payments.

NRAs to agriculture during transition

As domestic markets and trade and currency exchange regimes were liberalized in the early 1990s in Europe and Central Asia, farm output declined dramatically. This was mainly the result of nominal input prices increasing much more strongly than output prices. Industrial output declined by a similar order of magnitude, while the services sector, which had been severely constrained under the Communist system (at least as a stand-alone set of activities distinct from state-owned farm and industrial enterprises), grew rapidly after transition began.

Beginning in the early 1990s, many trade and price distortions were removed throughout the region. Price, exchange rate, and trade policies were all liberalized;

Figure 6.1. NRAs to Agriculture, Eastern European Countries, 1992–2007



Source: Anderson and Valenzuela (2008), updated from estimates reported in Anderson and Swinnen (2009).

subsidies were cut; hard budget constraints were introduced; property rights were privatized; and production decisions were shifted to companies and households. One consequence was that, on average, support to agriculture fell to very low levels in the early 1990s (as it did also for industrial production). Between 1992 and 1995, nominal assistance to agriculture averaged just 12 percent in the CEE-10 and was less than zero in Bulgaria and the three Baltic nations—as it was in Russia and Ukraine. By contrast, in Turkey, where nominal assistance averaged just 5 percent during 1986–89, the NRA rose to an average of 15 percent in 1992–95 and 25 percent in 1996–99 (figure 6.1 and table 6.2).

Changes in policy in the region, and hence in rates of agricultural assistance, have not been smooth. Rather, they have been characterized by stop-go phases and sometimes even reversals of previous reforms, as is apparent from figure 6.1. Despite that heterogeneity of experiences, one can identify a couple of general phases in the policy changes.

Following its initial collapse, support to agriculture increased during the mid-1990s in some countries. In CEE, this was driven by the explicit introduction of new support policies, while in Russia it reflected primarily exchange rate developments, which, in the presence of institutional constraints, constrained the pass-through of border prices to farmgate prices and pushed assistance rates up to high levels.

Table 6.2. NRAs to Agriculture,[a] Eastern European and CIS Focus Countries, 1992–2007

(*percent*)

	1992–95	1996–99	2000–03	2004–07[d]
Bulgaria	−19	−11	0	7
Czech Republic	20	19	27	24
Estonia	−14	20	20	23
Hungary	19	18	34	20
Latvia	−15	30	36	28
Lithuania	−19	29	32	29
Poland	10	24	7	32
Romania	22	29	53	50
Slovak Republic	28	26	30	21
Slovenia	64	79	80	31
CEE-10	**12**	**22**	**24**	**31**
Turkey	15	25	22	30
Russian Federation	−8	25	13	19
Ukraine	−21	−1	−11	−2
Kazakhstan	—	—	0	−5
All focus countries:				
Unweighted average[b]	6	24	25	22
Weighted average[a]	3	22	16	25
Dispersion[c]	26	21	26	14

Source: Anderson and Valenzuela (2008), updated from estimates reported in Anderson and Swinnen (2008).

Note: — = not available.

a. Weighted average for each country, including product-specific output and input distortions and NPS assistance as well as authors' guesstimates for noncovered farm products, with weights based on gross value of agricultural production at undistorted prices.

b. The unweighted average is the simple average across the 14 countries of their national NRA (production-weighted) average NRAs.

c. Dispersion is a simple four-year average of the annual standard deviation around a weighted mean of the national agricultural sector NRAs.

d. Final column refers just to 2004–05 for Russia and Ukraine and 2004 for Kazakhstan; and the CEE values assume the NRA for each product is the same as for the EU-25 in 2004–06 and for EU-27 in 2007, such that the differences across CEE countries are due to differing national product weights.

The increase in support started first in Central Europe, where, after the radical liberalization in the early 1990s, political pressures induced governments to reintroduce a series of measures. NRAs increased from close to zero in 1992 to 20 to 30 percent (or more) in the second half of the 1990s, but then they stabilized in the lead-up to EU accession in 2004. Between 2000 and 2003, the average rate of assistance to agriculture in the CEE-10 was just under 25 percent (figure 6.1), slightly less than half the rate of assistance (including from programs somewhat decou-

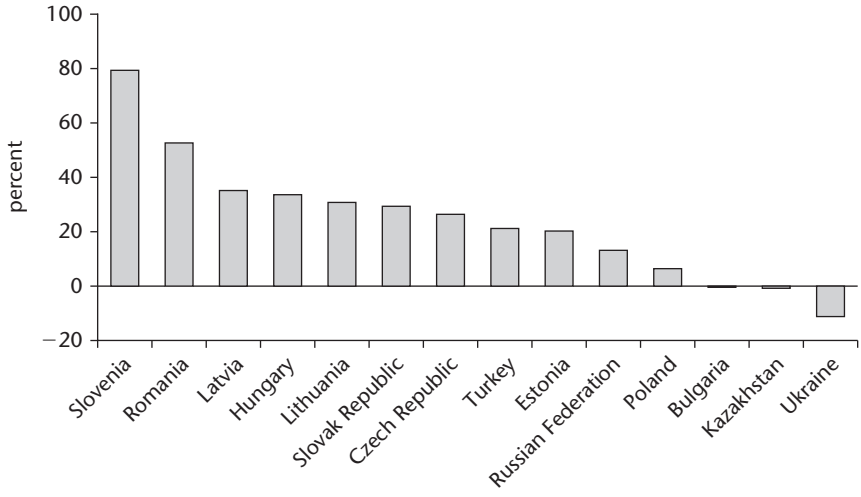
pled from production) provided to farmers in the EU-15 at that time (see Josling 2008).

Further East, two economic changes in the late 1990s had major impacts on agricultural incentives. First, the Russian financial crisis and the associated devaluation of the ruble, in the presence of imperfect pass-through, caused a strong decline in the estimated rates of assistance to agriculture. This macroeconomic correction brought down estimated assistance rates dramatically. Second, in the 2000s, the hike in world energy and mineral prices and general economic growth improved many CIS governments' budgetary situations. The improvement in the budgetary situation, in turn, has increased the level of support to agriculture. In Russia, for example, the government announced that agriculture would be a priority area for additional funding in 2005. Not all the additional funding is to go to subsidies, as some governments have plans to spend considerably on infrastructure and quality upgrading in agriculture. Rural incomes have improved because of better (and timely) payments of farm workers' wages and pensions to farm and rural workers, and because of improved rural services.

The combination of all these developments led to a somewhat lower weighted average NRA for agriculture in the region as a whole in the four-year period from 2000 to 2004 than in the period immediately before: 16 percent during 2000–03, compared with 22 percent in 1996–99 (table 6.2). In Russia, the level of average support fell even more (from 25 to 13 percent). However, supports rose again in 2004 and 2005, including in countries that have since joined the EU, before dropping again as international food prices rose in 2007. Meanwhile, the NRA moved closer to zero in Ukraine in 2005, but is probably still very negative in the rest of Central Asia. There is thus a very wide dispersion in average NRAs across countries in the region, from very high levels in the highest-income country (Slovenia) to continuing negative levels in the poorest countries of Bulgaria, Kazakhstan, and Ukraine (figure 6.2).

There are major differences in distortions across commodities, too. In the 1980s, virtually all commodities were supported, albeit some more than others. Now, some commodities are now taxed in the CIS (table 6.3). For example, by 2000–03, sugar, poultry, and milk were the most highly protected commodities in the CEE-10, while grains, beef, and pork were the least assisted. Meanwhile, in Russia and Ukraine, the range is even more extreme, from high positive assistance to livestock and sugar to high negative assistance to the production of the key feed inputs into livestock (coarse grains and oilseeds). Sunflower seeds, Russia's most commonly produced and traded oilseed, was in fact the only consistently exported commodity through the transition period. The case of Kazakhstan in 2004 was even starker, where import-competing producers were highly assisted while exporting industries had to endure negative assistance, such that even though the average NRA was close to zero, a strong antiagricultural trade bias prevailed.

Figure 6.2. NRAs to Agriculture, Individual Eastern European Focus Countries, 2000–03



Source: Anderson and Valenzuela (2008), updated from estimates reported in Anderson and Swinnen (2009).

Government intervention and controls are especially important in a few key commodities within each country, often because of (real or imagined) food security concerns or the need to raise government revenue to meet other priorities. This is the case for grains and oilseeds in Bulgaria, Russia, and Ukraine, both those used for human consumption and those that support (via low feed input prices) the production of livestock products. It has also been the case for cotton in Tajikistan, Turkmenistan, and Uzbekistan, where heavy taxation distorts incentives for producers—although open or porous borders make the taxing of cotton exports difficult when tax rates vary across countries in the subregion.

The trade bias index (TBI) reported in table 6.4 is one way of capturing the diversity of assistance rates across farm commodities. The more negative that index, the greater the gap between assistance to import-competing farm industries and assistance (or in some cases effective taxation) of export industries. Table 6.4 suggests that the antitrade bias has been a persistent feature of agricultural policies in the region throughout the transition period. Indeed, it has been worse in recent years than it was a decade earlier.

A more comprehensive way to measure the extent of variance of rates across time is to calculate the standard deviation of NRAs for the covered products. These too have remained persistently high. On average, they have been higher in recent years than in the early stages of transition (table 6.5).

Table 6.3. NRAs, Key Covered Farm Products,[a] Eastern European and CIS Focus Countries, 1992–2005

(*percent*)

	1992–95	1996–99	2000–03	2004–07
Wheat	−6	13	2	9
Barley	1	16	−5	6
Oats	−11	7	−27	−4
Rye	0	14	−10	−2
Maize	16	3	16	21
Rapeseeds	−8	−18	1	0
Sunflower	−13	−13	−13	4
Soybeans	45	0	9	−4
Cotton	−45	−47	−31	−29
Sugar	23	80	73	91
Potatoes	25	25	60	57
Beef	−16	20	36	53
Sheep meat	10	10	3	15
Pig meat	−8	16	12	32
Poultry	26	43	52	75
Eggs	16	48	2	25
Milk	6	43	25	26
All covered products	**−2**	**19**	**13**	**22**
Domestic market support	1	1	1	2
Border market support	−4	15	11	19
Dispersion of product NRAs	21	29	29	31
Product coverage[b]	62	63	61	62

Source: Anderson and Valenzuela (2008), updated from estimates reported in Anderson and Swinnen (2009).

a. Region's weighted average for each product and for all covered products, with weights based on gross value of agricultural production at undistorted prices.

b. Dispersion is the standard deviation shown as the simple four-year average of the annual standard deviation around the weighted mean.

The total amount of support is an imperfect indicator of distortions to incentives, since different trade, price, and subsidy instruments have different distortion effects. Most support to agriculture in the region was, and despite the reforms, still is provided via highly distortive and hence inefficient policy instruments. Under Communism, output price distortions were complemented by heavy distortions in input prices, in particular low fertilizer and energy prices and subsidized irrigation, while in the 1990s the majority of farm support in the CEE countries was provided by keeping output prices above border prices (see near the bottom of table 6.3). However, the share of support from those measures has declined over

Table 6.4. TBI,[a] Eastern European and CIS Focus Countries, 1992–2007

(*percent*)

	1992–95	1996–99	2000–03	2004–07[b]
Bulgaria	−0.02	−0.17	−0.18	−0.30
Czech Republic	0.05	−0.10	−0.23	−0.16
Estonia	−0.21	−0.16	−0.01	0.24
Hungary	−0.14	0.12	−0.11	0.05
Latvia	−0.35	−0.18	0.15	−0.22
Lithuania	−0.50	−0.32	−0.19	0.07
Poland	−0.19	−0.19	−0.24	0.26
Romania	−0.19	−0.28	−0.40	−0.23
Slovak Republic	0.03	−0.09	−0.05	0.06
Slovenia	0.26	0.40	0.38	0.18
CEE-10	**−0.15**	**−0.16**	**−0.23**	**0.02**
Turkey	−0.32	−0.46	−0.32	−0.19
Russian Federation	−0.11	−0.31	−0.34	−0.24
Ukraine	−0.12	−0.25	−0.21	−0.42
Kazakhstan	—	—	0.01	−0.32
All focus countries	**−0.15**	**−0.16**	**−0.23**	**0.02**

Source: Anderson and Valenzuela (2008), updated from estimates reported in Anderson and Swinnen (2009).

Note: — = not available.

a. TBI = $[(1 + NRAag_x/100)/(1 + NRAag_m/100) - 1]$, where $NRAag_m$ and $NRAag_x$ are the average percentage NRAs for the import-competing and exportable parts of the agricultural sector.

b. Final column refers just to 2004–05 for Russia and Ukraine and 2004 for Kazakhstan.

the past decade, consistent with developments within the EU-15. These policy changes are reflected in the composition of the assistance that farms have received. Under the Communist system, price support and output subsidies were the main component of agricultural assistance in the CEE countries, accounting for more than 80 percent of their NRA. After the reforms in the early 1990s, the share of market support and output subsidies declined substantially, falling below half. Since then, it has grown again, to around half of the NRA. Other important components of the NRAs of CEE countries and Turkey were input subsidies, direct payments, and other NPS subsidies, plus some decoupled payments in the most recent years (table 6.6).[7] In the CIS countries, those payments include soft loans and debt forgiveness, which continue to play an important role. While fiscal constraints for most of the 1990s limited the government's ability to support farms by this means, the budgetary situation changed in the 2000s as earnings from mineral and energy exports grew and these earnings have become a more important source of government assistance to farmers.

Table 6.5. Dispersion of NRAs across Covered Agricultural Products,[a] Eastern European and CIS Focus Countries, 1992–2007

(*percent*)

	1992–95	1996–99	2000–03	2004–07[c]
Bulgaria	18	21	25	48
Czech Republic	27	28	23	53
Estonia	24	28	20	45
Hungary	34	41	62	49
Latvia	42	40	44	58
Lithuania	47	47	53	54
Poland	31	28	27	53
Romania	48	52	59	69
Slovak Republic	25	27	25	49
Slovenia	50	42	39	57
CEE-10	**35**	**35**	**38**	**54**
Turkey	62	65	53	69
Russian Federation	37	33	40	40
Ukraine	66	48	37	32
Kazakhstan	—	—	28	39
All focus countries[b]	**39**	**38**	**38**	**45**

Source: Anderson and Valenzuela (2008), updated from estimates reported in Anderson and Swinnen (2009).

Note: — = not available.

a. Dispersion for each country is a simple four-year average of the annual standard deviation around a weighted mean of NRAs across covered products.

b. Unweighted average, that is, the simple average across the 14 countries of their four-year simple average dispersion measures.

c. Final column refers just to 2004–05 for Russia and Ukraine and 2004 for Kazakhstan.

The GSE of the assistance to farmers, expressed in constant 2000 dollar terms, shows that Turkey has been the largest supporter between the early 1990s and mid-2000s, though Russia is rapidly catching up to Turkey. Romania and Poland are the next largest aggregate supporters. The region as a whole provides support of more than US$24 billion per year, compared with just US$3 billion in the early years of transition (table 6.7a). When expressed on a per farmer basis, the range is huge. In 2000–03, for example, it ranged from negative amounts (–US$300) in Ukraine and Kazakhstan to an average of US$980 in the CEE countries, US$430 in Russia, more than US$2,200 in Hungary and Romania, and a huge amount in high-income Slovenia (table 6.7b). This compares with US$8,400 per farmer in the EU-15 in 2000–04 (Josling 2008). Slovenia's support has come down significantly since its accession to the EU, however, to an average of just under

Table 6.6. Components of NRAs to Agriculture, Eastern Europe and CIS, 1961–2007

(*percent*)

a. CEE-10

	1992–94	1995–99	2000–04	2005–07
NRA, covered products	10.4	16.4	25.5	17.7
NRA, noncovered products	10.6	17.3	26.9	24.7
NRA, all agriculture (excluding NPS)	10.5	16.7	26.1	21.3
All importables	19.1	32.1	45.2	31.7
All exportables	2.4	7.0	10.9	12.0
NRA, NPS assistance	1.9	2.5	2.5	4.4
NRA, all agriculture (including NPS assistance)	12.4	19.2	28.6	25.7
NRA, decoupled payments	0.6	0.8	2.9	12.1
NRA, all agriculture (including NPS and decoupled assistance)	13.0	20.1	31.5	37.8
NRA, all agricultural tradables (including NPS)	12.9	19.5	26.4	15.9
NRA, all nonagricultural tradables	5.7	4.9	4.4	4.6
RRA	6.7	14.1	21.1	10.7

b. Russian Federation and Ukraine

	1992–94	1995–99	2000–04	2005
NRA, covered products	−23.7	8.6	4.2	11.0
NRA, noncovered products	−23.9	11.3	6.2	14.1
NRA, all agriculture (excluding NPS)	−23.7	9.4	4.9	12.0
All importables	−25.4	20.3	24.7	22.9
All exportables	−21.5	−13.4	−15.3	−2.0
NRA, NPS assistance	6.3	4.8	2.7	0.0
NRA, all agriculture (including NPS assistance)	−17.4	14.2	7.5	12.0
NRA, decoupled payments	2.6	0.6	0.0	0.0
NRA, all agriculture (including NPS and decoupled assistance)	−14.8	14.8	7.6	12.0
NRA, all agricultural tradables (including NPS)	−17.4	14.2	5.9	6.3
NRA, all nonagricultural tradables	4.9	9.0	8.1	7.3
RRA	−21.5	4.8	−2.0	−0.9

(*Table continues on the following page.*)

Table 6.6. Components of NRAs to Agriculture, Eastern Europe and CIS, 1961–2007 (*continued*)
(percent)

c. Turkey

	1961–64	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–04	2005–07
NRA, covered products	−18.8	−17.7	−6.9	−8.1	−29.5	4.0	19.7	21.2	20.0	29.4
NRA, noncovered products	−18.8	−17.7	−6.9	−8.1	−29.5	4.0	19.7	21.2	20.0	27.8
NRA, all agriculture (excluding NPS)	−18.8	−17.7	−6.9	−8.1	−29.5	4.0	19.7	21.2	20.0	28.8
All importables	−10.8	−9.6	5.8	19.7	−19.6	28.5	60.2	80.5	54.0	45.0
All exportables	−29.9	−28.4	−18.0	−23.3	−35.5	−8.1	2.5	−1.9	3.5	21.9
NRA, NPS assistance	−0.1	−0.3	1.9	0.6	0.3	0.0	0.0	0.0	3.3	1.5
NRA, all agriculture (including NPS assistance)	−18.9	−17.9	−5.0	−7.5	−29.2	4.0	19.7	21.2	23.2	30.3
NRA, decoupled payments	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	3.7	2.9
NRA, all agriculture (including NPS and decoupled assistance)	−18.9	−17.9	−5.0	−7.5	−29.1	4.1	19.7	21.2	26.9	33.2
NRA, all agricultural tradables (including NPS)	−18.9	−17.9	−5.0	−7.5	−29.2	4.0	19.7	21.2	20.4	23.5
NRA, all nonagricultural tradables	60.5	140.8	49.6	55.7	32.8	20.5	10.0	2.3	0.9	0.5
RRA	−46.5	−64.0	−35.9	−35.6	−46.6	−13.6	8.8	18.6	19.3	23.0

Source: Anderson and Valenzuela (2008), updated from estimates reported in Anderson and Swinnen (2009).

Table 6.7. GSEs of Assistance to Farmers, Total and Per Farm Worker, Eastern European and CIS Focus Countries,[a] 1992–2007

a. Total (constant 2000 US$ millions per year)

	1992–95	1996–99	2000–03	2004–07[b]
Bulgaria	−671	−381	−17	197
Czech Republic	784	632	711	689
Estonia	−73	82	74	90
Hungary	856	768	1,205	920
Latvia	−208	167	195	179
Lithuania	−332	414	395	361
Poland	1,378	3,106	857	4,314
Romania	1,921	2,064	3,332	4,073
Slovak Republic	421	338	309	301
Slovenia	431	483	381	143
CEE-10	**4,509**	**7,674**	**7,441**	11,265
Turkey	4,671	8,033	6,070	10,525
Russian Federation	−1,486	7,394	3394	3,100
Ukraine	−4,461	−70	−1157	−182
Kazakhstan	—	—	−34	69
All focus countries	3,234	23,032	15,715	24,778

b. Per person engaged in agriculture[c] (constant 2000 US$ per year)

	1992–95	1996–99	2000–03	2004–07
Bulgaria	−1,429	−1,075	−65	1,010
Czech Republic	1,423	1,255	1,581	1,762
Estonia	−678	898	931	1,267
Hungary	1,335	1,372	2,494	2,253
Latvia	−1,038	993	1,333	1,393
Lithuania	−1,113	1,693	1,932	2,123
Poland	283	683	204	1,118
Romania	879	1,135	2,202	3,311
Slovak Republic	1,393	1,199	1,197	1,281
Slovenia	10,781	18,225	22,105	14,254
CEE-10	**466**	**893**	**977**	1,682
Turkey	344	566	414	702
Russian Federation	−152	842	431	439
Ukraine	−956	−17	−333	−60
Kazakhstan	—	—	−27	59
All focus countries	86	647	451	752

Source: Anderson and Valenzuela (2008), based on NRA estimates updated from Anderson and Swinnen (2009) and data on the number of farmers from U.N. Food and Agriculture Organization Statistical Database (FAOSTAT).

Note: — = not available.

a. GSEs include assistance to nontradables and NPS assistance. The number of farmers in these countries is difficult to obtain on a consistent basis. The FAOSTAT numbers may be subject to error. For example, Slovenia's may be understated in FAOSTAT, in which case its GSE per farmer is overestimated.

b. Final period refers to 2004–05 for Russia and Ukraine and just 2004 for Kazakhstan.

US$14,000 per farmer in 2005–07. For the EU-acceding countries, per farmer assistance over the next few years is likely to move closer to the EU average.

Since most of the support for farmers previously came through price-support measures, most notably import restrictions, these have the effect of raising consumer prices by a similar degree when calculated at the farmgate level. That means that prior to the mid-1990s, policies in all but Turkey and Slovenia imposed the equivalent of low or negative taxes on food consumers (CTEs), but thereafter the CTEs have become positive. The region's weighted average CTE in 2000–03 was 17 percent (table 6.8), compared with nearly twice that in the EU-15. CTEs in Romania and Slovenia have been well above that EU average this decade, and so presumably will fall during those countries' transition to the EU's Common Agricultural Policy (CAP), especially given the EU's policy reinstrumentation toward more direct farm income supports that do not raise consumer prices of food.

Assistance to agriculture relative to other tradable sectors

Import tariffs on primary agricultural commodities in Europe and Central Asia are on average twice as high as average tariffs in industry, but only half as high as tariffs on processed food. This is true both for the CEE and CIS countries. It suggests that while the region's farmers receive more tariff protection from competition abroad than do nonagricultural producers, food processors may be effectively protected despite having to pay more than world prices for primary farm products.

Import-competing producers are only part of each sector, however. When support for producers of exports in each sector is also taken into account, an overall NRA for all nonagricultural tradable industries can be used, together with the average NRA for agricultural tradable industries, to calculate the RRA. In so far as the NRAs for nonfarm industries are positive, the RRA is lower than the NRA for agriculture. But in most cases, the nonagricultural NRA is very low. Thus the overall NRA for tradable primary agriculture in the region during 2000–03 is estimated to have averaged more than three times higher than for producers of nonagricultural tradables (15 as compared with 5 percent), so the RRA averaged 10 percent. Only in three countries—Bulgaria, Kazakhstan, and Ukraine—has agricultural production been assisted less than nonagricultural tradables (RRA < 0) during the present decade. And in virtually all countries for which there is a time series, the RRA is higher at the end of the sample period than in the first few years of transition (figure 6.3).

Forces behind Transitional Policy Choices

Several political economy stylized facts widely observed in market economies—for reasons explained in, for example, Anderson and Hayami (1986), Anderson (1995), Swinnen (1994), and de Gorter and Swinnen (2002)—are also found in

Table 6.8. Percentage CTE of Policies Assisting Producers of Covered Farm Products,[a] Eastern European and CIS Focus Countries, 1992–2007

(*percent, at primary product level*)

	1992–95	1996–99	2000–03	2004–07[e]
Bulgaria	−20	−10	3	7
Czech Republic	23	19	22	20
Estonia	−15	12	9	20
Hungary	18	15	22	16
Latvia	2	28	32	32
Lithuania	−20	21	20	29
Poland	4	2	18	25
Romania	−6	16	39	29
Slovak Republic	13	15	16	17
Slovenia	48	58	45	24
CEE-10	**2**	**11**	**24**	**23**
Turkey	10	20	16	9
Russian Federation	−37	13	16	24
Ukraine	−25	0	−3	3
Kazakhstan	—	—	4	16
All focus countries:				
Unweighted average	−1	16	19	20
Weighted average[b]	**−13**	**13**	**16**	**14**
Dispersion of national CTEs[c]	27	17	14	10
Dispersion of region's product CTEs[d]	35	37	47	53

Source: Anderson and Valenzuela (2008) updated from estimates reported in Anderson and Swinnen (2009).

Note: — = not available.

a. Assumes the consumer tax equivalent (CTE) is the same as the NRA derived from trade measures (that is, not including any input taxes/subsidies or domestic producer price subsidies/taxes).

b. Weights are consumption valued at undistorted prices, where consumption (from FAO) is production plus imports net of exports plus change in stocks of the covered products.

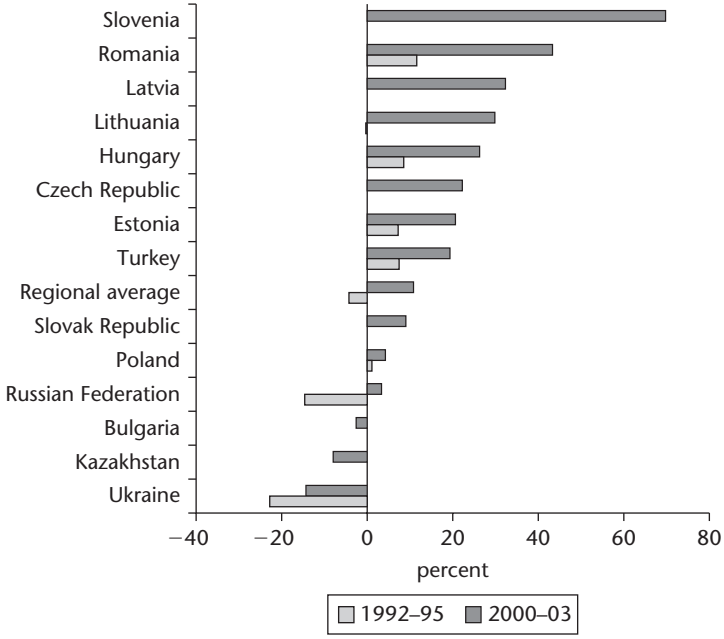
c. Simple four-year average of the annual standard deviation around a weighted mean of the regional average CTE across the covered products.

d. Simple four-year average of the annual standard deviation around a weighted mean of the national average CTE for covered products.

e. Final column refers to 2004–05 for Russia and Ukraine and just 2004 for Kazakhstan; while CEE values assume the CTE for each product is the same as for the EU-25 in 2004–06 and for EU-27 in 2007, such that the differences across CEE countries is due to differing national consumption weights.

Europe and Central Asia's transition economies. Specifically, for this region, as elsewhere, farmer assistance tends to be higher in higher-income countries, and in countries with weaker comparative advantage in agriculture. Hence, it is likely that similar politico-economic interactions and mechanisms are at work

Figure 6.3. RRAs to Agriculture,[a] Eastern European Focus Countries, 1992–95 and 2000–03



Source: Anderson and Valenzuela (2008), updated from estimates reported in Anderson and Swinnen (2009).

a. RRA is defined as 100*[(100 + $NRAag^t$)/(100 + $NRAnonag^t$) − 1], where $NRAag^t$ and $NRAnonag^t$ are the percentage NRAs for the tradables parts of the agricultural and nonagricultural sectors, respectively. For several countries no estimates are available for the 1992–95 period.

in this region as in other parts of the world. However, those correlations are becoming weaker over time among the CEE countries. Taking on the EU's CAP is part of the explanation, but there are also other forces, both domestic and international, that underlie the political economy of agricultural policies in the CEE and CIS countries. Several of those key forces are discussed in the following subsections.

Causes of rent extraction

Traditionally, heavy negative government intervention in the form of depressed incentives tends to be concentrated on commodities that have the potential to provide export tax revenue for the government. This is especially the case in the cotton sectors of Tajikistan, Turkmenistan, and Uzbekistan. There, as in a number

of African countries (see Anderson and Masters 2009), the government controls the cotton chain so as to extract rents, thereby depressing farmers' prices and production incentives.

There is a clear division in Central Asia between the roughly neutral policy toward cotton in Kazakhstan and the Kyrgyz Republic (where cotton previously accounted for a relatively modest share of total exports) on the one hand, and on the other the extensive taxation and extraction of rents from cotton in Tajikistan, Turkmenistan, and Uzbekistan (countries where cotton traditionally was a very important export tax resource).[8] In Turkmenistan and Uzbekistan, governments use state monopoly powers over marketing to transfer substantial resources out of agriculture. Most of the transfers in Uzbekistan appear to go to general government revenue, whereas in Turkmenistan much is wasted (for example, in inefficient cotton mills, which have negative value added) or accrues to secret accounts under the president's personal control. Moreover, recently, potentially important reforms have been introduced in Uzbekistan to reduce some of the distortions to farm incentives, while almost none have taken place in Turkmenistan. In Tajikistan, the rent distribution is more opaque, but equally detrimental to farms, as a coalition between the government and a monopolistic private trading company has caused depressed prices and incentives for farmers. Not surprisingly, cotton farmers have responded sharply to these incentive distortions, both in area and output: with rapid growth in Kazakhstan and the Kyrgyz Republic, and with declines or stagnation in the other countries.

The grain and oilseed export sectors of Bulgaria, Ukraine, and the grain surplus regions of Russia are similarly characterized by heavy government regulation and interventions. In traditional grain-exporting countries such as Bulgaria and Ukraine, for historic and psychological reasons, the grain sector has disproportionate political significance. For example, in the mid-1990s in Bulgaria, ministers of agriculture were regularly forced to resign following reports of grain shortfalls or unregulated exports threatening the local grain supply. In Ukraine, ad hoc grain market interventions continued in recent years.

Opportunities for rent seeking from distorted policies inhibit policy reform, as the few who benefit disproportionately from existing distortions lobby strongly for their continuation. This applies to various policies, such as cotton regulations in Central Asia, grain trade regulations in Bulgaria, Russia, and Ukraine and water policies in Central Asia. But it also applies to several policies in countries in which benefits go a specific group of farms. For example, the continuation of soft budget constraints in the large CIS countries, along with the failure of governments to enforce bankruptcies and strong land rights, disproportionately benefit large farming companies, while smaller family farms are often hurt by these policies. In Turkey, agricultural parastatal companies and marketing cooperatives benefit

from "farm support" and are major lobbyists in favor of market regulations and assistance packages.

Sometimes, specific political, regional, or ethnic coalitions also play a role. In Kazakhstan, for example, many residents of the rich northern grain regions were Russian and German. After independence, power shifted to Kazakh nationals, limiting the Russian and German groups' influence in government and causing many to emigrate. Another recent example is Bulgaria, where the government's resistance to privatizing tobacco processing companies and its decision to allocate a disproportionate amount of subsidies to tobacco growers are due to the fact that the Turkish minority in Bulgaria is particularly active in the sector and traditionally has held key positions in the Ministry of Agriculture.

Causes of increases in support during transition

Increases in agricultural support in the CEE countries in the second half of the 1990s and more recently in CIS countries are the result of the interaction of domestic political forces with international events. The increase in farmer assistance in CEE countries was likely caused by "normal" domestic internal pressures that are brought to bear in a contestable political environment, which results in an increase in agricultural protectionism as per capita income increases and agricultural comparative advantage declines. Protectionism between the mid-1990s and mid-2000s was also a case of reversing somewhat the overshooting in reform during the first few years of transition.

Overlaying these trends is the EU accession process, which encouraged CEE governments to target the levels of support expected in the EU by the end of the phase-in period of accession, so as to maximize the transfer of benefits from Brussels. However, it appears that in the years leading up to accession, the process had more impact on the introduction of new support instruments than on the overall level of support, probably because the full cost of that support had to be borne by the national economy prior to EU accession (Swinnen 2002).

Another factor contributing to the increase in agricultural support in the mid-1990s was the improvement in the government's budgetary situation, which allowed more subsidies to be given to farmers than was possible in the early years of transition. This factor has played a role throughout Europe and Central Asia, in particular in Russia and some of its neighbors, where recovery from the 1998 financial crisis has been aided by windfall gains from the dramatic rise in the export prices of energy raw materials. This factor has been stronger in countries where governments have more access to mineral resources, such as in Russia (oil and gas), Kazakhstan (oil), and Turkmenistan (gas).

Crises and political change

General political and economic crises have played an important role in inducing changes in agricultural distortions. The most obvious example is the fall of the Communist regime and the disintegration of the Soviet Union—and of the central directives coming from Moscow. However, even later there are several examples in which general crises have triggered changes. Most often, the policy reforms came only after new elections induced a change in government, reflecting changed electoral preferences.

For example, in Romania and Bulgaria, important progress in the removal of distortions and market reforms occurred only in the late 1990s, after electoral change brought reform-minded governments to power. In Bulgaria, significant progress was brought about by the financial crisis in 1996. Important reform progress was made in Ukraine in the years after the 1999 election in which the large farm lobby fell out with President Kuchma, who consequently introduced a series of important reforms that farmers had previously successfully opposed.

Democratic political change, however, is not a sufficient condition in itself for better agricultural policies. For example, political revolutions in Ukraine and the Kyrgyz Republic (the "Orange Revolution" and the "Tulip Revolution," respectively) have not contributed to better agricultural policy. In fact, agricultural distortions seem to have increased under the postrevolution Ukrainian government, while in the Kyrgyz Republic political change has mostly resulted in more market instability, while relatively little distortion remains in agriculture.

Impact of international agreements

EU accession, both prospective and actual, has had obvious and profound influences on policy choices. The CEE countries that joined in May 2004 and January 2007 have raised domestic agricultural and food prices toward EU-15 levels (on average, since for some prices came down). An important part of the EU farm subsidies is now in the form of direct payments. Though CEE farms receive considerably less of these subsidies than do EU-15 farmers, they will gradually increase to reach EU-15 levels by 2010. Another important difference is that subsidies in the EU-15 will be given on a per farm basis (single farm payments) earlier than in CEE countries.

CEE countries also have been induced also to undertake major regulatory improvements to stimulate their markets, including private investments in the food chain and public rural infrastructure investments. Likewise, their trade policies have changed to allow free access for all products from other EU-27 member countries and, in most cases, also freer access for nonagricultural products from

non-EU countries (the latter because the common external tariff typically was lower than that previously applied in acceding countries). The EU accession process, however, has not caused a major increase in food prices in the CEE countries. Two reasons behind this are the increased competition in consumer markets in the CEE countries with the full opening of agri-food markets to imports, and the massive inflow of foreign direct investment in the retail sector.

Impacts of other international agreements (including WTO accessions) have varied. The Czech Republic, Hungary, Poland, Romania, the Slovak Republic, Slovenia, and Turkey have been members of the WTO since its creation in 1995. Albania, Armenia, Bulgaria, Estonia, Georgia, the Kyrgyz Republic, Latvia, Lithuania, and Ukraine joined the WTO later, while Russia and Kazakhstan are still negotiating their WTO accession.

WTO accession has not strongly disciplined European and Central Asian countries that were founding members in 1995 (Bacchetta and Drabek 2002). For those that had to negotiate their entry in the latter 1990s, constraints on introducing or maintaining distortions are more serious. And for large countries in the region still in the process of negotiating their accession, notably Kazakhstan and Russia, the WTO has been even tougher in its demands. Whether those demands will prove an agricultural trade-liberalizing force remains to be seen, but at least they will provide a ceiling on the extent to which agricultural protection and subsidies may be raised in the future.

For the CEE countries, the most important WTO impact has been indirect: in anticipation of eastward enlargement, the EU was forced to introduce major changes to its CAP, which in turn has affected postaccession agricultural distortions in the CEE countries.

A further and somewhat erratic influence has been regional trading arrangements among the European and Central Asian countries. These include the Eurasian Economic Community (EAEC), the Central European Free Trade Area, and the Baltic Free Trade Area. However, the impact of these agreements on reducing agricultural policy distortions has been generally limited, because the agreements include many exceptions for agricultural and food products, especially for so-called sensitive products, which make up a substantial share of production. Moreover, Central Asian countries such as Kazakhstan and the Kyrgyz Republic have been reluctant to join the EAEC because the organization would impose Russia's trade and customs preferences on them.

Influence of international institutions

The role of other international institutions was very important at the start of transition in Europe and Central Asia, as it provided policy reform guidance in all

these countries. However, in more recent years, the influence of international institutions has declined. For countries joining the EU, policy advice from Brussels was perceived as more relevant. This is especially, but not only, the case for the EU accession countries. For countries aspiring to join the EU (such as most of the Balkan countries and Ukraine), or for those that view the accession countries as models for their own development strategies, policy advice from Brussels is taken seriously. Another reason is that in many of the countries of Southeast Europe and the CIS, improved macroeconomic situations have made them less beholden to international financial institutions requiring reforms as a condition for providing loans or financial assistance.

Prospects for Further Reducing Distortions

Clearly, there have been major reductions in distortions to agricultural incentives in Europe and Central Asia over the past two decades. In many countries in the region, average protection levels are now relatively low. However, there is still substantial room for further reduction of distortions to agricultural incentives. This could be done through various means: overall reductions in support, shifting support to less-distortive policy instruments, and focusing budgetary expenditures on public good investments (in infrastructure and in institutions that reduce trade costs) rather than on farm subsidies, shifting from a quantity-based to a quality-based policy paradigm, and so forth.

In terms of further reductions in policy distortions, some of the most distortive cases concern taxation of agriculture, most notably the control and rent extraction in the cotton sectors in some Central Asian countries. Removing those distortions would allow a substantial improvement in incentives to domestic producers. Though some progress has been made in recent years, much more can be done.

Countries for which EU accession is unlikely to happen in the medium term, such as Turkey, Ukraine, and several of the Balkan countries, should focus their policy attention in the near term on efficiency improvements in both their policies and their agricultural economies. This is consistent with the objective of EU accession, since the EU itself has moved in recent years to more decoupled farm support and is demanding that member countries move in that direction and improve the efficiency of their farms and food companies.[9]

The same policy framework should be promoted in countries further east, including in those that are likely to spend more funds on agriculture in the coming years as their fiscal situation improves. Increased funding should be focused on upgrading infrastructure, on quality and efficiency of the agri-food system, and on the introduction or improvements of a variety of institutions necessary to support rural markets. In several of the poorer and larger CIS countries, institu-

tional and infrastructure problems, as well as corruption, remain major constraints to trade and thereby distort farm incentives.

Competition and antitrust policy are important related areas for policy attention. In supply chains where farms have to sell their products to trading, processing, and retailing companies, the ability to choose freely between companies is of crucial importance in creating better conditions for farms. This applies across the region, where monopoly buyers (state-owned or private) push down prices and contract conditions, although the source of anticompetitive behavior and policy details are likely to differ, for example, between the increasing dominance of large retail chains in Central Europe versus some of the government-controlled cotton chains in Central Asia.

Despite constraining political economy forces, there are prospects for further reducing distortions to agricultural incentives in the foreseeable future. Accession of the CEE countries to the EU has increased their levels of farm assistance, though they now face more competition within the enlarged EU. While reducing CEE farm assistance in the future will not happen without reductions in EU protection levels, some reforms are currently underway in the EU (for example, the cut in EU sugar price support and the shift from per hectare payments to single farm payments). However, slow and intermittent progress in the WTO's Doha Round reduces the pressure for further reforms. Meanwhile, in the mineral- and energy-rich CIS countries, the rise in export earnings reduces budgetary constraints on governments inclined to give assistance to farmers as national incomes grow. CIS regional trade policies that affect markets, largely ad hoc and nontransparent, are also important distortions. Eliminating these policy interventions would require fundamental reforms of Russia's political system, including a transformation of attitudes and behaviors involving governance that Russian accession to the WTO is unlikely to alter in the medium term.

Notes

1. This is a strong feature of Asia's economies in transition as well. For a comparison of the Asian and European transition experiences, see Swinnen and Rozelle (2006).

2. The only country from this region that was part of the Krueger, Schiff, and Valdés (1991) study was Turkey, for the period 1961 to 1983. However, a follow-up study subsequently undertaken for a few economies in transition has been made available in a World Bank technical report (Valdés 2000).

3. For a detailed discussion of how misalignments in the exchange rate affect the measurement and interpretation of NRAs in Russia during its transition period, see Liefert and Liefert (2008).

4. In addition to the present study's estimation of price wedges, the latter would require a sophisticated economic model of the national economy with some quantification of the difference between private and social marginal costs. Such welfare analysis is thus beyond the scope of the present study.

5. The dramatic implications-including millions of peasants dying of starvation-are documented in sobering detail in Conquest (1986).

6. For an assessment of the support to farmers in the 1980s, see Cook, Liefert, and Koopman (1991).

7. Water price regulations and subsidies are important policy instruments in the irrigated regions of Central Asia, but it was not possible in this study to estimate their impact on NRAs. Energy policies are still used to assist various sectors, for example in Russia, but since they do not favor agriculture in particular, and are becoming less important, they too have been omitted from the NRA estimates.

8. Price and trade data were not sufficiently reliable to allow NRA calculations, but Pomfret (2008a, 2008b) and Christensen and Pomfret (2008) provide considerable informal information supporting the claims above.

9. From this perspective, it is important to point to the importance of other reforms, such as macroeconomic and regulatory reforms to stimulate food industry investment, labor market reforms to enhance off-farm employment opportunities, and credit reforms to stimulate access to rural credit.

References

Anderson, K. 1995. "Lobbying Incentives and the Pattern of Protection in Rich and Poor Countries." *Economic Development and Cultural Change* 43 (2): 401–23.

Anderson, K., Y. Hayami, et al. 1986. *The Political Economy of Agricultural Protection: East Asia in International Perspective*. Boston, London, and Sydney: Allen and Unwin.

Anderson, K., M. Kurzweil, W. Martin, D. Sandri, and E. Valenzuela. 2008a. "Methodology for Measuring Distortions to Agricultural Incentives." Agricultural Distortions Working Paper 02, World Bank, Washington, DC (and appendix A of this volume).

_____. 2008b. "Measuring Distortions to Agricultural Incentives, Revisited." *World Trade Review* 7 (4): 1–30.

Anderson, K., and W. Masters, eds. 2009. *Distortions to Agricultural Incentives in Africa*. Washington, DC: World Bank.

Anderson, K., and J. Swinnen, eds. 2008. *Distortions to Agricultural Incentives in Europe's Transition Economies*. Washington, DC: World Bank.

_____. 2009. "Distortions to Agricultural Incentives in Eastern Europe and Central Asia." Agricultural Distortions Working Paper 63, World Bank, Washington, DC.

Anderson, K., and E. Valenzuela. 2008. "Estimates of Global Distortions to Agricultural Incentives, 1955 to 2007." World Bank, Washington, DC. http://www.worldbank.org/agdistortions.

Bacchetta, M., and Z. Drabek. 2002. "Effects of WTO Accession on Policy-Making in Sovereign States: Preliminary Lessons from the Recent Experience of Transition Countries." Staff Working Paper DERD-2002-02, World Trade Organization, Geneva.

Broadman, H. G., ed. 2006. *From Disintegration to Reintegration: Europe and Central Asia in International Trade*. Washington, DC: World Bank.

Chen, S., and M. Ravallion. 2007. "Absolute Poverty Measures for the Developing World, 1981–2004." Policy Research Working Paper 4211, World Bank, Washington, DC.

Christensen, G., and R. Pomfret. 2008. "The Kyrgyz Republic." In *Distortions to Agricultural Incentives in Europe's Transition Economies*, ed. K. Anderson and J. Swinnen. Washington, DC: World Bank.

Conquest, R. 1986. *The Harvest of Sorrow*. London: Oxford University Press.

Cook, E. C., W. M. Liefert, and R. B. Koopman. 1991. "Government Intervention in Soviet Agriculture: Estimates of Consumer and Producer Subsidy Equivalents." Staff Report AGES 9146, Economic Research Service, U.S. Department of Agriculture, Washington, DC.

Crafts, N., and G. Toniolo. 2008. "European Economic Growth, 1950–2005: An Overview." CEPR Discussion Paper 6863, Centre for Economic Policy Research, London.

de Gorter, H., and J. Swinnen. 2002. "Political Economy of Agricultural Policies." In volume 2 of *Handbook of Agricultural Economics*, ed. B. Gardner and G. Rausser. Amsterdam: Elsevier Science.

Dries, L., and J. Swinnen. 2004. "Foreign Direct Investment, Vertical Integration and Local Suppliers: Evidence from the Polish Dairy Sector." *World Development* 32 (9): 1525–44.

Dries, L., T. Reardon, and J. Swinnen. 2004. "The Rapid Rise of Supermarkets in Central and Eastern Europe: Implications for the Agrifood Sector and Rural Development." *Development Policy Review* 22 (5): 525–56.

Ellman, M. 1988. "Contract Brigades and Normless Teams in Soviet Agriculture." In *Socialist Agriculture in Transition: Organizational Response to Failing Performance*, ed. J. C. Brada and K. E. Wädekin, 23–33. Boulder, CO: Westview Press.

Gray, K. R., ed. 1990. *Soviet Agriculture: Comparative Perspectives*. Ames, IA: Iowa State University Press.

Huffman, S. K., and S. R. Johnson. 2004. "Impacts of Economic Reform in Poland: Incidence and Welfare Changes within a Consistent Framework." *Review of Economics and Statistics* 86 (2): 626–36.

Josling, T. 2008. "Distortions to Agricultural Incentives in the Western Europe." Agricultural Distortions Working Paper 61, World Bank, Washington, DC. http://www.worldbank.org/agdistortions.

Krueger, A. O., M. Schiff, and A. Valdés. 1991. *The Political Economy of Agricultural Pricing Policy, Volume 3: Africa and the Mediterranean*. Baltimore: Johns Hopkins University Press for the World Bank.

Liefert, W., and O. Liefert. 2008. "The Russian Federation." In *Distortions to Agricultural Incentives in Europe's Transition Economies*, ed. K. Anderson and J. Swinnen. Washington, DC: World Bank.

Liefert, W., and J. Swinnen. 2002. "Changes in Agricultural Markets in Transition Economies." Agricultural Economic Report AER806, Economic Research Service, U.S. Department of Agriculture, Washington, DC.

Pomfret, R. 2008a. "Kazakhstan." In *Distortions to Agricultural Incentives in Europe's Transition Economies*, ed. K. Anderson and J. Swinnen. Washington, DC: World Bank.

_____. 2008b. "Tajikistan, Turkmenistan and Uzbekistan." In *Distortions to Agricultural Incentives in Europe's Transition Economies*, ed. K. Anderson and J. Swinnen. Washington, DC: World Bank.

Sandri, D., E. Valenzuela, and K. Anderson. 2007. "Economic and Trade Indicators for the Europe's Transition Economies, 1990 to 2004." Agricultural Distortions Working Paper 22, World Bank, Washington, DC. http://www.worldbank.org/agdistortions.

Swinnen, J. 1994. "A Positive Theory of Agricultural Protection." *American Journal of Agricultural Economics* 76 (1): 1–14.

_____. 2002. "Transition and Integration in Europe: Implications for Agricultural and Food Markets, Policy and Trade Agreements." *The World Economy* 25 (4): 481–501.

Swinnen, J., and S. Rozelle. 2006. *From Marx and Mao to the Market: The Economics and Politics of Agricultural Transition*. New York: Oxford University Press.

Valdés, A., ed. 2000. "Agricultural Support Policies in Transition Economies." World Bank Technical Paper 470, World Bank, Washington, DC.

World Bank. 2007. World Development Indicators Database. World Bank. http://go.worldbank.org/B53SONGPA0 (accessed June 2008).

7

LATIN AMERICA AND THE CARIBBEAN

*Kym Anderson and Alberto Valdés**

While the vast majority of the world's poorest households depend on farming for their livelihoods, poverty tends to be less focused on rural areas in Latin America than in Africa or South Asia, as Latin American countries generally have higher levels of development, larger nonfarm sectors in relation to their overall economies, more extensive urbanization, and a greater concentration of land ownership. Nonetheless, poverty is sufficiently prevalent in numerous parts of Latin America and the Caribbean that it continues to be a concern. In the past, farm earnings in the region have often been depressed by the pro-urban, antiagricultural bias of government policies. True, progress has been made over the past two decades in reducing the policy bias, but many trade-reducing price distortions remain between sectors, as well as within the agricultural sectors of most Latin American countries.

This study of Latin America is based on a sample of eight countries, including the big four economies of Argentina, Brazil, Chile, and Mexico; Colombia and Ecuador, two of the poorest tropical South American countries; the Dominican Republic, the largest Caribbean economy; and Nicaragua, the poorest country in Central America. Together, in 2000–04, these countries accounted for 78 percent of the region's population, 80 percent of the region's agricultural value added, and 84 percent of the total gross domestic product (GDP) of Latin America.

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The key characteristics of these economies—which account for only 4.5 percent of worldwide GDP, but 7.7 percent of agricultural value added and more than 10 percent of agricultural and food exports—are shown in table 7.1. The table reveals the considerable diversity within the region in terms of stages of development, relative resource endowments, comparative advantages and, hence, trade specialization and the incidence of poverty and income inequality. This means that these countries represent a rich sample for comparative study. By comparison, Nicaragua's per capita income is only one-seventh the global average, while the incomes of Colombia and Ecuador are one-third of this average. By contrast, the per capita income in Argentina and Chile averages just one-eighth below and in Mexico one-eighth above the global average. Only Argentina, Brazil, and Nicaragua are well above the global average in endowments of agricultural land per capita; the Dominican Republic and Ecuador are well below this average; and Chile, Colombia, and Mexico are a little less than one-third above the average. Income inequality is high throughout Latin America and the Caribbean compared with the rest of the world—the Gini coefficient is near or above 0.5 and averages 0.52. This is well above the Gini coefficient for Africa and Asia. Likewise, the Gini coefficient for land distribution is high in Latin America: 0.58 for Chile and more than 0.7 in Argentina, Brazil, Ecuador, and Nicaragua, compared with an average of less than 0.5 in Asia (World Bank 2007). Even so, there is comparatively little absolute poverty except in the poorest tropical parts of the region.

Though it relies on nearly twice as much agricultural land per capita as the rest of the world, Latin American agriculture is characterized by concentrated land ownership and a structure of production whereby medium and large commercial farms contribute the bulk of agricultural output. It is also a region with a high degree of urbanization. These features are important in understanding the forces behind agricultural policies. So, too, is the fact that, until a few years ago, most countries in the region were experiencing a high degree of macroeconomic instability and high inflation. The manipulation of food prices for urban consumers in an attempt to reduce inflation was (and, in Argentina, still is) a dominant feature driving farm pricing policy.

Most Latin American countries have gone undergone major economy-wide policy reforms that began, for some countries, in the 1980s (or the 1970s for Chile) and, for others, in the mid-1990s. Reforms centered on macroeconomic stabilization, trade liberalization, deregulation, and some privatization of state agencies. There was a considerable reassessment of the role of government in guiding economic development. Agricultural policies were an integral part of this reform process, although not the principle motivation of the reforms.

This chapter begins with a brief summary of economic growth and structural changes in the region since the 1960s and of agricultural and other economic

Table 7.1. Key Economic and Trade Indicators, Latin American Countries, 2000–04

	Share (%) of world:			National relative to world (world = 100)			Agricultural trade specialization index[b]	Poverty incidence[c]	Gini index for per capita income[d]
	Population	Total GDP	Agricultural GDP	GDP per capita	Agricultural land per capita	RCA,[a] agriculture and food			
Latin American focus countries	**6.49**	**4.49**	**7.73**	**69**	**178**	**219**	**0.42**	**7**	**52**
Argentina	0.61	0.54	1.04	89	426	541	0.85	5	51
Brazil	2.88	1.54	3.38	54	184	355	0.66	8	57
Chile	0.25	0.22	0.24	86	120	386	0.63	2	55
Colombia	0.70	0.24	0.77	35	132	264	0.25	7	59
Dominican Republic	0.14	0.06	0.18	41	54	474	0.29	3	52
Ecuador	0.20	0.07	0.16	33	80	487	0.59	16	44
Mexico	1.62	1.82	1.89	112	133	64	−0.17	7	46
Nicaragua	0.08	0.01	0.06	14	169	952	0.26	44	43
Other Latin American countries	**1.84**	**0.84**	**2.05**	**46**	**148**	—	—	—	—
Caribbean	0.20	0.07	0.13	36	23	—	—	—	—
Central America	0.52	0.21	0.78	41	55	504	0.26	—	—
South America	1.12	0.56	1.13	50	213	157	0.16	13	—
All Latin American countries	**8.33**	**5.33**	**9.78**	**64**	**171**	—	—	—	—

Source: Sandri, Valenzuela and Anderson (2007), compiled mainly from World Bank (2008).

Note: — = not available.

a. RCA = revealed comparative advantage. The RCA index is the share of agriculture and processed food in national exports as a ratio of that sector's share of global exports.

b. Primary agricultural trade specialization index is net exports as a ratio of the sum of exports and imports of agricultural and processed food products (world average = 0.0).

c. Percentage of the population living on less than US$1 per day.

d. The poverty incidence and Gini index are for the most recent year available between 2000 and 2004, except for Ecuador where they refer to 1998. The weighted averages for the focus countries use population as the basis for weights.

policies as they affected agriculture before and after the reforms of the mid-1980s to mid-1990s. It then summarizes estimates of the nominal rate of assistance (NRA) and the relative rate of assistance (RRA) to farmers delivered by national farm and nonfarm policies over the past several decades, as well as the impact of these policies on the consumer prices of farm products. Both farmer assistance and consumer taxation tend to be negative in periods when there is an antiagricultural, pro-urban consumer bias in a country's policy regime. The final sections describe lessons learned and draw key policy implications for the region.

Growth and Structural Changes[1]

Since 1980, real GDP in Latin America has grown at an average annual rate of 5.4 percent, or 3.6 percent per capita. These rates are somewhat above the averages of other developing countries of 4.1 percent total and 2.3 percent per capita, but somewhat below Asia's averages of 7.1 percent total and 5.5 percent per capita. The region's comparative growth performance was much less rosy in the 1960s and 1970s, however, before it moved away from an import-substitution industrialization regime. Among the focus countries in our study, Chile and Mexico have been the star performers since 1980, while Ecuador and Nicaragua have been the slowest growers. Nicaragua's civil conflict set the country back in the 1980s, but its economy grew twice as fast as Ecuador's in the 1990s.

Though the industrial sector has grown much more slowly than overall GDP over the past 25 years, agriculture has grown even more slowly, at barely half the rate of the rest of the economy, while the service sector has taken the lead. Among our sample countries, the economies of Chile and Mexico have been among the most rapidly growing, and Argentina's and Ecuador's the most slowly growing, apart from Nicaragua.

As a result of strong growth in service activities during the past two decades, the share of services in GDP has risen from barely one-half to two-thirds, while agriculture's share fell from 9 to 6 percent, on average, in our sample economies. The relative decline of agriculture has been slowest in Argentina, Brazil, and Nicaragua and the most rapid in oil-exporting Ecuador and Mexico, but also in Chile. In 2000–04, agriculture's share of GDP ranged from 4 percent in Chile and Mexico to twice that in Brazil and Ecuador, three times that in Colombia and the Dominican Republic, and more than four times that in Nicaragua.

The share of overall employment accounted for by farming activities in Latin America and Caribbean countries has fallen somewhat more slowly than agriculture's GDP share, according to statistics in the FAOSTAT Database of the Food and Agriculture Organization of the United Nations (which, because of definitional differences, is not always consistent with databases produced by countries).

In general, the share remains at much higher level than the GDP share, implying relatively low and slow-growing labor productivity on farms. The most rapid decline has occurred in Brazil, where the employment share in agriculture has fallen from one-half to less than one-sixth during the past 40 years.

Agriculture's average share in exports has also declined, by about one-third each decade since the late 1960s. The only exception is Chile, where the share has risen dramatically, from one-eighth to one-third. Chile contrasts markedly with the other rapidly growing economy in our sample, Mexico, where the share of farm products in all goods exports has fallen from 58 percent to only 6 percent. Additionally, the decline in relative importance of farm exports has been more rapid in Latin America than in the rest of the world: the index of the revealed comparative advantage of Latin America in these products (defined as the share of agriculture and processed food in national exports as a ratio of the share of such products in worldwide merchandise exports) has fallen by about one-third since the 1960s, as has the region's index of trade specialization (defined as net exports as a ratio of the sum of the imports and exports of agricultural and processed food products). There has been a marked upturn in these two indexes during the past decade, however, not only in Chile but in several other reforming Latin American countries, including Argentina and Brazil. The indexes are now at high levels in all countries in the sample apart from Mexico, which is also the only country in the sample with a revealed comparative disadvantage in agriculture.

Finally, before examining the region's policy reforms, it is important to note the increases in export orientation. A common indicator is the value of goods and services expressed as a percentage of GDP. Since the early 1990s, this indicator has roughly doubled in the three largest economies (Argentina, Brazil, and Mexico) but changed little in the other countries in our sample, apart from Chile, where it rose a few years earlier. Another indicator is the share of primary agricultural production that is exported. This share has jumped dramatically in the past 20 years, including in Mexico, where it is now more than 30 percent as a result of sharply increased specialization within the sector following the agricultural and trade policy reforms begun in anticipation of the North American Free Trade Agreement (NAFTA), which came into effect in 1994. Note, however, that import dependence has also grown as a consequence of trade specialization. Indeed, 17 of the region's 21 countries on which data are available are net food importers (de Ferranti et al. 2005). Only Argentina was a net exporter of cereals during 2003–05, even though all eight countries in our sample (except Mexico) are more than 100 percent self-sufficient in agricultural products in aggregate and even though the share of these countries in global exports of agriculture and food jumped from 6.8 to 9.6 percent between 1990–94 and 2000–04.

The Evolution of Agricultural and Trade Policies

Like most other regions, Latin American countries encompass a diverse range of policies, political structures, and institutions, though there has been, to some extent, a common evolution in the ideology motivating economic policies, beginning in the 1960s.

Prior to the reforms of the mid-1980s and early 1990s

Until approximately the mid-1980s, agricultural price interventions in the region were largely a by-product of a development strategy based on a claim that the best way to grow the economy was to adopt a protectionist policy to encourage import-substitution industrialization. This policy also raised budgetary resources in the form of import tax revenue, which was supplemented in some countries (such as Argentina) through agricultural export taxes. Both of these approaches harmed the region's most competitive farmers and were offset only slightly by farm credit and fertilizer subsidies.

Between the 1950s and the 1980s, there were concerns about high rates of inflation, especially where urban populations had strong political influence. Policy makers were under pressure to avoid large increases in food prices, which would potentially impact wage rates and thereby (according to theory prevailing at the time) accelerate inflation through the so-called cost-push effect.

In addition to fiscal and inflation objectives that made farm export taxes attractive, there was, in the 1950s and 1960s, a widespread belief among the region's policy makers and followers of the structuralist school associated with Prebisch (1950, 1959, 1964)—notwithstanding the seminal book by Schultz (1964)—that the efficiency losses generated through the extraction of rents in agriculture were low and that the main impact would be to reduce land rents and land values. Argentina is a prime example of a case in which the view persisted that farmers in Latin America were unresponsive to price incentives. While the belief in this unresponsiveness has now largely disappeared, a few countries—Argentina is one—still tax agricultural exports to generate fiscal revenues and lower consumer food prices.

An empirical study of agricultural pricing policies led by Krueger, Schiff, and Valdés (1991) included five Latin American countries for the period 1960–84. Its main findings are fourfold. First, over the period examined and for the farm products selected, the direct interventions affecting importables were positive, on average, while the direct interventions on exportables were negative. Second, aggregating over all selected products, one sees that the net effect was negative, indicating that the direct tax on exportables dominated the protection on importables. Third, the

rate of indirect taxation on agriculture (because of industrial protection policies and the overvaluation of the real exchange rate) was large and dominated the rate of direct taxation. And fourth, direct price policies stabilized agricultural prices relative to world prices, while indirect policies contributed little, if at all, to food price stability. The study found that direct protection for agricultural importables averaged 13 percent, while for exportables, it amounted to –6 percent. The indirect taxation rate in the region averaged 21 percent so that the total taxation rate (direct and indirect) averaged 28 percent. The highest direct taxation was found in Argentina and the Dominican Republic (about 18 percent). As a percent of agricultural GDP, net income transfers out of agriculture (direct and indirect) reached 84 percent in Argentina, 56 percent in Chile, 43 percent in the Dominican Republic, and 42 percent in Colombia.

Economic reforms from the mid-1980s to early 1990s

By the 1980s, there was disillusionment with the results of the import-substitution strategy and wider acceptance of theoretical developments regarding the causes of inflation and macroeconomic instability in general. During the 1980s and early 1990s, a macroeconomic framework designed for open economies gradually displaced the closed economy approach in most Latin American countries. Governments introduced economy-wide reforms with special emphasis on macroeconomic stabilization, deregulation, unilateral trade liberalization, and privatization.

The goal of the reformers was to create a better climate for productivity and private investment in all economic sectors, including agriculture. In most Latin American countries, the major change in trade policy was the partial or total removal of most quantitative restrictions on imports and exports, the elimination of export taxes, and a program of gradual reduction in the levels of import tariffs. This yielded incentives to move resources from import-competing to export-oriented sectors, including in agriculture, which enhanced competitiveness and led to greater integration with the world economy.

By the mid-1990s, the exchange rate was recognized as the most important "price" affecting the agricultural economy. At the outset of the reforms, it was expected that trade liberalization and the reduction of the fiscal deficit would lead to a depreciation of the real exchange rate (Krueger, Schiff, and Valdés 1988). Yet the reforms were followed by a significant appreciation of the currency that was associated with the opening of the capital account, greater inward foreign investment, and a major increase in domestic real interest rates. Reforms in the service sector also played a critical role. Deregulation and privatization had a major impact on the availability in the marketplace of the more-reliable and lower-cost services used in agriculture, such as ports, airlines, and shipping transport.

The timing of reforms differed somewhat across countries, however. Colombia, for example, became a more open economy through export promotion beginning in 1967; it adopted a more ambitious liberalization of trade in 1990 and then went into a policy reform reversal beginning in 1992. In Chile, the controlled markets of 1950 to 1974 were followed by radical economic reforms toward trade liberalization, deregulation, and privatization between 1978 and 1982, before a second phase of reforms beginning in 1984. Mexico, meanwhile, introduced strong policy changes starting in the mid-1980s, before the signing of NAFTA. The changes involved more openness, deregulation, and privatization; a reduction in credit subsidies; and major changes in the role of government in the marketing of farm products.

A wide variety of policy instruments have been applied to influence agricultural prices, even during the postreform period. Colombia, for example, has had minimum support prices, in addition to import tariffs, price compensation schemes, procurement agreements, a monopoly on grain imports by a government agency, export licenses and subsidies, and safeguards on imports. Moreover, until 1990, all imports of inputs were subject to prior import licenses. Then, in 1995, tariffs and tariff surcharges associated with price bands on more than 100 products were introduced. Mexico is another leader in interventions, including in the transition from highly government-controlled markets before the mid-1980s to more market-oriented policies. Its policies include price support programs (before the mid-1980s and in conjunction with state trading), credit and input subsidies, and direct income payments to farmers (*ProCampo*). Argentina, however, has undertaken simpler interventions. Agricultural exportables that are also wage goods have been subjected to export taxes, complemented by export bans in some years. The return to sizeable export taxes in late 2001 and their subsequent rises has been controversial, with the most recent rises leading to prolonged protests by farmers in urban areas in mid-2008.

Estimates of Latin American Policy Indicators

The net effect of these various interventions on farmer and consumer incentives are quantified using the common methodology (Anderson et al. 2008a, 2008b) that has been adopted by the authors of this volume and the four preceding regional volumes. After a brief word on methodology, a summary of results follows.[2]

Methodology

The NRA is defined as the percentage by which government policies have raised gross returns to producers above what they would be without the government's

intervention (or lowered them, if the NRA is below zero). If a trade measure is the sole source of government intervention, the measured NRA will also be the consumer tax equivalent (CTE) rate at that same point in the value chain. The NRAs are based on estimates of assistance to individual industries at farmgate. The targeted degree of coverage of the products for which agricultural NRA estimates are generated is 70 percent of the gross value of farm production at undistorted prices. The authors of the country case studies also provide guesstimates of the NRAs for noncovered farm products. For countries with non-product-specific (NPS) agricultural subsidies or taxes, such net subsidies are then added to product-specific assistance to obtain NRAs for total agriculture and also for tradable agriculture for use in generating an RRA.

Farmers are affected not only by the prices of their own outputs, but also (albeit indirectly, because of the changes to factor market prices and the exchange rate) by the incentives nonagricultural producers face. In other words, both absolute and relative prices—and hence, relative rates of government assistance—affect producer incentives. The direction of the economy-wide effect of distortions to agricultural incentives may be captured by the extent to which the tradable parts of agricultural production are assisted or taxed relative to producers of other tradables. By generating estimates of the average NRA for nonagricultural tradables, it is then possible to calculate an RRA, which is defined in percentage terms as: $\text{RRA} = 100[(1 + NRAag^t/100)/(1 + NRAnonag^t/100) - 1]$, where $NRAag^t$ and $NRAnonag^t$ are the weighted average percentage NRAs for the tradable parts of the agricultural and nonagricultural sectors, respectively. Since the NRA cannot be less than −100 percent if producers are to earn anything, neither can the RRA. If both sectors are assisted equally, the RRA is zero. Although this measure cannot fully capture the ultimate impacts on resource allocations to various sectors including nontradables (a computable general equilibrium model is needed for that), it is nonetheless useful in comparing policy biases across time and countries. If the RRA is below (above) zero, it indicates that a country's trade policy regime has an antiagricultural or proagricultural bias.

In calculating the NRA for producers of agricultural and nonagricultural tradables, the methodology seeks to include distortions generated by dual or multiple exchange rates. Such direct interventions in the market for foreign currency were common in Latin America in the 1970s and 1980s, but not since the reforms. However, some authors of the Latin American country studies have had difficulty finding an appropriate estimate of the extent of this distortion, so the impact on NRAs has been included only for the Dominican Republic, Ecuador, and Nicaragua. Its exclusion for the other five countries means the estimated (typically) positive NRAs for importables and (typically) negative NRAs for exportables are smaller than they should be for these countries. In cases where the NRA

for importables dominates that for exportables, this omission would lead to an underestimate of the average (positive) NRA for such tradables sectors. This applies to nonagricultural sectors for all the countries studied in this chapter. In the most common cases in earlier decades, where the estimated NRA for importables is dominated by a negative NRA for exportables in the farm sector, the estimate of the sectoral average NRA for agriculture would be less negative than it should be, and, hence, so would the RRA estimate.[3]

To obtain the values for farmer assistance and consumer taxation, the NRA estimates of the country authors have been multiplied by the gross value of production at undistorted prices to obtain an estimate in constant U.S. dollars of the direct gross subsidy equivalent (GSE) of assistance to farmers. This GSE value is then added up across products for each country and then across countries for any or all products to obtain regional aggregate transfer estimates for the countries being examined. An aggregate estimate for the rest of the region is obtained by assuming that the weighted average NRA for the countries not within the study is the same as the weighted average NRA for the countries within the study and that the share of each country in the region's gross value of farm production at undistorted prices is the same each year as the share of the country in the region's agricultural GDP measured at distorted prices. These GSE values are also expressed on a per farm worker basis.

To obtain comparable value estimates of the consumer transfer, the CTE estimate at the point at which a product is first traded is multiplied by consumption (obtained from the FAO SUA-FBS Database), valued at undistorted prices, to obtain an estimate in constant U.S. dollars of the tax equivalent to consumers of primary farm products. These, too, are summed across products for a country and across countries for any or all products to obtain regional aggregate transfer estimates for the countries under study.

Estimates of NRAs in agriculture

On average (whether simple or weighted), agricultural price and trade policies in Latin America reduced farmer earnings throughout the postwar period right through to the 1980s. The extent of these (when expressed as a nominal tax equivalent) peaked at more than 20 percent in the 1970s but still averaged close to 10 percent in the late 1980s. The only countries in our sample that received positive assistance from farm policies during that period were Chile (from the late 1970s, but only to a minor extent), Colombia, and Mexico. Argentina, Brazil, the Dominican Republic, and Ecuador each had negative rates of assistance that averaged well above 20 percent for at least one five-year subperiod, and, apart from the Dominican Republic, each had a negative average NRA even in the 1990s, as did

Nicaragua. However, by the mid-1990s, Brazil and the Dominican Republic joined Chile and Colombia in that they had positive average NRAs. Meanwhile, Mexico had raised its assistance considerably before engaging in reform following negotiations to join the World Trade Organization and the NAFTA, while Argentina had all but eliminated its discrimination against its exporters in the 1990s, only to reinstate explicit export taxes again in late 2001 when it abandoned its fixed exchange rate with the U.S. dollar and nominally devalued by two-thirds. The *NRAag* for the region in the 1990s and the first half of the present decade averaged slightly under 5 percent (table 7.2). Its switch from negative to positive occurred in 1992.

The effect of the policy reforms on NRAs over the past two decades is illustrated in figure 7.1. For all countries except Chile, the national average NRA was less negative or more positive in 2000–04 than in 1980–84. This is true, too, for the majority of the commodity NRAs for the region, although assistance for several commodities (such as milk and poultry) was cut. This pattern may be seen in figure 7.2 and table 7.3, which also illustrate the diversity of the region's average rates across commodities.

There is also a great deal of diversity across commodities within each country's farm sector. The extent of this diversity (as measured by the standard deviation) diminished, on average, by only about one-quarter during 1990–2004 compared with the prereform period of 1965–89. This is evident in table 7.4. The table reports the standard deviation of NRAs for covered products, which account for more than two-thirds of the value of agricultural production. This means there is still a great deal that may be gained in terms of improved resource reallocation within the agricultural sector if differences in rates of assistance for different industries are reduced.

One striking feature of the pattern of farm price distortions in Latin America and the Caribbean as a whole is the strong antitrade bias. This is shown for agriculture's import-competing and export subsectors in the region in figure 7.3 and for each country in table 7.5 (along with a trade bias index, or TBI). These estimates reveal that there has been little decrease in the bias over the past four decades, except in Brazil. Indeed, the average NRA for exportable farm products has been negative throughout virtually the whole period analyzed in all countries other than Chile (plus Brazil in the 1990s and Colombia since 2000), while the regional average NRA for import-competing farm industries has increased from near zero in the 1970s to 20 percent or more in the period since 1990 (with Chile again an exception with its NRA for import-competing industries falling to near zero). That is, despite the lower taxation of farm export industries, the region's antitrade bias has persisted because the average NRA for import-competing farm products has been rising recently in several of the countries being examined.

Table 7.2. NRAs to Agriculture,[a] Latin American Countries, 1965–2004
(*percent*)

	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–04
Argentina	−22.7	−22.9	−20.4	−19.3	−15.8	−7.0	−4.0	−14.9
Brazil[c]	−6.1	−27.3	−23.3	−25.7	−21.1	−11.3	8.0	4.1
Chile	16.2	12.0	4.5	7.2	13.0	7.9	8.2	5.8
Colombia	−4.7	−14.8	−13.0	5.0	0.2	8.2	13.2	25.9
Dominican Republic	5.0	−17.5	−21.2	−30.7	−36.4	−1.0	9.2	2.5
Ecuador[c]	−9.6	−22.4	−15.0	5.9	−1.0	−5.3	−2.0	10.1
Mexico	—	—	—	2.9	3.0	30.8	4.2	11.6
Nicaragua[c]	—	—	—	—	—	−3.2	−11.3	−4.2
Latin American focus countries								
Unweighted average[b]	−2.8	−15.5	−14.5	−7.7	−8.3	2.3	3.2	4.9
Weighted average[a]	−7.2	−21.0	−18.0	−12.5	−10.9	4.2	5.5	4.8
Dispersion of individual country average NRAs[d]	13.8	15.4	10.8	17.4	17.1	13.5	8.6	11.9

Source: Anderson and Valenzuela (2008), based on estimates reported in Anderson and Valdés (2008a).

Note: — = not available.

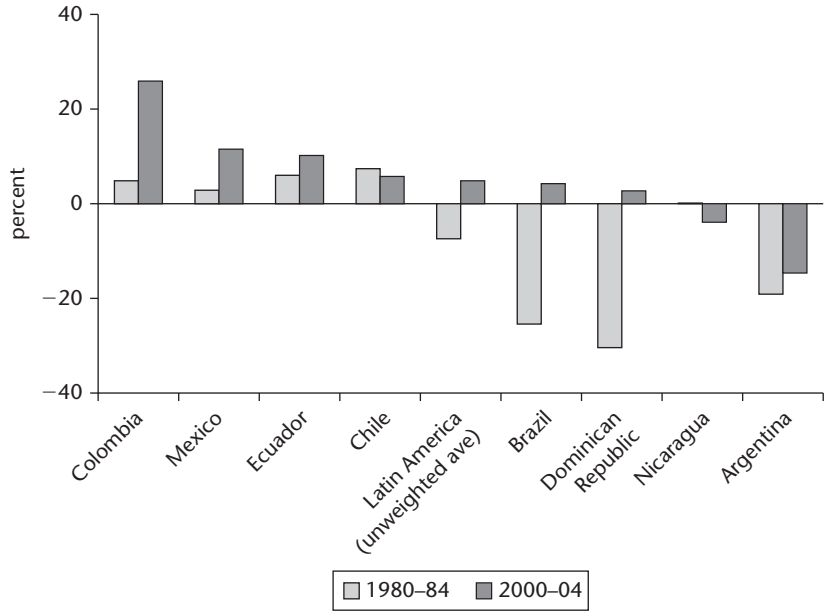
a. Weighted average for each country, including product-specific input distortions and NPS assistance as well as authors' guesstimates for noncovered farm products, with weights based on gross value of agricultural production at undistorted prices.

b. The unweighted average is the simple average across the eight countries of their national NRA (weighted) averages.

c. Ecuador and Brazil in the 1965–69 column refer to 1966–69 data; and Nicaragua 1990–94 column to 1991–94 data.

d. Dispersion of average NRAs across countries is a simple five-year average of the annual standard deviation around a weighted mean of the national agricultural sector NRA each year.

Figure 7.1. NRAs to Agriculture, Individual Latin American Countries[a] and Unweighted Regional Average, 1980–84 and 2000–04



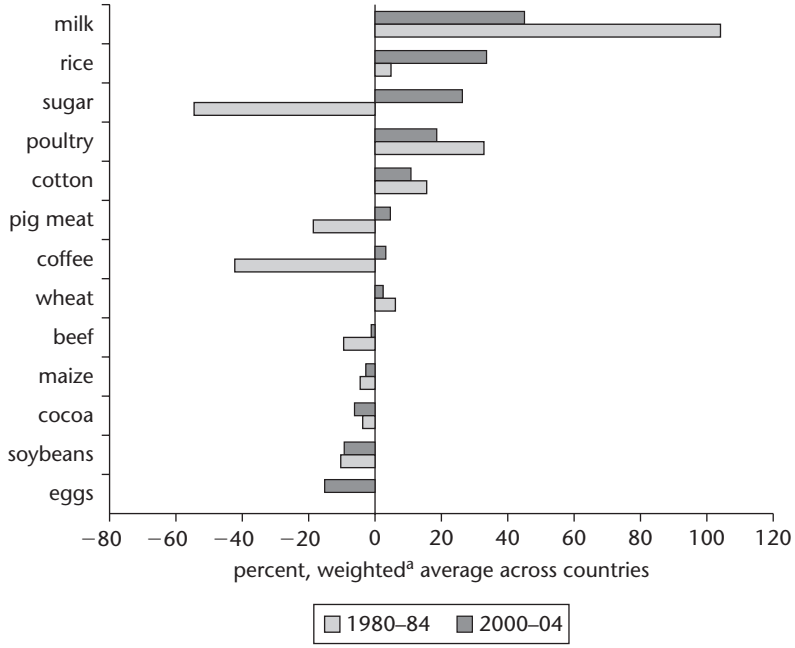
Source: Anderson and Valenzuela (2008), based on estimates reported in Anderson and Valdés (2008a).

a. There are no estimates for Nicaragua for 1980–84.

The contributions to the overall NRA for agriculture for the region as a whole provided by covered products, noncovered products, and NPS assistance are summarized in table 7.5. NPS assistance has added only one or two percentage points during the past four decades. Input price distortions have also contributed little, on average, to the overall regional NRA in agriculture, reducing the negative value slightly in the 1980s and adding slightly to the positive value during the past decade or so. In Chile, input distortions have reduced the positive NRA in the farm sector because of protectionist policies that have raised the price of imported or import-competing farm inputs. This has also been the case in Argentina since the early 1990s and, to a smaller extent, in Colombia since the 1960s. There is little in the way of domestic producer subsidies or taxes, on average, in the region; the main exception is positive support measures in Mexico and slightly negative support measures in Argentina.

The dollar value of the positive or negative assistance to farmers arising from agricultural price and trade policies has been nontrivial. The antiagricultural bias

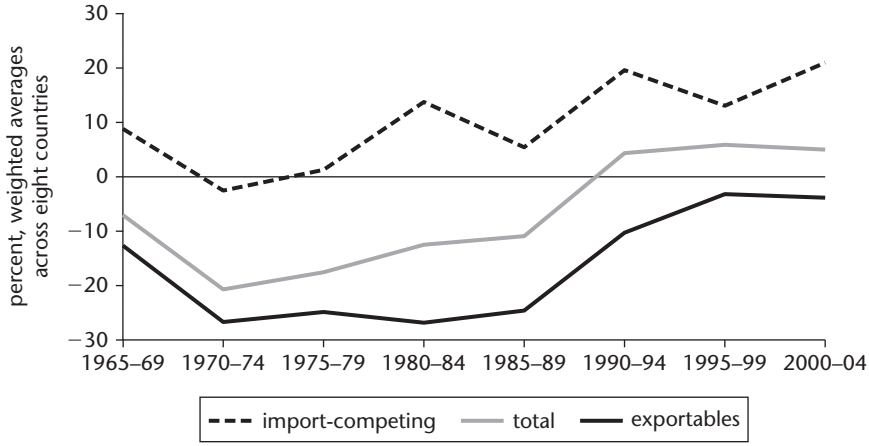
Figure 7.2. NRAs, by Product, Latin American Countries, 1980–84 and 2000–04



Source: Anderson and Valenzuela (2008), based on estimates reported in Anderson and Valdés (2008a).

a. Weights based on gross value of agricultural production at undistorted prices—that is, each NRA (by country, by product) is weighted by the country's value of production of that commodity in a given year. Products with less than 1 percent of the gross value of regional production are excluded. These include: apples, cassava, cocoa, garlic, onions, palm oil, peanuts, and sesame.

Figure 7.3. NRAs to Exportable, Import-Competing, and All[a] Agricultural Products, Latin American Region, 1965–2004



Source: Anderson and Valenzuela (2008), based on estimates reported in Anderson and Valdés (2008a).

Table 7.3. NRAs, Key Covered Farm Products, Latin American Focus Countries,[a] 1965–2004
(*percent*)

	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–04
Rice	27	5	−10	5	8	12	26	34
Wheat	−2	−15	11	6	6	18	3	2
Maize	−10	−8	−15	−5	−13	0	−4	−3
Other grains	−4	−3	−4	6	2	0	−14	−11
Soybeans	3	−5	−15	−11	−21	−10	−4	−10
Other oilseeds	−4	−3	−15	−21	−23	−11	−16	−21
Sugar	17	−61	−46	−54	−43	−20	7	27
Cotton	−7	−2	−14	−16	−23	−12	6	11
Coffee	−27	−26	−32	−42	−29	1	−9	3
Cocoa	6	−16	−13	−4	−14	−16	−12	−7
Fruits and vegetables	−12	−22	−31	−5	−33	−16	−24	−20
Beef	−23	−21	−11	−10	−4	2	5	−1
Pig meat	6	−14	−13	−19	−20	6	−3	4
Poultry	110	144	108	33	23	23	8	19
Eggs	—	—	—	0	−6	2	−16	−16
Milk	2	−7	19	104	70	45	29	45
All covered products	**−13.0**	**−25.1**	**−19.6**	**−14.6**	**−14.3**	**0.9**	**0.8**	**2.7**

Sources: Anderson and Valenzuela (2008) based on estimates reported in Anderson and Valdés (2008a).

Note: — = not available.

Table 7.4. Dispersion of NRAs across Covered Agricultural Products[a] within Latin American Focus Countries, 1965–2004[b]

(*percent*)

	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–04
Argentina	18.5	17.8	19.9	15.7	12.1	7.1	9.4	12.6
Brazil	28.1	37.2	41.0	35.9	25.5	27.4	8.5	7.6
Chile	33.0	37.2	30.4	17.0	26.1	16.5	14.7	13.3
Colombia	34.8	21.2	29.9	42.5	34.1	27.2	31.0	46.0
Dominican Republic	86.5	64.0	89.3	83.0	102.3	137.1	92.6	132.8
Ecuador	99.0	88.6	104.8	106.2	48.5	18.8	27.9	29.6
Mexico	—	—	—	71.9	60.1	57.7	30.6	41.1
Nicaragua	—	—	—	—	—	40.1	35.7	27.7
Latin American focus countries								
Unweighted average[c]	50.0	44.3	52.5	53.2	44.1	41.5	31.3	38.8
Product coverage[d]	54	65	68	71	68	65	69	70

Source: Anderson and Valenzuela (2008), based on estimates reported in Anderson and Valdés (2008a).

Note: — = not available.

a. Dispersion for each country is a simple five-year average of the annual standard deviation around a weighted mean of NRAs across covered products each year.

b. The 1965–69 column for Ecuador and Brazil refers to 1966–69 data; the 1990–94 Nicaragua column to 1991–94 data.

c. The unweighted average is the simple average across the eight countries of their five-year simple average dispersion measures.

d. Share of gross value of total agricultural production at undistorted prices accounted for by covered products in the region.

Table 7.5. NRAs to Agricultural Relative to Nonagricultural Industries, Latin American Region, 1965–2004

a. Unweighted averages for eight focus countries (*percent*)

	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–04
NRA, covered products[a]	−9.1	−21.8	−17.0	−8.8	−8.9	1.0	1.1	4.4
NRA, noncovered products	−0.5	−9.2	−10.0	−6.5	−7.5	1.4	0.9	0.4
NRA, all agricultural products[a]	−5.4	−17.0	−15.0	−8.3	−9.3	0.4	0.7	2.7
Total agricultural NRA (including NPS)[b]	−2.8	−15.5	−14.5	−7.7	−8.3	2.3	3.2	4.9
TBI[c]	−0.22	−0.18	−0.31	−0.41	−0.33	−0.26	−0.25	−0.26
NRA, all agricultural tradables[b]	−6.0	−19.0	−16.4	−7.2	−8.2	2.6	3.5	5.7
NRA, all nonagricultural tradables	16.8	20.6	15.6	14.3	13.4	7.7	7.3	6.5
RRA[d]	**−19.5**	**−32.9**	**−27.7**	**−18.8**	**−19.1**	**−4.8**	**−3.5**	**−0.8**

b. Weighted averages for eight focus countries (*percent*)

	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–04
NRA, covered products[a]	−13.0	−25.1	−19.6	−14.6	−14.3	0.9	0.8	2.7
NRA, noncovered products	−3.3	−15.5	−15.0	−10.9	−13.1	0.7	3.8	2.1
NRA, all agricultural products[a]	−8.6	−21.7	−18.1	−13.6	−14.0	0.8	1.7	2.5
Total agricultural NRA (including NPS)[b]	**−7.2**	**−21.0**	**−18.0**	**−12.5**	**−10.9**	**4.2**	**5.5**	**4.8**
TBI[c]	−0.20	−0.25	−0.26	−0.36	−0.29	−0.25	−0.14	−0.21
NRA, all agricultural tradables[b]	−9.3	−23.0	−19.0	−12.9	−11.2	4.4	5.5	4.9
NRA, all nonagricultural tradables	15.9	27.8	23.3	18.5	16.8	7.3	6.6	5.5
RRA[d]	**−21.4**	**−39.8**	**−34.2**	**−26.6**	**−24.0**	**−2.7**	**−1.0**	**−0.6**

Source: Anderson and Valenzuela (2008), based on estimates reported in Anderson and Valdés (2008a).

a. NRAs including product-specific input subsidies.

b. NRAs including NPS assistance, that is, the assistance to all primary factors and intermediate inputs as a percentage of the total primary agricultural production valued at undistorted prices.

c. TBI = $(1 + NRAag_x/100)/(1 + NRAag_m/100) - 1$, where $NRAag_m$ and $NRAag_x$ are the average percentage NRAs for the import-competing and exportable parts of the agricultural sector. The regional average TBI is calculated from the regional averages of the NRAs for exportable and import-competing parts of the agricultural sector.

d. RRA is defined as $100*[(100 + NRAag^t)/(100 + NRAnonag^t) - 1]$, where $NRAag^t$ and $NRAnonag^t$ are the percentage NRAs for the tradable parts of the agricultural and nonagricultural sectors, respectively.

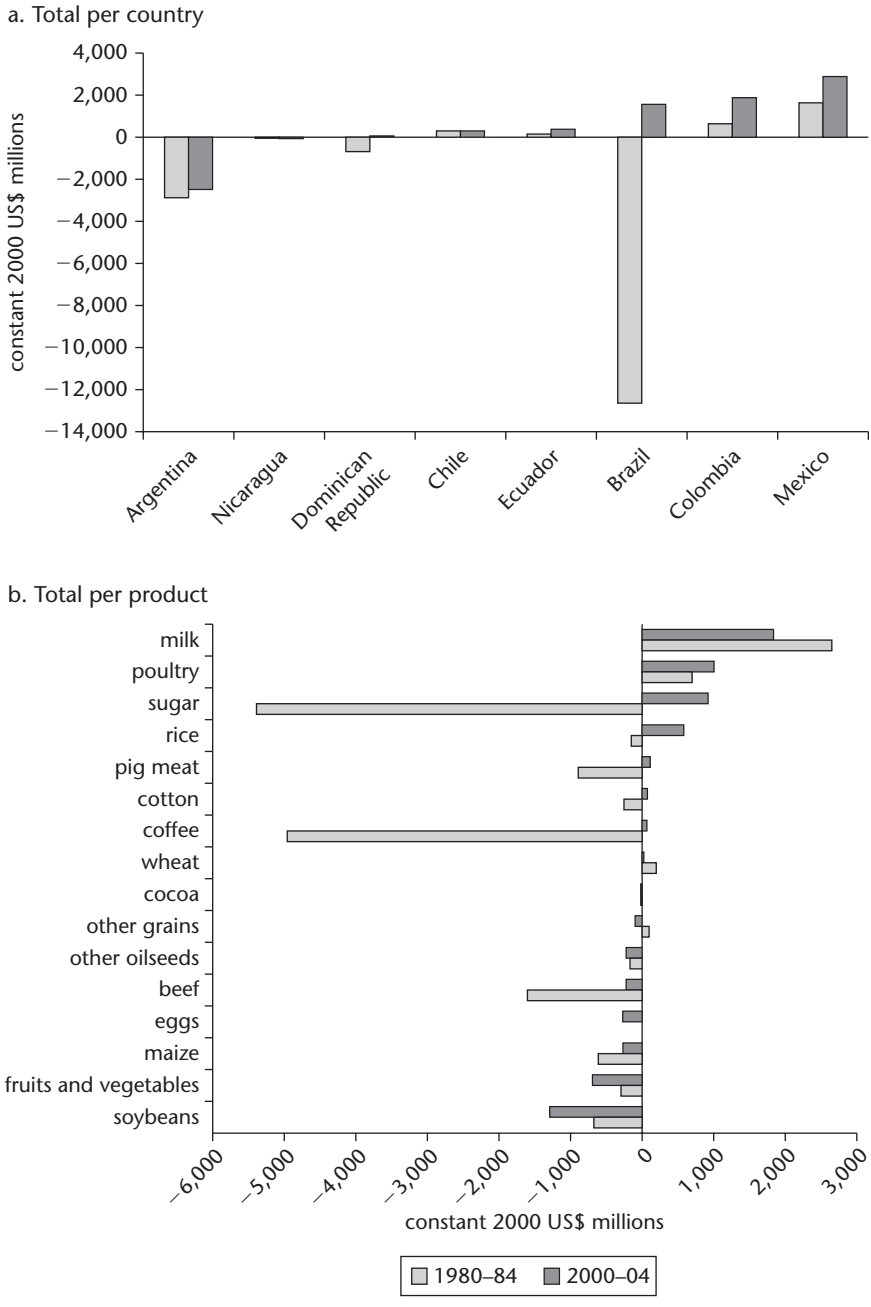
peaked for the region in the 1975–84 period at nearly US$17 billion per year in constant 2000 dollar terms, assuming that the Latin American countries not under study had the same NRAs as the countries under study, keeping aside the case of Mexico (see the bottom row of table 7.6a). This is equivalent to a gross tax of almost US$400 for each person engaged in agriculture. Around 60 percent of this US$17 billion arose because of policies in Brazil. Thanks to the reforms of the past two decades, this taxation has gradually disappeared in all the countries under study except Argentina and Nicaragua. However, the reform does not mean that there is now no intervention. Rather, the old policy has been replaced by positive assistance to farmers in the remaining six countries. This assistance has averaged US$6 billion per year, or around US$140 per farmworker, over the 1995–2004 period. The US$140 is small compared with per capita income for the region (about 4 percent), but it ranges from more than US$450 in Colombia (one-quarter of that country's per capita GDP in 2000–04) to −US$1,700 in Argentina (negative one-third of that country's per capita GDP). The extent of this dramatic transformation in the region as a whole over the past two decades is illustrated in figure 7.4 for the individual countries and for key products. Table 7.7 reveals that, as in most other regions of the world, the lion's share of assistance goes to milk, sugar, and rice.

Assistance to nonfarm sectors and RRAs

The antiagricultural policy bias of the past was caused not merely by agricultural policies. The significant reduction in border protection for the manufacturing sector and the indirect impact of this on the drop in the price of nontradables after the initiation of the reforms, together with the deregulation and privatization of services, have also been important in the changes in the incentives affecting intersectorally mobile resources. The reduction in assistance to nonfarm tradable sectors has been as responsible for the expansion in agricultural exports since the early 1990s as the reduction in direct taxation on these agricultural exports.

Quantifying this distortion in nonfarm tradable sectors as accurately as the quantification of the distortion in agriculture has not been possible. Our authors have had to rely on applied trade taxes (for exports, as well as imports) rather than undertaking price comparisons for nonfarm goods, and, hence, they have not captured the quantitative restrictions on trade that were important in earlier decades but that have been less important recently.[4] Nor have they captured distortions in the services sectors; many of these sectors now produce tradables (or would do so in the absence of interventions preventing the emergence of this production). As a result, the NRAs for nonfarm importables are underestimated, and the decline indicated is less rapid than the decline that actually occurred; the situation is

Figure 7.4. GSEs of Assistance to Farmers, Latin American Countries, 1980–84 and 2000–04



Source: Anderson and Valenzuela (2008), based on estimates reported in Anderson and Valdés (2008a).

Table 7.6. GSEs of Assistance to Farmers, Total and Per Farm Worker, Latin American Countries,[a] 1965–2004

a. Total (*constant 2000 US$ millions*)

	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–04
Argentina	−1,699	−2,630	−2,466	−2,850	−1,533	−738	−595	−2,473
Brazil	−790	−7,905	−8,141	−12,724	−9,142	−3,578	3,101	1,509
Chile	482	378	167	267	394	380	465	294
Colombia	−358	−1,555	−1,719	583	5	905	1,562	1,835
Dominican Republic	61	−457	−603	−694	−561	−22	150	39
Ecuador	−192	−477	−453	121	−23	−132	−68	324
Mexico	—	—	−389	1,581	762	7,426	984	2,805
Nicaragua	—	—	—	—	—	−32	−140	−54
Latin American focus countries	**−2,496**	**−12,647**	**−13,604**	**−13,716**	**−10,098**	**4,210**	**5,459**	**4,279**
All Latin American countries[a]	**−3,082**	**−15,613**	**−16,794**	**−16,933**	**−12,467**	**5,197**	**6,740**	**5,283**

b. Per person engaged in agriculture (*constant 2000 US$*)

	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–04
Argentina	−1,094	−1,776	−1,727	−2,030	−1,054	−498	−404	−1,693
Brazil	−51	−482	−475	−736	−561	−240	224	118
Chile	650	515	216	324	442	401	478	299
Colombia	−119	−483	−483	153	1	244	419	496
Dominican Republic	88	−641	−859	−1,003	−803	−33	238	66
Ecuador	−199	−475	−446	114	−20	−108	−54	260
Mexico	—	—	−51	194	90	867	115	329
Nicaragua	—	—	—	—	—	−81	−351	−137
Latin American focus countries	**−85**	**−411**	**−417**	**−408**	**−305**	**132**	**177**	**144**
All Latin American countries[a]	**−81**	**−390**	**−396**	**−386**	**−283**	**119**	**156**	**124**

Source: Anderson and Valenzuela (2008), based on estimates reported in Anderson and Valdés (2008a).

Note: — = not available.

a. Assumes the rate of assistance in nonfocus countries is the same as the average for the focus Latin American countries excluding Mexico, and that their share of the value of Latin American and Caribbean (excluding Mexican) agricultural production at undistorted prices is the same as their average share of the region's agricultural GDP at distorted prices during 1990–2004, which was 23 percent. Farmer numbers are from FAOSTAT and may differ from national statistics.

Table 7.7. GSEs of Policies Affecting Farmers in Latin America, by Product and Subsector, 1965–2004

a. By product (*at undistorted farmgate prices, US$ millions*)

	Rice	Wheat	Maize	Other grains	Soybean	Other oilseeds	Sugar	Cotton
1965–69	24	−17	−92	0	1	0	8	−19
1970–74	−40	−216	−162	−1	−55	0	−1,829	−8
1975–79	−230	91	−475	−56	−436	−81	−1,619	−159
1980–84	−55	116	−396	53	−428	−110	−3,260	−156
1985–89	−55	65	−707	10	−1,533	−151	−1,980	−380
1990–94	201	395	−17	−5	−386	−92	−988	−158
1995–99	569	79	−373	−151	−279	−256	233	36
2000–04	614	30	−307	−113	−1,371	−241	970	78

	Cocoa	Coffee	Fruits and vegetables	Beef	Pig meat	Poultry	Eggs	Milk	All covered products
1965–69	1	−127	−19	−289	1	10	—	2	−516
1970–74	−8	−169	−41	−440	−4	15	—	−29	−2,987
1975–79	−32	−815	−163	−404	−53	116	−51	236	−4,131
1980–84	−8	−3,014	−165	−1,027	−565	423	−14	1,603	−7,003
1985–89	−17	−1,738	−623	−327	−504	344	−66	944	−6,716
1990–94	−14	30	−610	188	93	533	19	1,471	661
1995–99	−10	−536	−977	704	−110	378	−225	1,393	476
2000–04	−7	76	−750	−264	111	1,048	−285	1,915	1,504

(*Table continues on the following page.*)

Table 7.7. GSEs of Policies Affecting Farmers in Latin America, by Product and Subsector, 1965–2004 (*continued*)

b. By subsector (*at undistorted farmgate prices, US$ billions*)

	GSE for just covered farm products[b]	GSE for just non-covered farm products	Total GSE, all direct assistance to farmers[a]			
			Total	Exportables	Import-competing	Nontradables
1965–69	−0.5	−0.1	−0.6	−0.7	0.1	0.0
1970–74	−3.0	−1.1	−4.0	−3.9	−0.2	0.0
1975–79	−4.0	−1.5	−5.5	−5.5	0.0	0.0
1980–84	−7.0	−2.2	−8.5	−12.1	2.9	0.0
1985–89	−6.7	−3.1	−7.5	−10.7	0.9	0.0
1990–94	0.7	0.4	3.8	−4.6	5.7	0.0
1995–99	0.5	1.2	5.3	−2.3	3.9	0.0
2000–04	1.5	0.6	4.3	−3.3	5.4	0.0

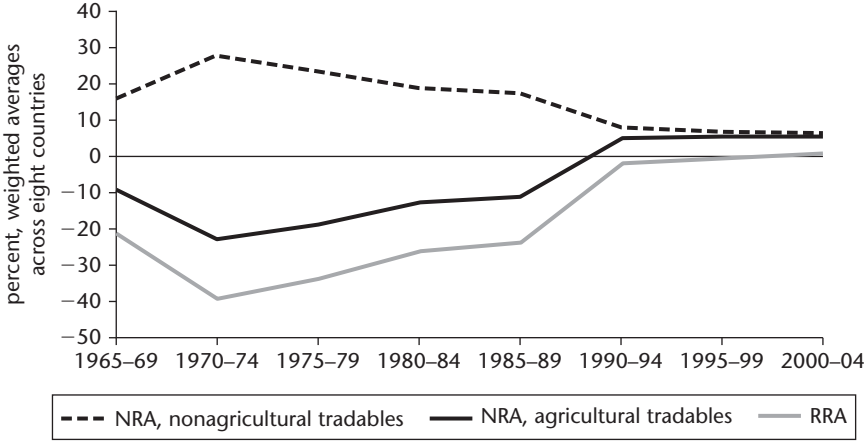
Source: Anderson and Valenzuela (2008), based on estimates reported in Anderson and Valdés (2008a).

Note: — = not available.
a. GSEs including assistance to nontradables and NPS assistance.
b. GSEs including product-specific input subsidies.

similar for nonfarm exportables, except that the actual NRAs would have been negative in most cases. Of these two elements of underestimation, the former bias probably dominated. Thus, the author estimations of the overall NRA for nonagricultural tradables should be considered a lower-bound estimate; this is especially true as one looks back in time, so that the decline indicated in the NRA estimates is less rapid than it actually would have been.[5]

Despite these methodological limitations, the estimated NRAs for nonfarm tradables prior to the 1990s are sizeable. For Latin America as a whole, the average value of the NRAs for nonfarm tradables has steadily declined throughout the past four decades as policy reforms have spread. This has therefore contributed to a decline in the estimated RRA among farmers. Thus, the RRA has fallen from below −30 percent in the 1970s to an average of −1 percent in 2000–04 (see table 7.5), and this appears (in figure 7.5) to have been caused as much by falling positive NRAs among nonfarm producers as by falling negative NRAs among farmers. The extent of the change in RRAs among individual countries over the past two decades is striking, particularly in the case of Brazil and the Dominican Republic (where negative RRAs virtually disappeared) and of Colombia (where RRAs switched from negative to positive). In figure 7.6, this is depicted by

Figure 7.5. NRAs to Agricultural and Nonagricultural Tradable Products and RRA,[a] Latin American Region, 1965–2004

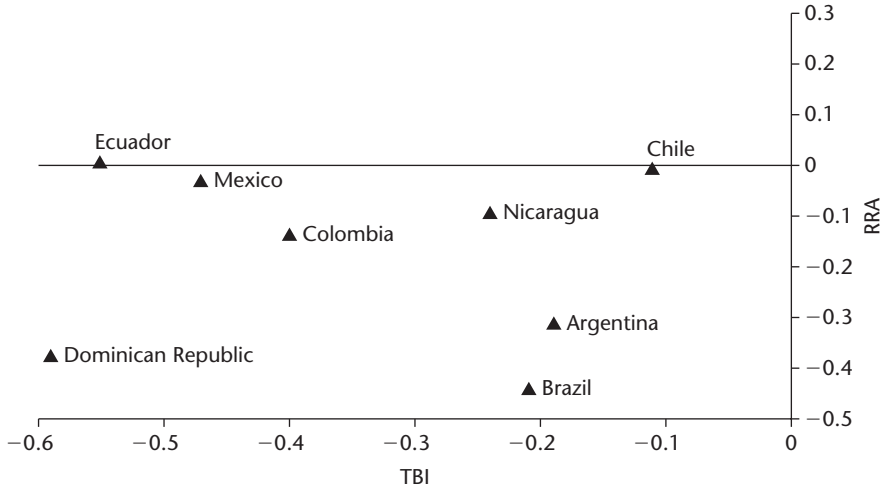


Source: Anderson and Valenzuela (2008) based on estimates reported in Anderson and Valdés (2008a).

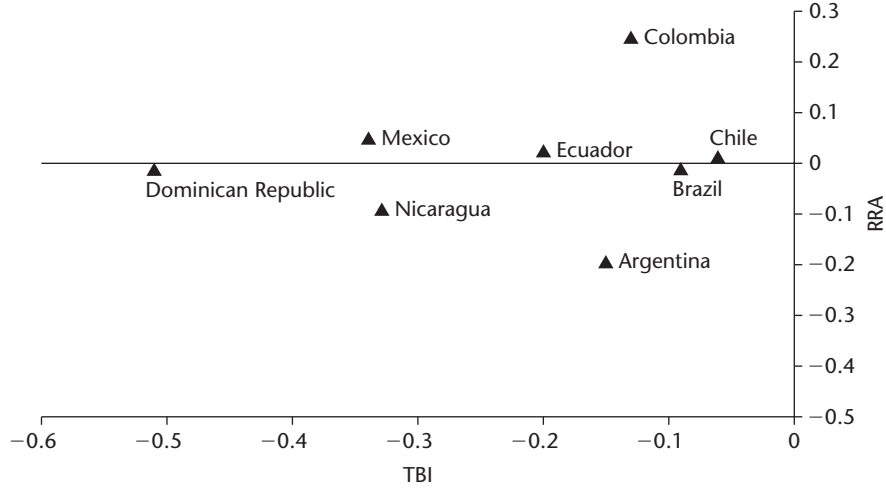
a. The RRA is defined as $100*[(100 + NRAag^t)/(100 + NRAnonag^t) - 1]$, where $NRAag^t$ and $NRAnonag^t$ are the percentage NRAs for the tradable parts of the agricultural and nonagricultural sectors, respectively.

Figure 7.6. Relationship between RRA and the TBI for Agriculture, Latin American Focus Countries, 1980–84[a] and 2000–04

a. 1980–84



b. 2000–04



Sources: Anderson and Valenzuela (2008) based on estimates reported in Anderson and Valdés (2008a).

a. Nicaragua data refer to 1991–94 in the first period.

countries being closer to the horizontal line in the middle of the figure (where RRA = 0) in 2000–04 than in 1980–84. That figure also shows some movement to the right by countries over that period, indicating the extent to which their antitrade bias within the farm sector has diminished. Were countries to have eliminated both their antiagricultural and antitrade policy biases, they would be located on the right-hand crossover of the RRA = 0 and TBI = 0 axes. Unfortunately, only Chile and Brazil were close to that point by 2004.

The CTEs of agricultural policies

The extent to which farm policies impact the retail consumer price of food and the price of livestock feedstuffs depends on a wide range of factors, including the degree of processing undertaken and the extent of competition along the value chain. Here, an attempt is made only to examine the importance of the impact of policies on the buyer's price at the level where the farm product is first traded internationally and, hence, where price comparisons are made (for example, for wheat, raw sugar, or beef).[6] To obtain weights to make it possible to sum up across commodities and countries, the volume of apparent consumption is calculated simply as production plus net imports and then valued at undistorted prices.

If there were no farm input distortions and no domestic output price distortions, such that the NRA was entirely the result of border measures such as an import or export tax, then the CTE would equal the NRA for each covered product. Because domestic distortions are relatively minor in Latin America and because the NRA tends to be positive for import-competing products and negative for exportables (until recently), this is the case for the CTE as well. The weighted average CTE for the region has thus been negative for most of the period, averaging around −15 percent until the 1990s and marginally above zero thereafter (table 7.8a). Though the variance across products is somewhat less now than before the reforms of the past two decades, it is still considerable (table 7.8b). In proportional terms, the current transfers from consumers are largest in Colombia and Ecuador, but in dollar terms they are also large in Mexico. At its peak in the 1980s, the transfer from producers to consumers in the region amounted to US$7 billion per year at the producer level for the products covered in this project, whereas, in the present decade, the average transfer occurs from consumers to producers, while the total reaches around US$6 billion per year (table 7.9a). Among the covered products, the biggest transfers are for milk, poultry, sugar, and rice (table 7.9b). Even if one were to take account also of the assistance for noncovered products, the total per capita transfer from consumers in recent years would amount to less than US$15.

Table 7.8. Percentage CTE of Policies Affecting Covered Farm Products,[a] Latin American Countries, 1965–2003
(*percent, at primary product level*)
a. Aggregate CTEs, by country

	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–03
Argentina	−27.6	−27.2	−25.2	−23.4	−16.6	−5.7	0.0	−9.1
Brazil	2.1	−25.4	−19.8	−25.8	−26.5	−23.1	−2.1	−1.3
Chile	7.1	1.5	2.8	9.0	23.8	18.1	14.2	10.7
Colombia	7.2	−13.4	−5.3	27.4	20.8	16.2	33.9	49.7
Dominican Republic	12.9	−7.1	−7.7	−27.8	−31.4	7.8	16.6	3.5
Ecuador	−10.5	−25.7	3.9	35.0	17.4	−3.3	4.6	18.5
Mexico	—	—	—	−1.3	0.8	22.3	−1.9	9.9
Nicaragua	—	—	—	—	—	10.5	10.6	9.0
Latin American focus countries:								
Unweighted average	−0.8	−16.2	−8.8	−1.0	−1.7	4.8	9.5	11.4
Weighted average[b]	−4.7	−22.1	−16.2	−13.4	−12.3	−2.7	1.4	5.1
Dispersion of national CTEs[c]	15.5	13.4	14.5	29.2	26.0	17.4	15.0	18.8

b. Regional CTEs, by product

	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–03
Rice	30	8	−10	0	6	6	19	30
Wheat	17	0	32	19	8	22	8	13
Maize	−9	−4	−13	−11	−14	−4	−8	−4
Other grains	0	0	−6	−6	−5	−3	−15	−14
Soybean	4	−5	−15	−13	−19	−10	−5	−9
Other oilseeds	0	0	−24	−22	−22	−10	−8	−17
Sugar	28	−60	−44	−54	−41	−18	8	27
Cotton	−6	−1	−14	−24	−23	−23	−7	7
Coffee	−25	−26	−32	−52	−34	−7	−10	−4
Cocoa	6	−16	−13	−4	−16	−16	−12	−7
Fruits and vegetables	8	10	−12	1	−30	−16	−22	−17
Beef	−27	−23	−14	−11	−6	−11	4	1
Pig meat	6	−14	−14	−26	−26	3	−3	4
Poultry	110	132	98	26	18	17	7	21
Egg	—	—	−10	0	−6	2	−16	−17
Milk	5	−3	18	70	54	38	28	44
Latin American focus countries:								
Weighted average[b]	−4.7	−22.1	−16.2	−13.4	−12.3	−2.7	1.4	5.1
Dispersion of regional product CTEs[d]	35.2	46.4	34.6	30.4	23.5	16.3	13.8	18.6

Source: Anderson and Valenzuela (2008), based on estimates reported in Anderson and Valdés (2008a).

Note: — = not available.

a. Assumes the CTE is the same as the NRA derived from trade measures (that is, not including any input taxes/subsidies or domestic producer price subsidies/taxes).

b. Weights are consumption valued at undistorted prices, where consumption (from FAO) is production plus imports net of exports plus change in stocks of the covered products.

c. Simple five-year average of the annual standard deviation around a weighted mean of the national average CTE.

d. Simple five-year average of the annual standard deviation around a weighted mean of the regional average CTE for the covered products shown above.

Table 7.9. Value of CTE of Policies Affecting Covered Farm Products, Latin American Countries, 1965–2003
(*constant 2000 US$ millions, at primary product level*)

a. Aggregate CTEs, by country

	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–03
Argentina	−993	−1,367	−1,442	−1,696	−903	−321	−3	−748
Brazil	18	−3,097	−3,657	−7,420	−5,849	−5,548	−133	43
Chile	−45	−214	71	176	308	318	303	180
Colombia	208	−566	−4	1,204	640	622	1218	1160
Dominican Republic	45	−24	−27	−46	−93	85	96	44
Ecuador	−104	−276	20	309	134	−42	75	350
Mexico	—	—	—	−1,358	685	16,619	2712	4,965
Nicaragua	—	—	—	—	—	22	10	20
Latin American focus countries	**−871**	**−5,545**	**−5,038**	**−8,831**	**−5,078**	**11,755**	**4,276**	**6,013**
All Latin American countries[a]	**−1,054**	**−6,846**	**−6,219**	**−10,902**	**−6,269**	**14,507**	**5,279**	**5,938**

b. Regional CTEs, by product[b]

	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–03
Rice	116	−79	−538	−371	145	156	563	535
Wheat	260	−337	1,085	1,088	−65	120	−7	−27
Maize	−272	−262	−1,012	−1,324	−1,360	695	−528	543
Other grains	1	−3	−117	−128	44	99	−11	28
Soybean	4	−184	−1,057	−906	−1,151	−1,035	240	−460
Other oilseeds	0	1	−150	−157	−152	−51	−74	−73
Sugar	29	−3,320	−2,540	−3,892	−2,009	9,666	2,092	287
Cotton	−61	−12	−356	−444	−327	−317	−67	56
Coffee	−101	−121	−300	−1,581	−512	−56	−105	−21
Cocoa	0	−3	−7	−2	−3	−2	−1	−1
Fruits and vegetables	−20	−41	−193	−136	−83	731	−46	806
Beef	−924	−1,186	−923	−2,424	−344	−268	671	115
Pig meat	4	−14	−167	−1,507	−439	26	−22	309
Poultry	44	49	231	603	303	791	462	1,231
Egg	—	—	−106	−3	−10	39	0	0
Milk	66	−35	533	2,337	881	1,157	1,110	2,682
Latin American focus countries:	**−871**	**−5,548**	**−5,616**	**−8,831**	**−5,078**	**11,755**	**4,276**	**6,013**

Source: Anderson and Valenzuela (2008) based on estimates reported in Anderson and Valdés (2008a).

a. Assumes the rate of assistance to covered products in nonfocus countries is the same as the average for the focus Latin American countries excluding Mexico, and that their share of the value of Latin American and Caribbean (excluding Mexican) agricultural production at undistorted prices is the same as their average share of the region's agricultural GDP at distorted prices during 1990–2004, which was 23 percent. These dollar amounts do not include noncovered farm products, which amount to almost one-third of agricultural output (see last row of table 7.4), nor any mark-up that might be applied along the value chain.

b. Mexico is included in the five-year product averages for 1975–79: thus, the Latin American country total is higher in absolute number than the Latin American country total in part a, which excludes Mexico in this period.

What Have We Learned?

The most salient feature of price and trade policies in the Latin American region since the 1960s is the major economic reforms, including significant trade liberalization, in most countries during the late 1980s and early 1990s. Overall levels of nonagricultural protection have declined considerably, most significantly in the industrial sector, and there have been reforms in the service sector (deregulation and privatization). Both changes have improved the competitiveness of the agricultural sector. More specifically, several features of the Latin American experience of the past 40 or more years are worth highlighting.

First, the region has seen a gradual movement away from the taxation of farmers relative to nonagricultural producers since the 1970s and the emergence of positive assistance for agriculture since the early 1990s. The gradual fall in the estimated (negative) RRA for the region, from as high as −40 percent in the early 1970s to less than −2 percent in the past decade, though not dissimilar to trends in Africa and Asia, has been nonetheless dramatic. Instead of being effectively taxed nearly US$17 billion per year, as occurred in the 1980s (or US$400 per person working in agriculture), farmers in Latin America now enjoy support of more than US$5 billion per year, or nearly US$125 per person employed on farms. An exception is Argentina, where there was a reversal of policy reform that involved a step back to direct export taxation in late 2001, though this has to be seen in the context of the massive devaluation in Argentina at the time, when the country abandoned exchange rate parity with the U.S. dollar. Thanks to the devaluation, Argentina continued to contribute to the rapid growth of Latin America's share in the global exports of farm products that was stimulated by the gradual elimination of antiagricultural policies.

Second, dispersion in average NRAs and RRAs across Latin America for farmers has not diminished much despite the reforms in all countries. This means there is still significant scope for reducing distortions in the region's use of resources in agriculture. This finding also indicates that political economy forces are at work in each country and that these are not changing greatly relative to the situation in other countries over time.

Third, the dispersion in NRAs among farmers within each Latin American country examined here has also not diminished much. This result means there is still scope for reducing distortions in resource use within agriculture even in countries with an average *NRAag* and an RRA close to zero. As in other regions, the products in Latin America showing the highest rates of distortion and GSE values are rice, sugar, and milk.

Fourth, the strong antitrade bias in assistance rates within the farm sector remains in place. In the 1970s, the NRA for import-competing farm industries

averaged close to zero in the region. Since then, it has increased to an average of around 20 percent, while the NRA for agricultural exportables has become less negative. The fact that the average NRAs for import-competing and exportable agricultural industries have risen almost in parallel means that the antitrade bias has not fallen much. This may be understandable from a political economy viewpoint, but it nonetheless means that resources are not being allocated efficiently within the farm sector and—because openness tends to promote economic growth—that total factor productivity growth in agriculture is slower than it would be if the remaining interventions were removed.

Fifth, the most important instruments of farm assistance or taxation continue to be trade-restrictive measures. Domestic taxes and subsidies on farm inputs and outputs and NPS have made only minor contributions to the estimates of NRAs for Latin America.

Sixth, because the agricultural taxation or assistance is mostly due to trade measures, movements in the CTE closely replicate changes in farm support or taxation, which means that, before the reforms, food prices were kept artificially low (though in recent years, food prices have been above international levels, on average). It also means there is considerable variation in CTEs across products and across countries in the region. CTEs are highest for milk, rice, and sugar, but are negative, on average, for maize, beef, and soybeans. The current level of taxation on food consumers in the region as a whole is small, though, amounting to less than US$15 per capita per year.

And seventh, the decline in negative RRAs has been caused as much by cuts in protection in nonagricultural sectors as by reforms in agricultural policies. This underscores the fact that the reductions in distortions in agricultural incentives in the region have been part of a series of economy-wide reform programs and have not been caused merely by farm policy reforms.

Poverty and Policy Implications

The assistance trends surveyed in this chapter are, in one sense, encouraging for economic policy advisors: the long period of encouraging import substitution in the industrial sector and of taxing primary exports, which so heavily discriminated against the agricultural sector in Latin America, has been largely relegated to history. However, as the above summary of the findings makes clear, this does not mean that policies are no longer distorting agricultural incentives. If Latin America follows the policy path chosen by more advanced economies—increasing agricultural assistance as per capita incomes rise—there may be even more distortion in the future. This suggests that vigilance

will be needed among economic policy advisors in the years to come. Meanwhile, the opposite policy problem remains in Argentina, where explicit export taxation was reintroduced in late 2001 and has been increased a number of times in the years since.

Neither taxes on agricultural imports to reduce import competition for the benefit of poor farmers, nor taxes on agricultural exports to lower the cost of food for the urban poor, is the most efficient way to reduce poverty (Winters, McCulloch, and McKay 2004). Poverty-reducing objectives are laudable, but trade policy instruments are almost never the best way to achieve them. On the contrary, food trade taxes have the potential to worsen poverty, depending on the earning and spending patterns of poor households and on the alternative tax-raising instruments available. Far more preferable would be microeconomic reforms to mitigate the deep-seated structural problems affecting the competitiveness of factor and goods markets. This is because the reforms have accentuated the differences between commercially oriented farmers and farmers who are less prepared to take advantage of the economic liberalization. Although countries have adopted various policies to mitigate the human costs of economic adjustment (especially since the mid-1990s), adverse effects on rural poverty and traditional agriculture were often left behind (Spoor 2000; Valdés and Foster 2007). Though many Latin American countries have implemented social safety net programs, such as direct income transfers and conditional cash transfers, to aid all poor people (including families in agriculture), the challenge for the years ahead is to improve the coverage and effectiveness of poverty alleviation programs. Beyond reducing poverty, such programs are important because they contribute to investing in human capital and act as a form of compensation to reduce the political obstacles to further economic reforms.

Notes

1. The economic indicators quoted in this section are from the first nine tables in the appendix to Anderson and Valdés (2008a), based predominately on data compiled from the World Bank's 2008 World Development Indicators Database and the FAOSTAT Database by Sandri, Valenzuela, and Anderson (2007).

2. Annual estimates and additional details may be found in the appendix to Anderson and Valdés (2008a).

3. Other reasons for exchange rate misalignment are discussed in some country studies, but they are not quantified. Several country studies document the significant instability of real exchange rates, which has important influences on the relative profitability of tradable versus nontradable products. Furthermore, some countries, Brazil in particular, tend to have a highly unstable nominal exchange rate because of short-term speculative trading and the effect of political uncertainties on producer incentives. For the purposes of this project and the reasons given in Anderson et al. (2008a, 2008b), however, these these tendencies are not considered policy distortions.

4. The distortions in the prices of the inputs in the production of nonfarm goods have also been ignored, again in contrast to the treatment of price distortions in estimating agricultural NRAs.

5. This bias is accentuated in cases in which distortions to exchange rates are not included, as noted in the methodology section. Exchange rate distortions have been included only in the studies on the Dominican Republic, Ecuador, and Nicaragua, and these economies are too small for their inclusion to affect noticeably the weighted average NRAs and RRAs for the region as a whole.

6. The consumer tax at the retail level is probably smaller in percentage terms but larger in value terms, because of the addition of marketing margins in the processing, distribution, and retail parts of the value chain.

References

Anderson, K., M. Kurzweil, W. Martin, D. Sandri, and E. Valenzuela. 2008a. "Methodology for Measuring Distortions to Agricultural Incentives." Agricultural Distortions Working Paper 02, Development Research Group, World Bank, Washington, DC (and appendix A of this volume).

_____. 2008b. "Measuring Distortions to Agricultural Incentives, Revisited." *World Trade Review* 7 (4): 1–30.

Anderson, K., and A. Valdés. 2008a. "Distortions to Agricultural Incentives in Latin America and the Caribbean." Agricultural Distortions Working Paper 70, World Bank, Washington, DC.

_____, eds. 2008b. *Distortions to Agricultural Incentives in Latin America*, Washington, DC: World Bank.

Anderson, K., and E. Valenzuela. 2008. *Global Estimates of Distortions to Agricultural Incentives, 1955 to 2007*. Core database at http://www.worldbank.org/agdistortions.

de Ferranti, D., G. Perry, W. Foster, D. Lederman, and A. Valdés. 2005. *Beyond the City: The Rural Contribution to Development*. Washington, DC: World Bank.

FAOSTAT Database. Food and Agriculture Organization of the United Nations. http://faostat.fao.org/default.aspx (accessed December 2007).

FAO SUA-FBS Database (Supply Utilization Accounts and Food Balance Sheets Database, FAOSTAT). Food and Agriculture Organization of the United Nations. http://faostat.fao.org/site/354/default.aspx (accessed December 2007).

Krueger, A. O., M. Schiff, and A. Valdés. 1988. "Agricultural Incentives in Developing Countries: Measuring the Effect of Sectoral and Economywide Policies." *World Bank Economic Review* 2 (3): 255–72.

_____. 1991. *Latin America*. Volume 1 of *The Political Economy of Agricultural Pricing Policy*. Baltimore: Johns Hopkins University Press; Washington, DC: World Bank.

Prebisch, R. 1950. "The Economic Development of Latin America and its Principal Problems." Document E/CN.12/89/Rev.1, United Nations, New York, NY.

_____. 1959. "Commercial Policy in Underdeveloped Countries." *American Economic Review, Papers and Proceedings* 49 (2): 251–73.

_____. 1964. "Towards a New Trade Policy for Development: Report by the Secretary-General of the United Nations Conference on Trade and Development." Document E/CONF.46/3, United Nations, New York, NY.

Sandri, D., E. Valenzuela, and K. Anderson. 2007. "Economic and Trade Indicators for Latin America, 1960 to 2004." Agricultural Distortions Working Paper 19, World Bank, Washington, DC.

Schultz, T. W. 1964. *Transforming Traditional Agriculture*. New Haven, CT: Yale University Press.

Spoor, M. 2000. "Two Decades of Adjustment and Agricultural Development in Latin America and the Caribbean." LC/L.1352-P/I, Economic Reforms Series 56, United Nations Economic Commission for Latin America and the Caribbean, Santiago, Chile.

Valdés, A., and W. Foster. 2007. "The Breadth of Policy Reforms and the Potential Gains from Agricultural Trade Liberalization: An Ex Post Look at Three Latin American Countries." In *Key Issues for a*

Pro-Development Outcome of the Doha Round. Volume 1 of *Reforming Agricultural Trade for Developing Countries*, ed. Alex F. McCalla and John Nash, 244–96. Washington, DC: World Bank.

Winters, L. A., N. McCulloch, and A. McKay. 2004. "Trade Liberalization and Poverty: The Evidence So Far." *Journal of Economic Literature* 42 (1): 72–115.

World Bank. 2007. *World Development Report 2008: Agriculture for Development,* Washington, DC: World Bank.

_____. 2008. World Development Indicators Database. World Bank. http://go.worldbank.org/B53SONGPA0 (accessed December 2007).

8

SUB-SAHARAN AND NORTH AFRICA

*Kym Anderson and William A. Masters**

In the 1960s and 1970s, many African governments had macroeconomic, sectoral, and trade policies that increasingly favored urban households at the expense of farm households, and the production of importable goods at the expense of exportables (Krueger, Schiff, and Valdés 1988, 1991). Similar biases were also prevalent elsewhere, but rarely to the same extent as in Africa. The magnitude of pro-urban (antiagricultural) and also pro-self-sufficiency (antitrade) interventions matters greatly for economic development, because agriculture is the main employer for the poor and is often a key export sector. Changes in these biases could help explain Africa's development experience, including the continent's slow pace of poverty alleviation and economic growth especially in the 1970s and 1980s, and its subsequent recovery since then.

Much progress has been made in recent years in reducing the antiagricultural and antitrade biases of policy in Africa, and these changes have been associated with faster economic growth and poverty alleviation. Many price distortions remain, however, and with 60 percent of Sub-Saharan Africa's workforce still employed in agriculture and more than 80 percent of the region's poorest households depending directly or indirectly on farming for their livelihoods (World Bank 2007; Chen and Ravallion 2007), agricultural and trade policies are still key influences on the pace and direction of change in Africa.

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This chapter summarizes a set of case studies measuring distortions within and across countries over time. No attempt is made here to summarize the voluminous literature on policy and economic growth in Africa, the most recent major continental study being Ndulu et al. (2008). This chapter also makes no attempt to summarize the literature dealing with public investment or economic growth strategies more broadly, which was addressed recently by Spence et al. (2008). The goal is more narrowly defined—simply, to compare quantitative indicators of the past with recent agricultural price policies.

Including Africa in this global study is crucial for several reasons. First, the continent is home to many of the world's poorest people. In 2006, the region accounted for less than 2 percent of global gross domestic product (GDP) and exports and just 4 percent of agricultural GDP, but it also accounted for 12 percent of the world's farmers, 16 percent of agricultural land, and 28 percent of those living on less than US$1 a day (World Bank 2008). Second, it is the region where output and income growth has been slowest over the past half century, especially on a per capita basis. And third, it is where sectoral and macroeconomic (including exchange rate) policies have been among the most heavily interventionist, dampening the contribution of market incentives to growth. There is thus much to be learned from examining the policy history of the region, and there is great potential for poverty alleviation if market-friendly, growth-enhancing policies are adopted and the recent large increase in development assistance funds is used wisely to complement and strengthen market forces.

The African part of this study is based on a sample of 21 countries. It includes the Arab Republic of Egypt, the most populous and poorest country in North Africa, plus five countries of East Africa (Ethiopia, Kenya, Sudan, Tanzania, and Uganda), five countries in Southern Africa (Madagascar, Mozambique, South Africa, Zambia, and Zimbabwe), five large economies in West Africa (Cameroon, Côte d'Ivoire, Ghana, Nigeria, and Senegal), and five smaller economies of West and Central Africa for which cotton is a crucial export (Benin, Burkina Faso, Chad, Mali, and Togo), and for which price distortions are estimated for just cotton and four nontraded food staples. In 2000–04, these economies (aside from Egypt) together accounted for around 90 percent of the agricultural value added, farm households, total population, and total GDP of Sub-Saharan Africa. Estimates of distortions are provided for as many years and products as data permit, amounting to an average of 43 years and nine crop or livestock products per country. The covered products account for more than two-thirds of the value of most countries' agricultural production.

The 21 focus economies in Africa examined here accounted for only 1.3 percent of worldwide GDP but 11 percent of the world's farmers in 2000–04. These and related shares are detailed in table 8.1, which reveals the considerable diversity

Table 8.1. Key Economic and Trade Indicators, African Focus Countries, 2000–04

	Share (%) of world: National relative to world (world = 100)								
	Population	Total GDP	Agricultural GDP	GDP per capita	Agricultural land per capita	RCA[a] agriculture and food	TSI[b]	Poverty[c]	Gini index[d]
Benin	0.12	0.01	0.09	7	55	1,034	—	31	39
Burkina Faso	0.19	0.01	0.09	5	111	953	—	29	40
Cameroon	0.25	0.03	0.38	13	74	445	—	15	45
Chad	0.14	0.01	0.07	5	695	—	—	—	—
Côte d'Ivoire	0.28	0.04	0.21	12	139	722	—	18	48
Egypt, Arab Rep. of	1.13	0.26	1.11	23	6	175	—	2	34
Ethiopia	1.08	0.02	0.23	2	58	958	—	12	30
Ghana	0.33	0.02	0.2	6	88	748	—	17	41
Kenya	0.52	0.04	0.29	8	103	636	—	12	43
Madagascar	0.28	0.01	0.1	5	202	670	—	63	47
Mali	0.2	0.01	0.1	5	353	624	—	39	40
Mozambique	0.3	0.01	0.08	4	324	359	−0.03	30	47
Nigeria	1.98	0.15	1.09	8	73	3	—	71	44
Senegal	0.17	0.02	0.09	10	94	444	—	13	41

(*Table continues on the following page.*)

Table 8.1. Key Economic and Trade Indicators, African Focus Countries, 2000–04 (*continued*)

	Share (%) of world: National relative to world (world = 100)								
	Population	Total GDP	Agricultural GDP	GDP per capita	Agricultural land per capita	RCA[a] agriculture and food	TSI[b]	Poverty[c]	Gini index[d]
South Africa	0.73	0.42	0.39	59	275	134	0.52	9	58
Sudan	0.55	0.05	0.5	8	490	209	—	—	—
Tanzania	0.58	0.03	0.33	5	166	800	0.73	56	35
Togo	0.09	0	0.05	5	80	407	—	—	—
Uganda	0.42	0.02	0.15	4	60	938	0.8	83	46
Zambia	0.18	0.01	0.07	7	398	194	0.35	60	51
Zimbabwe	0.21	0.04	0.14	18	200	602	0.83	62	50
African focus countries	9.73	1.21	5.74	13	145	—	—	—	—
All Sub-Saharan Africa	9.37	0.98	4.93	10	164	—	0.55	41	—
All North Africa	2.34	0.70	2.81	30	84	—	-0.78	—	—
All Africa	11.71	1.67	7.74	14	148	—	0.20	32	—

Source: Sandri, Valenzuela, and Anderson (2007), compiled mainly from World Bank 2008.

Note: — = not available.

a. Revealed comparative advantage = share of agriculture and processed food in national exports as a ratio of that sector's share of global exports.

b. Primary agriculture trade specialization index (TSI) = (X − M)/(X + M), 2000–02 (world average = 0).

c. Percentage of population living on < US$1/day, from Chen and Ravallion (2007).

d. Gini index for the most recent year available between 2000 and 2004, from World Bank 2008.

within the region in terms of stages of economic development, resource endowments, trade specialization, poverty incidence, and income inequality. The countries are also very diverse in political and social development terms, and thus offer important opportunities for comparative study. Averages presented here all include South Africa, where per capita national income is more than four times larger than the other focus countries, but where income inequality is also among the highest in the world.

The extent of poverty decline in Sub-Saharan Africa has been disappointing relative to other developing-country regions. Over the 1981–2004 period, the number of Sub-Saharan African people living on less than US$1 per day (in 1993 purchasing power parity terms) grew from 168 million to 298 million. As a percent of the population, the number of people in extreme poverty rose to 47 percent in 1990, then stabilized and eventually declined to 41 percent by 2004, marginally below the 42 percent level of 1981. More than two-thirds of that decline in poverty incidence over the past decade or so has been in rural areas, while most of the rest is explained by the rural poor moving to urban centers where their incomes may rise above the dollar-a-day threshold but many remain very poor. The African experience contrasts strongly with that of Asia, where even in South Asia the proportion of the population living on less than US$1 a day has fallen from one-half to less than one-third (Chen and Ravallion 2007).

Policy choices have played an important role in observed rates of economic growth, structural change, and poverty alleviation in Africa. Many countries had increasingly severe antiagricultural and antitrade biases in the 1960s and 1970s, which contributed to farmers' poverty, especially in the 1970s. Subsequent reforms varied widely in terms of starting date, speed, and extent of policy change. The switch to policies that are less biased against farmers and trade began in some countries by the late 1970s but in many others only in the 1980s or even later. The transition is ongoing, often with periods of stalling and even reversal, the most notable recent example being Zimbabwe. Agricultural price distortions are not the only target of policy reform of course, but they are a key aspect of economic policy in most African countries.

This chapter begins with a brief summary of economic growth and structural changes in the region since the 1950s and of agricultural and other economic policy developments as they affected the farm sector at the time of and in various stages after independence from colonial powers. The chapter then summarizes estimates of the nominal rate of assistance (NRA) and the relative rate of assistance (RRA) to farmers delivered by national farm and nonfarm policies over the past several decades, as well as the impact of these policies on the consumer prices of farm products, using the project's methodology (Anderson et al. 2008a, 2008b). The final sections point to what has been learned and draw out implications of the

findings, including for poverty and inequality and for possible future directions of policies affecting agricultural incentives in Africa.

Growth and Structural Change[1]

Between 1980 and 2004, per capita GDP for the 21 focus countries in Africa grew at just 0.7 percent per year. This was half the global average of 1.4 percent and a small fraction of Asia's 5.5 percent, so per capita incomes in Africa have fallen well below the income levels of other countries, especially those in Asia. The difference is due mainly to nonfarm growth, since agricultural GDP growth per capita was about the same in Africa as in other regions (0.6 percent in Africa compared with 0.5 percent for the world as a whole).

The aggregate, long-term experience, though, masks large variation over time and across countries. Most notably, Africa experienced a sharp decline in agricultural output per capita from the early 1970s through the late 1980s, followed thereafter by a decline in total national income per capita. Both indicators stabilized and then shifted upward in the 1990s. More recently, during 2000–06, per capita GDP growth averaged 4.7 percent in Sub-Saharan Africa compared with 3 percent for the world as a whole (World Bank 2007).

Trends in GDP are closely linked to changes in Africa's export volumes since the early 1960s. Exports grew at relatively slow rates in Africa compared with the global average of 6.1 percent, causing the region's share of global exports to halve. However, as African economies have gradually opened up, the share of exports in GDP has reversed its decline and began rising in several countries.

Though African economies are slowly recovering from their decline during the 1970s and 1980s, only a few countries have achieved substantial restructuring away from agriculture and toward other activities. About one-quarter of the focus countries have seen their shares of agriculture in GDP actually increase over the entire 1965–69 to 2000–04 period. In nearly three-quarters of the focus countries, agriculture's share of GDP is more than 25 percent; it is more than 40 percent in Cameroon, Chad, and Ethiopia. The share of overall employment accounted for by farming activities has fallen in all focus countries but generally remains above 50 percent, which is much higher than farmers' share of GDP. These data underscore the relatively low incomes of farm households, and hence the continued importance of agricultural prices for social welfare.

Agriculture is particularly important as a source of exports in Africa, accounting for more than 70 percent of merchandise exports in Benin, Burkina Faso, Ethiopia, Tanzania, and Uganda during 2000–04. Agriculture's share of merchandise exports has actually risen in three of the focus African countries (Benin, Zambia, and Zimbabwe), though it has declined elsewhere partly because of rises

in other primary exports, such as petroleum in Sudan, and partly because of growth in exports of manufactured goods, for example in Kenya, Madagascar, and Senegal. Such nonfarm exports have grown even faster in other regions, however, so the index of revealed agricultural comparative advantage (defined as the share of agriculture and processed food in national exports as a ratio of the share of such products in worldwide merchandise exports) has risen in most of the focus countries. The exceptions are Nigeria and Sudan, which have newly exploited mineral or energy deposits.

While most African countries have an increasing level of revealed comparative advantage in agricultural exports, there is also rising domestic demand for farm output. During colonial times, production was heavily export oriented. At the start of the independence period in 1961–64, the total value of agricultural output was about 120 percent of consumption; that ratio has since declined to around 105 percent. The share of farm production that is exported has fallen from nearly 20 percent to just 8 percent, and the share of imports in domestic consumption of farm products has doubled, from 2 to 4 percent.

The Evolution of Agricultural Trade Policies

The trends in growth and development described above are closely linked to economic policies pursued by African governments. Before independence, most of Africa had been ruled since the 19th century by foreign powers whose explicit objective was to control trade, both for political reasons and to extract revenue. Interventions were typically managed through licensed monopolies, marketing boards, and restrictions on Africans' labor mobility, property ownership, and market participation. The few countries not ruled by a foreign power were controlled by a local aristocracy or immigrant minority whose economic policies were similarly repressive, as in Ethiopia, South Africa, and Zimbabwe.

Majority rule came to Africa much later than to any other major region of the world, and it arrived in the 1960s at a time when central planning was widely seen as a promising strategy for economic development. The newly independent, elected governments typically kept the marketing boards and other instruments for intervention that had been developed by previous administrations, simply expanding their mandate to cover more people and larger regions of the country. Their stated goals were to be more inclusive and serve a larger fraction of the African population than the exclusive licensing and limited mandates of colonial institutions. The new governments also adopted new criteria for public employment, with staffing priorities that reflected electoral politics instead of colonial interests. Both changes led to large increases in the public payroll and fiscal expenditure. These steps were often underwritten by foreign donors, including the

former colonial powers plus other industrialized countries and oil exporters. Project aid and budget support grew rapidly, especially in the 1970s when loans were available at zero or negative real interest rates. These capital inflows covered growing fiscal deficits, current-account imbalances, and increasingly overvalued foreign exchange rates. In general, inflation was kept low, as governments chose to ration credit and foreign exchange rather than expand the money supply, although a few countries, such as Ghana and Zimbabwe, have experienced hyperinflation.

African governments' use of externally funded, state-controlled development strategies seemed promising at the time. Many countries around the world were adopting similar approaches. Western aid to support economic interventions also helped counter the growing influence of the Soviet Union, which had supported African liberation movements against colonialism. In retrospect, it is evident that communist powers helped Africans pursue political freedoms they denied to their own people, while lenders and donors of aid helped Africans maintain economic controls they would never have tolerated at home. The net result was a substantial rise in the degree of African governments' economic intervention during the 1960s and 1970s, from the severe but targeted controls of colonial administrations to the more generalized attempts at state-led development of independently elected governments.

The growth of African government intervention during the 1960s and 1970s had two major consequences. First, it fueled political instability, offering the incentives and the means for incumbents and their rivals to seize power and exploit government institutions. Some elected leaders were overthrown by force, while others became increasingly despotic and only a few allowed peaceful transitions. Political opportunism among both elected and self-appointed leaders compounded the second consequence of economic intervention, which was to weaken market institutions, distort economic incentives, and slow the pace of poverty alleviation. It is not known how fast African economies might have grown under different economic policies in the 1960s and 1970s, but the nature and extent of historical interventions was clearly associated with some degree of reduced growth and worsening poverty.[2]

In the 1980s, African governments faced mounting pressures for public-sector reform, triggered by a sudden rise in world real interest rates, and combined with global recession that worsened Africa's terms of trade. Domestic political concerns intensified, and governments found it increasingly difficult to finance the growing fiscal deficits associated with intervention. Lenders of last resort such as the World Bank and International Monetary Fund (IMF) made their aid conditional on devaluation, deregulation, privatization, and retrenchment. The Washington-based institutions used similar criteria for their clients throughout the

developing world, following the "Washington Consensus" reform agenda described by Williamson (1990).

Trade policy reforms in the 1980s and 1990s were heavily influenced by structural adjustment programs sponsored by the World Bank and the IMF. Loan conditions were widely debated and often blamed for the economic stresses that accompanied them, but the actual implementation of reforms was typically slow and often subject to reversal or offsetting policy changes. Senegal, for example, took out the first World Bank structural adjustment loan (SAL) in 1980 and received its last such loan in 1992 before switching to other instruments, such as a private sector adjustment credit received in 2004. The last African loan to have the term "structural adjustment" in its title was made to Mali in 2005.[3] By then, the focus of World Bank–IMF conditionality had shifted to national Poverty Reduction Strategy Papers (PRSPs), a mechanism designed to involve a broader range of stakeholders and a wider variety of government activities than had been involved in the SALs. The process was initiated in 1999, and as of mid-2008 a total of 33 African countries had some sort of PRSP on record with the World Bank and the IMF.[4] Of the 21 focus economies, the only countries without one are Egypt, Sudan, and Zimbabwe.

Africa is a large and diverse continent, divided into more than 50 sovereign nations with widely varying circumstances. Some of the smaller countries have had very distinctive policy and growth experiences. Botswana, Lesotho, and Swaziland, for example, had no choice but to maintain free trade in a customs union with their much richer and more powerful neighbor, South Africa. This enforced openness probably facilitated convergence toward South Africa's income level, helping them achieve Africa's fastest rates of poverty alleviation through the 1970s and 1980s. Other small countries, such as Cape Verde and Mauritius, experienced rapid economic growth due in part to high levels of migration, remittances, and capital flows. Africa's larger countries, including all of the 21 focus economies, have had relatively interventionist governments and slow poverty alleviation in this period, followed by reform and a degree of recovery. Studies of African economies customarily emphasize the diversity among countries, an extremely important point. There are also striking patterns across countries, as found in previous studies such as Ndulu et al. (2008). The new data presented below reveal both diversity and clear trends in policy choices.

Measuring Rates of Assistance and Taxation

The magnitude of government interventions affecting farmers and food consumers is quantified here using the common methodology (Anderson et al. 2008a, 2008b) that has been adopted by the authors of this volume and the four preceding

regional volumes in this series. After a brief description of that methodology, a summary of results follows.[5]

Methodology

The NRA is defined as the percentage by which government policies have raised gross returns to farmers above what they would be without the government's intervention. Similarly, the consumer tax equivalent (CTE) is the percentage by which policies have raised prices paid by consumers of agricultural outputs.[6] Negative NRA and CTE values imply net taxation of farmers or net subsidies to consumers. The NRA and CTE will be identical if the sole source of government intervention is a trade measure and the two are measured at the same point in the value chain, but in general there will also be some domestic producer or consumer taxes or subsidies to differentiate them. The NRAs are based on estimates of assistance to individual industries at the farmgate. The targeted degree of coverage of the products for which agricultural NRA estimates are generated is 70 percent of the gross value of farm production at undistorted prices. The authors of the country case studies also provide guesstimates of the NRAs for noncovered farm products. For countries with non-product-specific (NPS) agricultural subsidies or taxes, such net subsidies are added to product-specific assistance to obtain NRAs for total agriculture and also for tradable agriculture for use in generating an RRA.

Farmers are affected not only by the prices of their own outputs, but also (albeit indirectly, because of the changes to factor market prices and the exchange rate) by the incentives nonagricultural producers face. In other words, both absolute but relative prices—and hence, relative rates of government assistance—affect producer incentives. If one assumes that there are no distortions in the markets for nontradables and that the value shares of agricultural and nonagricultural nontradable products remain constant, the economy-wide effect of distortions to agricultural incentives may be captured by the extent to which the tradable parts of agricultural production are assisted or taxed relative to producers of other tradables (Vousden 1990, following Lerner 1936). By generating estimates of the average NRA for nonagricultural tradables, it is then possible to calculate an RRA, which is defined in percentage terms as: $\text{RRA} = 100[(1 + NRAag^t/100)/(1 + NRAnonag^t/100)\ 1]$, where $NRAag^t$ and $NRAnonag^t$ are the weighted average percentage NRAs for the tradable parts of the agricultural and nonagricultural sectors, respectively. Since the NRA cannot be less than −100 percent if producers are to earn anything, neither can the RRA. If both these sectors are assisted equally, the RRA is zero. This measure is useful in that, if it is below (or above) zero, it provides an internationally comparable indication of the extent to which a country's policy regime has an antiagricultural or proagricultural bias.

In calculating the NRA for producers of agricultural and nonagricultural tradables, this methodology seeks to include distortions generated by dual or multiple exchange rates. These have been important in many African countries, particularly during the 1970s and 1980s, making their estimated (typically) positive NRAs for importables and (typically) negative NRAs for exportables larger than they otherwise would have been.

Dollar values of farmer assistance and consumer taxation are obtained by multiplying the NRA estimates by the gross value of production at undistorted prices, to obtain an estimate in U.S. dollars of the direct gross subsidy equivalent (GSE) of assistance to farmers. The GSEs are then summed across products for a country and across countries for any or all products to get regional aggregate transfer estimates for the studied economies. GSE values are calculated in constant dollars, and are also expressed on a per-farm-worker basis.

To obtain comparable dollar value estimates of the consumer transfer, the CTE estimate at the point at which a product is first traded is multiplied by consumption (obtained from the Food and Agriculture Organization's [FAO's] supply and utilization database) valued at undistorted prices to obtain an estimate in constant U.S. dollars of the tax equivalent to consumers (TEC) of primary farm products. This too is summed across products for a country, and across countries for any or all products, to get regional aggregate transfer estimates for the covered farm products of the African focus countries.

Estimates of NRAs in agriculture

Agricultural price, trade, and exchange rate policies have reduced the earnings of African farmers quite substantially, especially prior to the 1980s.[7] The average rate of taxation on all agricultural production, as measured by the weighted average NRA, was less than 8 percent at the time many African countries achieved independence in the early 1960s, and then almost doubled to a peak around 15 percent in the 1970s, as interventions became more severe (table 8.2). Reforms have since reduced the average extent of taxation to below its level of the early 1960s, including a brief period in the late 1980s when a combination of policy reforms and low international commodity prices brought the weighted average NRA to near zero. Such averages hide considerable diversity within the region, particularly in South Africa, where net protection of farmers rose during the 1970s and early 1980s and declined thereafter, opposite of the trend in the Africa-wide average.

A visual impression of the variation across countries and the extent of reforms between 1975–79 and 2000–04 is provided in figure 8.1, showing clearly the major reduction in taxation rates facing farmers in countries such as Cameroon, Ghana, Madagascar, Senegal, and Tanzania. That figure also shows the transition from

Table 8.2. NRAs to Agriculture,[a] African Focus Countries, 1955–2004[c]
(percent)

	Region	1955–59	1960–64	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–04
Cameroon	West	—	−2.9	−6.0	−7.4	−14.4	−11.2	−2.4	−1.1	−1.3	−0.1
Côte d'Ivoire	West	—	−23.5	−29.3	−28.1	−30.8	−32.2	−24.3	−19.5	−20.0	−24.5
Egypt, Arab Rep. of	North	−23.2	−33.9	−37.7	−37.5	−15.9	−9.2	56.6	−6.1	4.0	−6.1
Ethiopia	East	—	—	—	—	—	−17.5	−22.3	−24.4	−17.8	−11.2
Ghana	West	−4.4	−9.0	−19.8	−14.9	−25.6	−21.2	−6.3	−1.7	−3.0	−1.4
Kenya	East	26.6	23.0	9.7	−11.8	−1.7	−18.6	10.5	−5.8	2.4	9.3
Madagascar	South	0.2	−5.9	−11.1	−13.5	−27.1	−38.8	−18.2	−5.4	−2.9	1.0
Mozambique	South	—	—	—	—	−34.5	−25.2	−32.0	−2.7	3.9	12.4
Nigeria	West	—	20.7	11.9	6.7	6.3	9.4	8.2	3.9	0.4	−5.4
Senegal	West	—	−9.3	−7.2	−22.4	−22.7	−20.5	4.7	5.6	−6.1	−7.5
South Africa	South	—	4.1	9.4	−0.7	3.8	22.9	11.7	10.8	5.7	−0.1
Sudan	East	−11.7	−20.4	−31.8	−43.4	−24.3	−29.3	−35.4	−47.8	−24.5	−11.9
Tanzania	East	—	—	—	—	−41.8	−56.3	−45.3	−25.2	−23.2	−12.4
Uganda	East	—	−1.8	−3.1	−7.8	−17.6	−6.2	−6.8	−0.6	0.5	0.4
Zambia	South	—	—	−22.4	−15.8	−37.3	−2.7	−58.9	−30.8	−28.6	−28.5
Zimbabwe	South	16.9	−27.2	−25.5	−26.0	−28.6	−24.0	−24.1	−24.9	−20.8	−38.7
African focus countries:											
Unweighted average[b]		−0.3	−7.8	−12.5	−12.9	−15.5	−13.7	−8.9	−8.7	−6.6	−6.0
Weighted average[a]		−13.6	−7.7	−11.3	−14.7	−12.7	−7.9	−1.0	−8.9	−5.7	−7.3
Dispersion of individual country NRAs[c]		20.8	13.4	15.1	14.3	17.1	21.2	29.5	16.1	12.3	13.5

Source: Anderson and Valenzuela (2008) based on estimates reported in the appendix and in Anderson and Masters (2008).

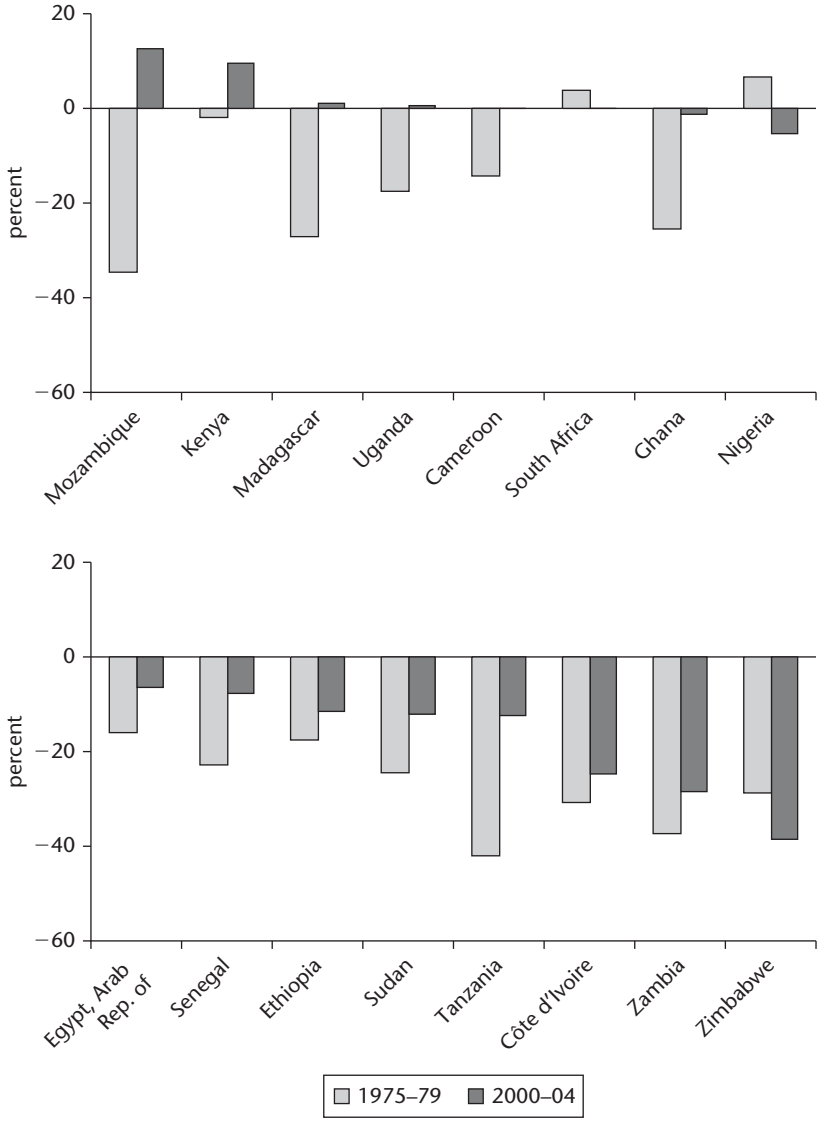
Note: — = not available.

a. Weighted average for each country, including product-specific output and input distortions and NPS assistance as well as authors' guesstimates for noncovered farm products, with weights based on gross value of agricultural production at undistorted prices. Cameroon, Côte d'Ivoire, Nigeria, Senegal, Uganda, and Zambia data under 1960–64 are for 1961–64; Tanzania data under 1975–79 are for 1976–79; and Ethiopia data under 1980–84 are for 1981–84.

b. The unweighted average is the simple average across the 16 countries of their national NRA (weighted) average NRAs.

c. Dispersion is a simple five-year average of the annual standard deviation around a weighted mean of the national agricultural sector NRAs each year.

Figure 8.1. NRAs to Agriculture, Individual African Focus Countries and Unweighted Regional Average, 1975–79 and 2000–04[a]



Source: Anderson and Valenzuela (2008), based on estimates reported in the appendix and in Anderson and Masters (2008).

a. Ethiopia data for the first period refer to 1981–84, as 1975–79 data are unavailable.

taxation to support of farmers in Mozambique and Kenya, as well as the transition from slight support to taxation in Nigeria, and the continuing heavy degree of taxation in Côte d'Ivoire, Zambia, and Zimbabwe.

One important type of variation in distortions is the within-country dispersion of product NRAs, as measured in table 8.3 by the standard deviation around the weighted mean NRA for covered agricultural products in each period. This dispersion was highest in 1985–89, when many reforms were only partly completed, but even after the recent reforms it is no lower than it was at the beginning of the period. The dispersion of NRAs within African countries is an important target for reform, whatever the level of average NRA.

Variation among products has a somewhat similar pattern across countries. Figure 8.2 shows the pattern of dispersion in the regionwide average NRA among the key farm commodities in the late 1970s and a quarter century later. As in other regions of the world, assistance is among the highest for sugar and milk, and is most negative for tropical cash crops such as coffee, cotton, cocoa, and tobacco. The dispersion over a wider range of products and the full time period is summarized in table 8.4.

A third type of variation is cross-country diversity of national average NRAs. This is evident from the bottom of table 8.2: NRA averages for the agricultural sector became more similar between the latter 1950s and the early 1970s, then less similar until the latter 1980s, and then more similar again, so that by 2000–04 this type of dispersion was back to what it had been in the early 1960s.

The fourth important type of variation is differential treatment of import-competing and exportable products, in a way that often favors self-sufficiency. The extent of antitrade bias is shown, in figure 8.3, as the gap between average NRAs for import-competing and exportable products. This gap grew from the 1950s through to the 1980s. It has since narrowed again, due mainly to changes in taxation of exportables, but the gap is still sizeable. This is summarized in the trade bias index (TBI) reported for Africa as a whole in the middle row of table 8.5.

Decomposing the NRA into components reveals a subtle but important influence on the aggregate average. Since the late 1970s, the share of tradable farm products that are exportables has fallen from two-thirds to just over one-half (from 67 to 54 percent). Many governments tax trade in both directions, with negative NRAs for exportables and positive NRAs for importables, so the changing composition of African agriculture from exportable to importable helps drive the aggregate NRA toward zero. This compositional effect adds to the changes within the exportables and import-competing subsectors illustrated in figure 8.3. In the African context, product-specific input price distortions contributed very little to the sectoral NRA estimates, and in many cases the case-study authors reported no values at all. Interventions in domestic markets also contributed relatively little.

Table 8.3. Dispersion of NRAs across Covered Agricultural Products,[a] African Focus Countries, 1955–2004
(percent)

	1955–59	1960–64	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–04
Cameroon	—	13.5	18.0	21.8	29.0	20.6	17.2	16.1	13.0	7.5
Côte d'Ivoire	—	25.1	28.0	33.1	46.2	33.3	33.1	26.2	23.4	33.1
Egypt, Arab Rep. of	21.9	14.7	17.1	21.3	32.2	31.9	89.6	33.0	28.7	22.1
Ethiopia	—	—	—	—	—	26.4	28.2	28.0	29.1	23.6
Ghana	9.8	17.2	29.9	29.0	47.9	69.6	56.3	26.2	17.2	25.5
Kenya	33.2	26.0	30.7	20.5	26.5	22.3	23.6	23.4	24.7	25.6
Madagascar	—	31.3	24.7	24.6	37.5	39.2	42.0	39.1	30.3	22.5
Mozambique	—	—	—	—	34.8	36.0	40.3	28.6	33.4	37.9
Nigeria	—	112.9	95.4	94.2	89.9	92.0	94.4	83.2	72.7	53.2
Senegal	—	20.3	16.1	33.5	44.5	38.2	58.8	67.1	14.3	18.6
South Africa	25.7	17.9	19.1	25.3	31.6	42.7	35.0	31.8	20.3	20.3
Sudan	34.2	34.9	34.1	36.2	40.0	31.7	54.4	75.3	41.2	63.2
Tanzania	—	—	—	—	38.6	39.1	41.3	46.5	47.3	51.9
Uganda	—	7.8	11.6	28.5	47.0	39.3	40.5	7.8	6.6	6.9
Zambia	—	14.5	29.6	26.6	36.1	34.8	35.4	39.2	36.1	38.1
Zimbabwe	74.6	71.0	47.3	36.9	27.7	28.1	24.4	25.2	25.3	33.9
African focus countries:										
Unweighted average[b]	33.2	31.3	30.9	33.2	40.6	39.1	44.7	37.3	29.0	30.2
Product coverage[c]	68	73	72	72	70	67	66	66	66	68

Source: Anderson and Valenzuela (2008) based on estimates reported in the appendix and in Anderson and Masters (2008).

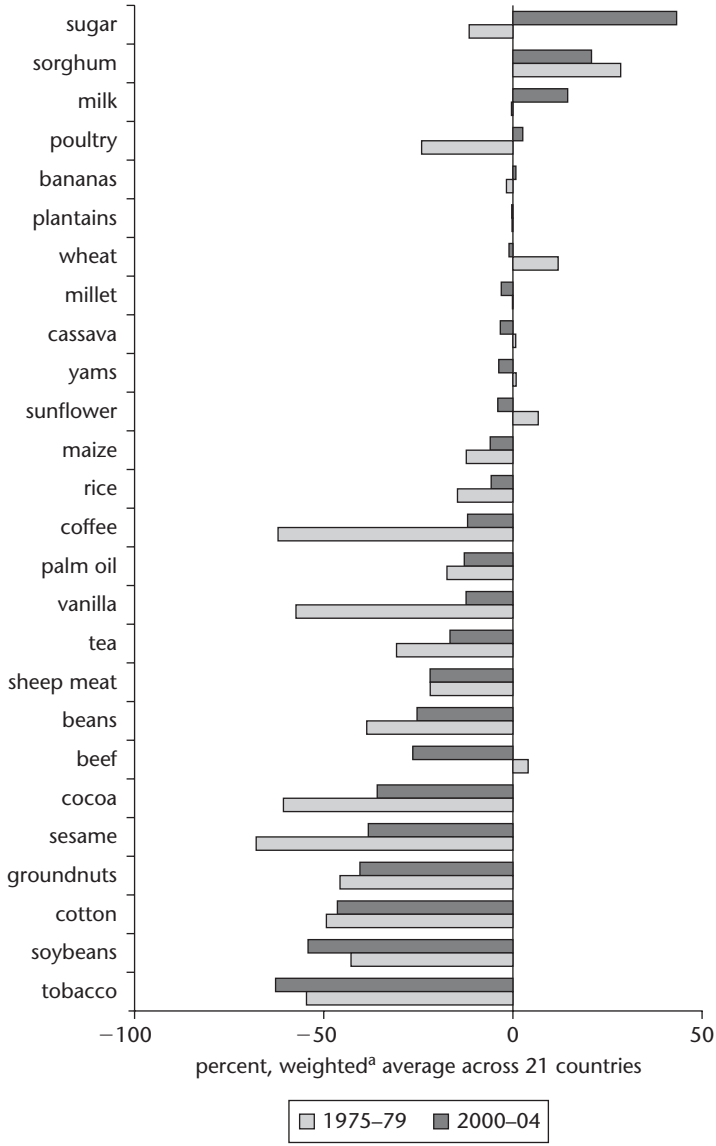
Note: — = not available.

a. Dispersion for each country is a simple five-year average of the annual standard deviation around a weighted mean of NRAs across covered products each year. Cameroon, Côte d'Ivoire, Nigeria, Senegal, Uganda, and Zambia data under 1960–64 are for 1961–64; Tanzania data under 1975–79 are for 1976–79; and Ethiopia data under 1980–84 are for 1981–84.

b. The unweighted average is the simple average across the 16 countries of their five-year simple average dispersion measures.

c. Share of gross value of total agricultural production, valued at undistorted prices, accounted for by covered products.

Figure 8.2. NRAs, Key Covered Products, African Focus Countries, 1975–79 and 2000–04



Source: Anderson and Valenzuela (2008), based on estimates reported in the appendix and in Anderson and Masters (2008).

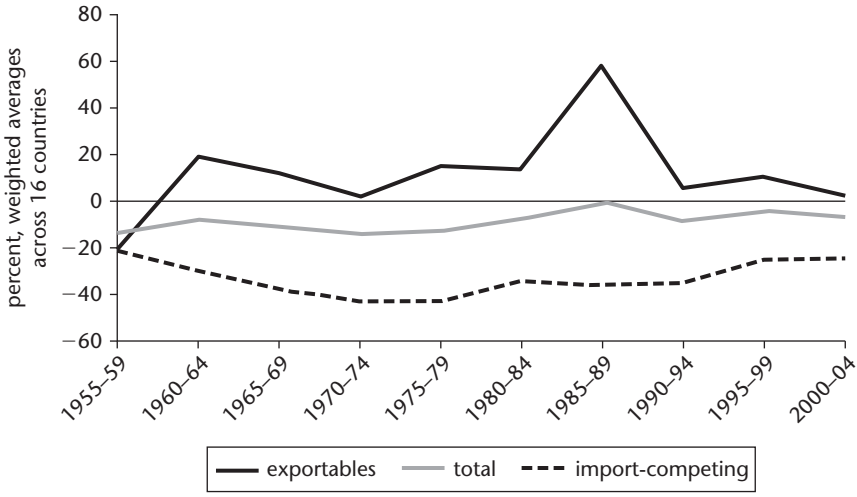
a. Weights based on gross value of agricultural production at undistorted prices, with each NRA (by country, by product) weighted by the country's value of production of that commodity in a given year.

Table 8.4. NRAs, Key Covered Farm Products, All African Focus Countries,[a] 1955–2004
(percent)

	1955–59	1960–64	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–04
Bananas	—	−2	−4	0	−2	−1	−1	3	5	1
Beans	—	6	2	−3	−39	−53	−66	−25	−24	−25
Beef	−13	−21	−29	−37	4	11	23	−38	−1	−26
Cassava	0	0	0	0	1	2	1	−1	−3	−3
Cocoa	−14	−27	−54	−48	−60	−52	−36	−35	−32	−36
Coffee	−11	−27	−36	−44	−62	−53	−42	−37	−21	−12
Cotton	−16	−41	−53	−54	−49	−43	−31	−54	−38	−46
Groundnuts	−29	−27	−38	−51	−46	−44	−17	−30	−36	−40
Maize	−4	12	3	−7	−12	1	38	8	2	−5
Milk	−35	−22	−32	−42	−1	−22	67	−27	−8	15
Millet	−77	−19	−6	−4	−1	1	0	1	−3	−2
Palm oil	—	−25	−31	−44	−17	−25	−12	108	41	−13
Plantains	0	0	0	0	0	0	0	0	0	0
Poultry	—	−13	−13	−16	−24	18	−3	6	13	3
Rice	−62	−38	−39	−22	−14	−14	29	0	−8	−5
Sesame seeds	−40	−53	−64	−65	−68	−60	−48	−48	−50	−38
Sheep meat	−12	−14	−18	−22	−21	−20	−37	−49	−45	−21
Sorghum	−35	62	87	49	28	17	41	37	23	21
Soybeans	—	—	−14	−30	−43	−43	−40	−53	−50	−54
Sugar	−22	−6	11	−24	−11	−1	42	2	7	44
Sunflower seeds	—	15	17	6	7	16	7	6	−6	−4
Tea	3	9	−7	−20	−30	−34	−29	−40	−28	−16
Tobacco	—	−42	−38	−45	−54	−47	−48	−38	−34	−63
Vanilla	—	−62	−53	−39	−57	−76	−85	−78	−28	−13
Wheat	−13	−27	−13	−6	12	−5	19	4	1	−1
Yams	0	0	0	0	1	1	0	−1	−4	−3
All covered products	**−19.9**	**−13.0**	**−17.8**	**−22.1**	**−20.3**	**−12.1**	**0.9**	**−12.4**	**−6.6**	**−8.9**

Source: Anderson and Valenzuela (2008), based on estimates reported in the appendix and in Anderson and Masters (2008).

Figure 8.3. NRAs to Exportable, Import-Competing, and All[a] Agricultural Products, African Region, 1955–2004



Source: Anderson and Valenzuela (2008), based on estimates reported in the appendix and in Anderson and Masters (2008).

a. The total NRA can be above or below the exportable and importable averages because assistance to nontradables and NPS assistance is also included.

Most of the region's measured NRA is due to border measures, which are largely trade taxes, quantitative trade restrictions, and the operations of parastatal trading companies.

In absolute terms, the total value of taxes on farming has been substantial. Africa's antiagricultural bias in NRA terms peaked in the late 1970s, but the sector has since grown, so that in constant 2000 U.S. dollars the total value of annual transfers from farmers has risen from around US$2 billion in the early 1960s (taking account of the fact that NRAs were available for only four-fifths as much agricultural production then as from 1980) to US$10 billion in the 1970s, and back to around US$6 billion in the 1980s (ignoring the mid-1980s period when international prices were at record lows), 1990s, and 2000–04 (see bottom row of table 8.6a). The distribution across countries is shown in figure 8.4a, where it is clear that the major transfers in recent years have been from farmers in Ethiopia and Sudan in the East, Zimbabwe in the South, and Côte d'Ivoire and Nigeria in the West. What is also clear from that figure is how much decline there has been since the latter 1970s in such transfers, particularly in Egypt and Tanzania but also in many smaller African economies. For Africa as a whole, the latest estimate is equivalent to a gross tax of US$40 per year for each person engaged in agriculture,

Table 8.5. NRAs to Agricultural Relative to Nonagricultural Industries, African Region, 1955–2004
(percent)

a. Unweighted averages

	1955–59	1960–64	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–04
NRA, covered products	0.0	−14.5	−19.3	−20.2	−24.8	−20.5	−11.6	−13.3	−9.1	−8.9
NRA, noncovered products	0.6	1.0	−0.4	−0.8	−1.3	−1.5	−3.8	−3.5	−3.0	−2.9
NRA, all agricultural products	−1.8	−10.0	−14.2	−14.7	−17.0	−15.4	−10.1	−10.7	−7.1	−6.5
Total agricultural NRA (including NPS)[b]	−0.3	−7.8	−12.5	−12.9	−15.5	−13.7	−8.9	−8.7	−6.6	−6.0
TBI[c]	−0.11	−0.35	−0.40	−0.33	−0.41	−0.34	−0.41	−0.24	−0.19	−0.21
Assistance to just tradables:										
All agricultural tradables[b]	3.1	−10.9	−19.7	−20.6	−26.2	−21.5	−13.9	−13.9	−9.3	−9.4
All nonagricultural tradables	18.8	13.1	12.6	23.5	27.0	27.3	23.0	18.8	15.2	14.5
RRA[a]	−13.2	−21.2	−28.7	−35.5	−41.8	−38.2	−29.7	−27.5	−21.2	−20.9
Memo, ignoring exchange rate distortions:										
Total agricultural NRA	7.0	−6.1	−8.4	−13.0	−13.6	−13.1	−7.6	−9.8	−8.5	−8.6
TBI, all agricultural products	0.00	−0.16	−0.13	−0.03	0.11	0.29	0.45	−0.03	−0.03	1.31
RRA[a]	−8.3	−17.1	−21.5	−27.8	−31.3	−28.7	−18.8	−23.8	−20.7	−19.6

(*Table continues on the following page.*)

Table 8.5. NRAs to Agricultural Relative to Nonagricultural Industries, African Region, 1955–2004 (*continued*)
(percent)

b. Weighted averages

	1955–59	1960–64	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–04
NRA, covered products	−19.9	−13.0	−17.8	−22.1	−20.3	−12.1	0.9	−12.4	−6.6	−8.9
NRA, noncovered products	0.5	3.6	1.8	−0.2	−0.3	−3.3	−7.6	−4.8	−5.1	−5.2
NRA, all agricultural products	−14.0	−8.4	−12.2	−15.6	−13.8	−9.5	−2.0	−10.0	−6.1	−7.7
Total agricultural NRA (including NPS)[b]	−13.6	−7.7	−11.3	−14.7	−12.7	−7.9	−1.0	−8.9	−5.7	−7.3
TBI[c]	0.00	−0.41	−0.45	−0.44	−0.50	−0.43	−0.60	−0.39	−0.33	−0.26
Assistance to just tradables:										
NRA, all agricultural tradables[b]	−24.1	−13.3	−19.6	−25.0	−22.1	−13.5	−0.3	−15.4	−8.7	−12.0
NRA, all nonagricultural tradables	19.5	3.7	2.7	1.5	5.7	1.6	9.2	2.7	2.0	7.3
RRA[a]	−36.5	−15.2	−21.4	−26.0	−25.9	−13.1	−8.3	−17.1	−10.4	−18.0
Memo, ignoring exchange rate distortions:										
Total agricultural NRA	−10.3	−5.2	−7.3	−11.6	−8.9	−3.7	5.6	−6.7	−5.6	−6.2
TBI, all agricultural products	0.03	−0.14	−0.17	−0.16	−0.29	−0.05	−0.26	−0.01	0.30	0.20
RRA[a]	−26.7	−9.7	−13.4	−17.7	−17.0	−2.7	5.9	−12.7	−11.8	−16.1

Source: Anderson and Valenzuela (2008), based on estimates reported in the appendix and in Anderson and Masters (2008).

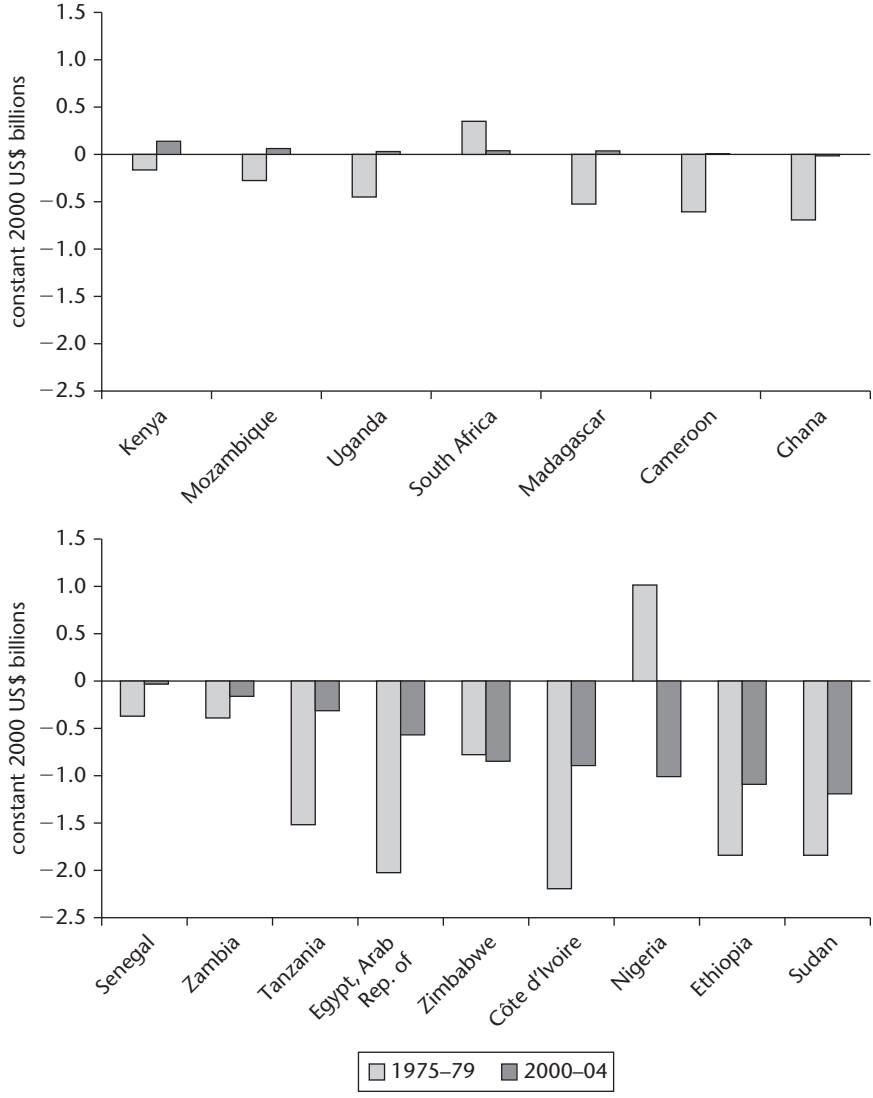
a. RRA is defined as $100*[(100 + NRAag^t)/(100 + NRAnonag^t) - 1]$, where $NRAag^t$ and $NRAnonag^t$ are the percentage NRAs for the tradables parts of the agricultural and nonagricultural sectors, respectively.

b. NRAs including NPS assistance, that is, the assistance to all primary factors and intermediate inputs as a percentage of the total primary agricultural production valued at undistorted prices.

c. TBI = $(1 + NRAag_x/100)/(1 + NRAag_m/100)$ 1, where $NRAag_m$ and $NRAag_x$ are the average percentage NRAs for the import-competing and exportable parts of the agricultural sector. The regional average TBI is calculated from the regional averages of the NRAs for exportable and import-competing parts of the agricultural sector.

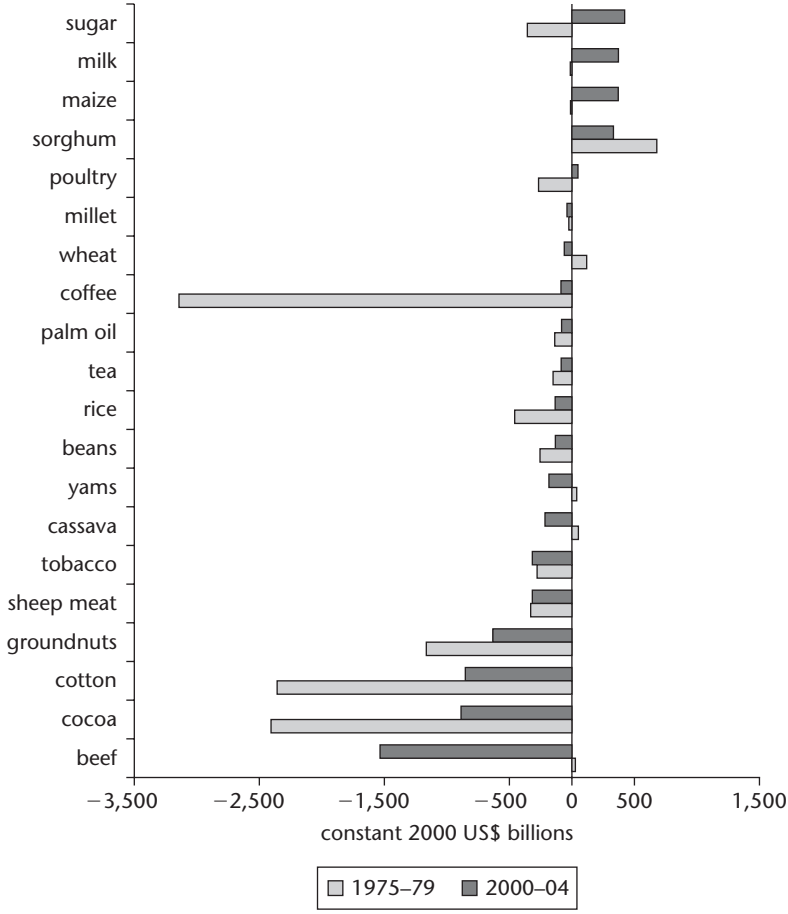
Figure 8.4. GSEs of Assistance to Farmers, African Focus Countries,[a] 1975–79 and 2000–04

a. Total per country



(*continued*)

b. Total per product



Source: Anderson and Valenzuela (2008), based on estimates reported in the appendix and in Anderson and Masters (2008).

down from more than three times that amount in the 1970s (bottom row of table 8.6b), but still larger than government investment or foreign aid targeted to agriculture (Masters 2008). As shown in table 8.7 and figure 8.4b, the burden of taxation was imposed mainly through the three major export cash crops (cocoa, coffee, and cotton), plus groundnuts, beef, rice, and sugar in the 1970s. Three decades later those cash crops are still the main source of transfer from agriculture, while sugar and milk have become positively assisted.

In summary, the level and dispersion of agricultural NRAs confirm that there has been substantial reform toward less distortion of incentives. However, they also suggest that there are still many opportunities for policy changes that would

Table 8.6. GSEs of Assistance to Farmers, Total and Per Farm Worker, African Focus Countries,[a] 1955–2004

a. Total (*constant 2000 US$ millions*)

	1955–59	1960–64	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–04
Benin	—	—	—	−8	−4	−5	−3	−13	−17	−4
Burkina Faso	—	—	—	−5	−11	−12	−5	−10	−13	0
Cameroon	—	−83	−174	−263	−636	−274	−48	−33	−39	−4
Chad	—	—	—	−20	−25	−15	−2	−7	−8	−1
Côte d'Ivoire	—	−406	−603	−742	−2,223	−1,535	−1,047	−752	−878	−911
Egypt, Arab Rep. of	−1,561	−2,472	−3,348	−4,153	−2,046	−1,204	5,348	−582	354	−571
Ethiopia	—	—	—	—	—	−1,863	−2,392	−2,188	−2,096	−1,113
Ghana	−103	−188	−350	−334	−727	−404	−91	−28	−78	−34
Kenya	137	162	75	−134	−157	−408	168	−77	35	140
Madagascar	2	−84	−185	−358	−555	−579	−239	−73	−39	10
Mali	—	—	—	−12	−28	−22	−11	−18	−31	2
Mozambique	—	—	—	—	−280	−198	−120	−20	51	55
Nigeria	—	2,193	1,176	867	986	2,198	1,402	794	96	−1,034
Senegal	—	−76	−54	−234	−377	−220	45	37	−31	−42
South Africa	—	186	500	−300	330	2,067	853	841	456	14
Sudan	−344	−686	−1,200	−2547	−1,861	−2,373	−2,984	−3,633	−1,848	−1,210
Tanzania	—	—	—	—	−1,525	−1,062	−665	−322	−576	−330
Togo	—	—	—	−1	−2	−6	−4	−7	−7	−3
Uganda	—	−36	−64	−199	−462	−144	−111	−12	18	14
Zambia	—	—	−149	−112	−388	−31	−396	−178	−197	−158
Zimbabwe	39	−347	−305	−475	−779	−602	−533	−536	−467	−851
African focus countries	**−1,829**	**−1,838**	**−4,682**	**−9,030**	**−10,770**	**−6,691**	**−834**	**−6,817**	**−5314**	**−6031**

(*Table continues on the following page.*)

Table 8.6. GSEs of Assistance to Farmers, Total and Per Farm Worker, African Focus Countries,[a] 1955–2004 (*continued*)

b. Per person engaged in agriculture (*constant 2000 US$*)

	1961–64	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–04
Benin	—	—	−8	−4	−4	−2	−9	−11	−3
Burkina Faso	—	—	−2	−3	−3	−1	−2	−3	0
Cameroon	−35	−71	−102	−241	−99	−16	−10	−11	−1
Chad	—	—	−12	−14	−7	−1	−3	−3	0
Côte d'Ivoire	−275	−368	−402	−1,072	−644	−382	−250	−280	−292
Egypt, Arab Rep. of	−363	−459	−535	−250	−144	672	−75	43	−67
Ethiopia	—	—	—	—	—	—	−107	−94	−45
Ghana	−86	−149	−130	−248	−120	−23	−6	−15	−6
Kenya	41	17	−27	−27	—	—	−8	3	11
Madagascar	−34	−67	−116	−162	−151	−56	−15	−7	2
Mali	—	—	−4	−9	−6	−3	−5	−7	0
Mozambique	—	—	—	−53	−34	−21	−3	7	7
Nigeria	174	86	60	69	153	96	54	6	−68
Senegal	−55	−35	−137	−196	−103	19	14	−11	−13
South Africa	75	197	−122	156	1,097	442	440	250	8
Sudan	−176	−292	−574	−381	−432	−482	−539	−255	−156
Tanzania	—	—	—	−196	−121	−65	−27	−43	−22
Togo	—	—	−2	−3	−7	−4	−7	−7	−2
Uganda	−10	−15	−42	−88	−24	−16	−2	2	2
Zambia	—	−106	−71	−215	−15	−164	−65	−67	−52
Zimbabwe	−225	−180	−249	−363	−244	−182	−161	−132	−237
African focus countries	**−29**	**−68**	**−120**	**−134**	**−77**	**−9**	**−55**	**−39**	**−41**

Source: Anderson and Valenzuela (2008), based on estimates reported in the appendix and in Anderson and Masters (2008).

Note: — = not available.

a. Cameroon, Côte d'Ivoire, Nigeria, Senegal, Uganda, and Zambia data under 1960–64 are for 1961–64; Tanzania data under 1975–79 are for 1976–79; and Ethiopia data under 1980–84 are for 1981–84. Farmer numbers are from U.N. Food and Agriculture Organization Statistics Database (FAOSTAT) which may differ from national statistics.

be both pro-poor and progrowth, for raising income for low-income farmers, and for improving resource allocation within and between countries.

Assistance to nonfarm sectors and RRAs

The antifarm policy biases of the past were due not just to agricultural policies, but also to policies affecting mobile resources engaged in other sectors. For example, to the extent that protection to manufacturing also has declined over time, the relative burden on agriculture has diminished even more than the agricultural NRA suggests.

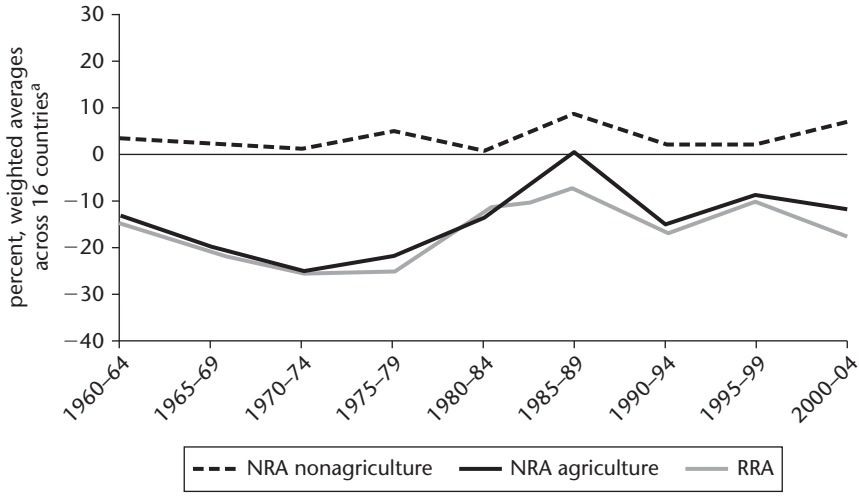
This study aims to capture the intersectoral effects through using the NRA on nonagricultural products to generate the RRA between farm and nonfarm activities. The case studies are focused mainly on agricultural policy, and their NRAs for the nonfarm sector typically are measured simply using data on applied trade taxes rather than price comparisons. As a result, unlike for farm NRAs, the estimated nonfarm NRAs usually do not include the effects of quantitative trade restrictions that were significant in earlier decades but have been relaxed in recent times. The nonfarm NRAs also do not capture distortions in the services sectors, some of which now produce tradables or use resources that are mobile between sectors. It is not possible, therefore, to be confident that the estimated NRAs for nonfarm activities are smaller and decline less rapidly than in fact was the case, and that the RRA estimates understate the past level of antifarm bias.

Even though the estimates of the NRA for nonfarm tradables should be considered lower-bound estimates, they turn out to be quite large. Their unweighted average among the African focus countries rose from around 12 percent in the 1960s to 27 percent during 1975–84 before declining to around 15 percent during the most recent decade or so. As a result, the unweighted RRA is lower and dips even more (to −42 percent) in the middle of the studied period than does the NRA for agriculture, before returning at the end of the period to around the −20 percent it was in the early 1960s (figure 8.5).

CTEs of agricultural policies

If there were no farm input distortions and no domestic output price distortions, so that the NRA is entirely the result of border measures such as an import or export tax or restriction, and there were no domestic consumption taxes or subsidies in place, the CTE would equal the NRA for each covered product. But such domestic distortions are nevertheless present in several African countries. Also, the value of consumption weights used in obtaining the CTEs are quite different from the value of production weights used for obtaining weighted average NRAs

Figure 8.5. NRAs to Agricultural and Nonagricultural Tradable Products and RRA,[a] Africa Region, 1960–2004



Source: Anderson and Valenzuela (2008), based on estimates reported in the appendix and in Anderson and Masters (2008).

a. The RRA is defined as 100*[(100 + $NRAag^t$)/(100 + $NRAnonag^t$) − 1], where $NRAag^t$ and $NRAnonag^t$ are the percentage NRAs for the tradables parts of the agricultural and nonagricultural sectors, respectively. The five small cotton-exporting countries of West and Central Africa are not included here.

(both measured at undistorted prices). Hence, the average CTEs are quite diferent from the average NRAs for numerous countries, particularly those exporting cash crops in order to import staple foods. This can be seen by comparing the country and product CTEs in table 8.7 with the corresponding NRAs in table 8.2. Nonetheless, the weighted average CTE for the region has moved much like the NRA: starting at around −10 percent at the time of independence, falling to −17 percent (that is, a 17 percent consumer subsidy equivalent) by the early 1970s, and then gradually lessening and eventually reaching close to zero (with a blip in the latter 1980s when Egypt overshot in its reform efforts to reduce the suppression of domestic food prices just when the international price of food fell to record low levels). The variance in national CTEs within countries also rose before the reforms and fell after the latter 1980s (see table 8.7 including the bottom row).

In dollar terms, the subsidies to consumers of farm products in Africa are largest in Sudan and Ethiopia, while the tax on consumers historically has been largest in Nigeria and South Africa. Prior to its reforms in the 1980s, Egypt was also a huge subsidizer of food consumers. The transfer, on average, from producers to consumers in the region amounted in 2000–04 to around US$1.7 billion per

Table 8.7. Percentage CTE of Policies Assisting Producers of Covered Farm Products,[a] African Focus Countries,[d] 1961–2004

(percent, at primary product level)

	1961–64	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–04
Benin	—	—	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Burkina Faso	—	—	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cameroon	−0.4	−0.7	−1.3	−3.7	−3.7	−1.1	−0.4	−0.2	0.0
Chad	—	—	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Côte d'Ivoire	−9.4	−20.1	−8.4	3.8	−10.8	−3.9	−4.6	−4.3	−3.8
Egypt, Arab Rep. of	−47.1	−49.5	−49.6	−20.8	−12.3	109.5	−2.7	13.9	−2.8
Ethiopia	—	—	—	—	−15.2	−17.6	−20.3	−12.1	−10.0
Ghana	−2.1	−4.4	−2.5	−4.6	1.7	10.2	4.0	0.8	2.8
Kenya	26.1	21.3	−12.8	20.7	26.0	14.8	−14.6	12.0	18.7
Madagascar	−15.9	−22.1	−19.2	−26.2	−42.4	−13.4	−1.2	−1.9	4.0
Mali	—	—	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mozambique	—	—	—	−50.5	−39.6	−53.4	−3.6	5.5	31.1
Nigeria	31.2	23.1	14.0	9.0	4.3	15.2	5.6	7.4	0.9
Senegal	−10.8	−10.3	−30.2	−25.2	−18.3	32.0	31.9	−6.0	−7.0

(*Table continues on the following page.*)

Table 8.7. Percentage CTE of Policies Assisting Producers of Covered Farm Products,[a] African Focus Countries,[d] 1961–2004 (*continued*)

(percent, at primary product level)

	1961–64	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–04
South Africa	4.0	10.2	−0.2	6.7	29.8	14.7	8.6	6.6	−0.6
Sudan	−15.2	−28.9	−41.8	−16.8	−24.2	−30.1	−47.7	−21.2	−5.2
Tanzania	—	—	—	−42.0	−53.7	−41.3	−17.5	−23.1	−8.8
Togo	—	—	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Uganda	−1.0	−1.8	−1.1	−1.3	1.0	−0.9	0.3	1.7	1.3
Zambia	−26.7	−38.5	−46.3	−54.3	−20.8	−68.0	−54.4	−30.5	−31.3
Zimbabwe	−28.7	−35.4	−40.1	−53.7	−39.4	−37.1	−42.4	−36.6	−63.7
African focus countries:									
Unweighted average	−7.4	−12.1	−13.3	−12.7	−10.4	−3.3	−7.6	−4.2	−3.6
Weighted average[b]	−7.8	−11.8	−16.6	−8.7	−6.1	15.5	−8.2	−0.5	−3.2
Dispersion of national CTEs[c]	21.3	22.8	19.8	22.7	21.6	40.6	19.9	13.9	17.9

Source: Anderson and Valenzuela (2008), based on estimates reported in the appendix and in Anderson and Masters (2008).

Note: — = not available.

a. Assumes the CTE is the same as the NRA derived from trade measures (that is, not including any input taxes/subsidies or domestic producer price subsidies/taxes).

b. Weights are consumption valued at undistorted prices, where consumption (from FAO) is production plus imports net of exports plus change in stocks of the covered products.

c. Simple five-year average of the annual standard deviation around a weighted mean of the national average CTE.

d. Cameroon, Côte d'Ivoire, Nigeria, Senegal, Uganda, and Zambia data under 1960–64 are for 1961–64; Tanzania data under 1975–79 are for 1976–79; and Ethiopia data under 1980–84 are for 1981–84.

year, which is only one-third (when expressed in 2000 U.S. dollars) the annual average transfer in the 1970s. Among the covered products, the diversity in measures across the continent means that there are no obvious stand-out products, unlike in other regions, where the biggest transfers are from consumers to producers of milk, rice, and sugar.

The link between antifarm and antitrade policies

A visual picture of the overall finding that distortions have been reduced substantially since the 1970s is provided in figure 8.6. That figure shows values of agriculture's TBI on the horizontal axis, and its RRA on the vertical axis. An economy with no antiagricultural bias (RRA = 0) and no antitrade bias within the farm sector (TBI = 0) would be located at the intersection of the two axes in the upper right corner. In 1975–79, South Africa was the only economy anywhere near that point, and most other Sub-Saharan African economies were far to the southwest of it. In 2000–04, by contrast, Kenya and Nigeria were also close to that neutrality point, and all the other countries shown were far closer than they were in the 1970s. This is not to say there are few distortions left within the agricultural sector, though, because RRA and TBI values in the range of −20 to −40 and −0.2 to −0.4, respectively, are not small and because there is still a wide dispersion of product NRAs in most countries' agricultural sectors. Note also from figure 8.6 that the 2000–04 values fit roughly along a 45-degree line, as the tax burden on agriculture in these countries consists primarily of taxes on trade.

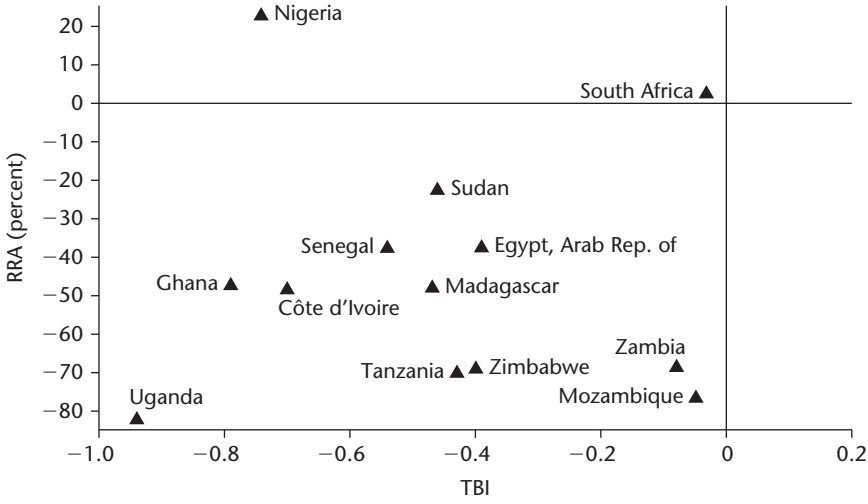
International spillovers and multilateral agreements

Though the distortion estimates take each country's border prices as given, in reality each country's policies do have some small effect on other countries' prices. An import restriction that raises domestic prices will lower prices elsewhere, while an export tax that lowers domestic prices will raise them elsewhere. In addition, attempts by one country to stabilize its domestic prices over time will reduce the stability of international prices. As a result, each country's openness to trade contributes to an international public good, offering other countries more favorable and often more stable border prices. This is a classic collective action problem, calling for a multilateral agreement to lock in freer trade policies.

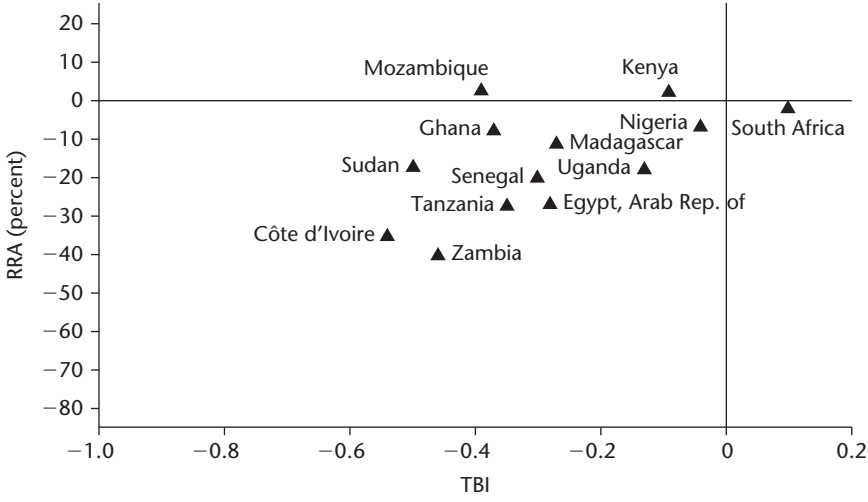
Collective action to stabilize world prices is precisely what was sought during the General Agreement on Tariffs and Trade's (GATT's) Uruguay Round Agreement on Agriculture, via tariff bindings and disciplines on administered domestic prices. Tariff bindings can reduce the extent of spillovers by restricting the range over which tariffs can increase in response to low prices. World Trade Organization

Figure 8.6. Relationship between RRA and the TBI for Agriculture, African Focus Countries, 1975–79 and 2000–04

a. 1975–79



b. 2000–04



Source: Anderson and Valenzuela (2008), based on estimates reported in the appendix and in Anderson and Masters (2008).

(WTO) bindings, however, are so far above applied import tariffs that this discipline on food-importing members in years of low international prices is very weak. The most recent stage of the Doha Round of WTO-sponsored multilateral trade negotiations broke down in mid-2008 because many developing countries were calling for policy space in the form of a special safeguard mechanism that would have allowed even more scope for limiting imports, something richer members of the organization, including the United States, were not willing to sanction in a new agreement. Moreover, there is no corresponding GATT/WTO discipline on food export restrictions, which, as 2008 starkly revealed, can be problematic in years of high international prices.

Africa's share of world trade is so small that its policies contribute relatively little to the collective action problem described earlier, except to the extent that African governments have sided with such countries as Indonesia and India in demanding special safeguards and thereby delayed or prevented the emergence of a new WTO agreement. As the victim rather than perpetrator of international agricultural policy spillovers, however, Africa could benefit greatly from a more effective system of multilateral trade rules. International trade agreements may also help African governments undertake reforms that would not otherwise be possible, allowing them to make commitments and assemble coalitions that could not otherwise be sustained. The details of WTO and other international agreements are outside the scope of this book, but generally the results presented here regarding national policies suggest that multilateral agreements can help each government deliver more favorable market conditions for agricultural development, at the very least, by limiting the rise of import restrictions in other countries. In addition, following the imposition by numerous food-exporting developing countries in 2008 of export restrictions that harmed food importers, perhaps WTO members may eventually agree to limit export restrictions as well.

What Have We Learned?

Each of the case studies presented in this volume provides detailed insights into Africa's wide variety of country experiences. Aggregating their results to characterize all of Africa necessarily obscures as much as it reveals. Making generalizations is sometimes useful, however, if only to allow comparison with other regions, and to detect common trends that cannot be seen in individual cases. Several principal findings for the African countries considered in this study are presented below.

First, African governments have removed much of their earlier antifarm and antitrade policy biases, which had worsened in the late 1960s and 1970s, primarily through increased taxation of exportable products. Reforms of the 1980s and

1990s reversed that trend, and average rates of agricultural taxation are now back to or below the levels of the early 1960s. Most of this gain has come from reduced taxation of farm exports.

Second, the substantial distortions that remain continue to impose a large tax burden on Africa's poor. In constant 2000 U.S. dollar terms, transfers paid by farmers in the 21 focus countries peaked in the late 1970s, at more than US$10 billion per year, or US$134 per farm worker. In 2000–04, the burden of taxation averaged US$6 billion per year, or US$41 per person working in agriculture. Even this lower amount is appreciably larger than public investment or foreign aid into the sector. The continuing taxation in Africa contrasts with the situation in both Asia and Latin America, where the average agricultural NRAs and RRAs reached zero by the early 21st century, although like Africa, those regions still have a wide dispersion of NRAs across products and countries.

Third, African farmers have become less taxed, in part because of the changing trade orientation of African agriculture. Reduced taxation of farmers has occurred partly because of a decline in the share of output that is exportable and a corresponding rise in the share that is import-competing. The rate of protection from imports for these products has fluctuated but remains positive. This helps only the few farmers who are net sellers of the protected products, however, and does so in a way that is less efficient and less equitable than many other possible interventions.

Fourth, trade restrictions continue to be Africa's most important instruments of agricultural intervention. Domestic taxes and subsidies on farm inputs and outputs, along with NPS assistance, are a small share of total distortions to farmer incentives. As a result, policy incidence on consumers tends to mirror the incidence on producers, with fiscal expenditures playing a much smaller role than in more-affluent regions.

And fifth, differences in NRAs and RRAs across commodities and countries are still substantial. Dispersion rates, as measured by the standard deviation in NRAs and RRAs across commodies and countries, rose and then fell over time. Looking forward, whatever the overall level of taxation or assistance, moving toward more uniform rates within the farm sector and between countries within the region could still yield substantial increases in efficiency of resource use.

Where to from Here?

While it is expected that the policy choices of African governments will continue to vary, it is hoped that the overall trend toward reform will continue. Despite difficult conditions, many African governments will continue to reduce taxation of agricultural exports, improve market institutions, and invest in rural public goods.

In that case, producers will continue to respond in ways that generate faster economic growth and sustained poverty alleviation. That has been the pattern in other regions, and African countries have shown their willingness and ability to begin these changes.

Our hopes are tempered by experience, however, including the experience of agricultural policy transition in other regions. A fundamental concern in agricultural policy over time as economies progress toward becoming middle-income, though, is overshooting. In response to rural poverty and inequality, many countries start protecting agriculture soon after they stop taxing it. This imposes large costs on consumers, and slows national economic growth. Countries that lock in relatively efficient and equitable policies as soon as they are attained can therefore enjoy a high payoff relative to those that allow farm support policies to become increasingly costly over time. In particular, policies that raise the prices of staple foods impose serious costs on the urban poor and on rural net buyers of these products, as has been demonstrated by recent increases in their prices for other reasons (Ivanic and Martin 2008).

Rural-urban poverty gaps can be addressed in far more efficient ways than by subsidizing production or raising food prices. For example, rural poverty can be and has been alleviated in parts of Africa and Asia by increasing the mobility of some members of farm households who work full- or part-time off the farm and repatriate part of their higher earnings back to those remaining on the farm (Otsuka and Yamano 2006; World Bank 2007). Concerted government interventions through targeted social policy measures can also be an efficient and effective way to reduce gaps between rural and urban incomes and raise national incomes overall (Winters, McCulloch, and McKay 2004). Efficient ways of assisting the left-behind groups of poor (nonfarm as well as farm) households include public investment measures that have high social payoffs, such as basic education and health, rural infrastructure, and agricultural research and extension.

Notes

1. The economic indicators quoted in this section are from the first 10 tables in the appendix, based predominately on the compilation of data from the World Bank (2008) and the United Nations' FAOSTAT Database by Sandri, Valenzuela, and Anderson (2007).

2. Recent studies attempting to measure the magnitude of various constraints on growth have addressed direct effects of exogenous factors, such as unfavorable demographic conditions and transport opportunities (Bloom and Sachs 1998), unfavorable temperature conditions and economic scale (Masters and McMillan 2001), and declining rainfall during the mid-1960s through the late 1980s (Barrios, Bertinelli, and Strobl forthcoming), as well as select variables such as institutions (Rodrik, Subramanian, and Trebbi 2004), policies (Glaeser et al. 2004), and inequality (Easterly 2007). A synthesis approach allows for simultaneous determination of government choices and economic outcomes, in models that link exogenous conditions to an equilibrium level of tax rates and public investment, which, in turn, drives growth (for example, McMillan and Masters 2003).

3. A detailed listing of World Bank projects is available at http://go.worldbank.org/0FRO32VEI0.

4. A detailed listing of countries' PRSPs is available at http://www.imf.org/external/np/prsp/prsp.asp.

5. Annual estimates and additional details may be found in the appendix.

6. A major difficulty in very poor countries (especially in very poor, landlocked countries) with high internal and border costs of trading, and with large price ranges during each year for farm products because of high storage costs, is to obtain domestic and border prices at the same point in the marketing chain before calculating the NRA and CTE. The issue is discussed in general in appendix A, and the ways it has been dealt with in the country case studies are documented in detail in the various chapters in Anderson and Masters (2009).

7. Recall that the sample covers around 90 percent of Sub-Saharan Africa's economy. For North Africa, the sample includes only Egypt, which accounts for almost half the population of North Africa but only 37 percent of its GDP.

References

Anderson, K., and W. A. Masters. 2008. "Distortions to Agricultural Incentives in Sub-Saharan and North Africa." Agricultural Distortions Working Paper 64, World Bank, Washington, DC.

_____, eds. 2009. *Distortions to Agricultural Incentives in Africa*. Washington, DC: World Bank.

Anderson, K., M. Kurzweil, W. Martin, D. Sandri, and E. Valenzuela. 2008a. "Methodology for Measuring Distortions to Agricultural Incentives." Agricultural Distortions Working Paper 02, World Bank, Washington, DC (and appendix A of this volume).

_____. 2008b. "Measuring Distortions to Agricultural Incentives, Revisited." *World Trade Review* 7 (4): 1–30.

Anderson, K., and E. Valenzuela. 2008. *Global Estimates of Distortions to Agricultural Incentives, 1955 to 2007*. Core database available at http://www.worldbank.org/agdistortions.

Barrios, S., L. Bertinelli, and E. Strobl. Forthcoming. "Trends in Rainfall and Economic Growth in Africa: A Neglected Cause of the African Growth Tragedy." *Review of Economics and Statistics*.

Bloom, D. E., and J. D. Sachs. 1998. "Geography, Demography, and Economic Growth in Africa." *Brookings Papers on Economic Activity* 29 (2): 207–96.

Chen, S., and M. Ravallion. 2007. "Absolute Poverty Measures for the Developing World, 1981–2004." Policy Research Working Paper 4211, World Bank, Washington, DC.

Easterly, W. 2007. "Inequality Does Cause Underdevelopment: Insights from a New Instrument." *Journal of Development Economics* 84 (2): 755–76.

Glaeser, E. L., R. La Porta, F. Lopez-de-Silanes, and A. Shleifer. 2004. "Do Institutions Cause Growth?" *Journal of Economic Growth* 9 (3): 271–303.

Ivanic, M. and W. Martin. 2008. "Implications of Higher Global Food Prices for Poverty in Low-Income Countries." Policy Research Working Paper 4594, World Bank, Washington, DC.

Krueger, A. O., M. Schiff, and A. Valdés. 1988. "Measuring the Impact of Sector-specific and Economy-wide Policies on Agricultural Incentives in LDCs." *World Bank Economic Review* 2 (3): 255–72.

_____. 1991. *The Political Economy of Agricultural Pricing Policy, Volume 3: Africa and the Mediterranean*. Baltimore: Johns Hopkins University Press for the World Bank.

Lerner, A. 1936. "The Symmetry between Import and Export Taxes." *Economica* 3 (11): 306–13.

Masters, W. A. 2008. "Beyond the Food Crisis: Trade, Aid and Innovation in African Agriculture." *African Technology Development Forum* 5 (1): 3–13.

Masters, W. A., and M. S. McMillan. 2001. "Climate and Scale in Economic Growth." *Journal of Economic Growth* 6 (3): 167–86.

McMillan, M. S., and W. A. Masters. 2003. "An African Growth Trap: Production Technology and the Time-Consistency of Agricultural Taxation, R&D and Investment." *Review of Development Economics* 7 (2): 179–91.

Ndulu, B., S. A. O'Connell, R. H. Bates, P. Collier, C. C. Soludo, J.-P. Azam, A. K.Fosu, J. W. Gunning, and D. Njinkeu. 2008. *The Political Economy of Economic Growth in Africa, 1960–2000.* Cambridge and New York: Cambridge University Press.

Otsuka, K., and T. Yamano. 2006. "Introduction to the Special Issue on the Role of Nonfarm Income in Poverty Reduction: Evidence from Asia and East Africa." *Agricultural Economics* 35 (supplement): 373–97.

Rodrik, D., A. Subramanian, and F. Trebbi. 2004. "Institutions Rule: The Primacy of Institutions Over Geography and Integration in Economic Development." *Journal of Economic Growth* 9 (2): 131–65.

Sandri, D., E. Valenzuela, and K. Anderson. 2007. "Economic and Trade Indicators for Africa." Agricultural Distortions Working Paper 21, World Bank, Washington, DC. http://www.worldbank.org/agdistortions.

Spence, M., et al. 2008. *The Growth Report: Strategies for Sustained Growth and Inclusive Development.* Washington, DC: World Bank.

Vousden, N. 1990. *The Economics of Trade Protection*. Cambridge: Cambridge University Press.

Williamson, J. 1990. "What Washington Means by Policy Reform." In *Latin American Adjustment: How Much Has Happened?*, ed. J. Williamson. Washington, DC: Institute for International Economics.

Winters, L. A., N. McCulloch, and A. McKay. 2004. "Trade Liberalization and Poverty: The Empirical Evidence." *Journal of Economic Literature* 62 (1): 72–115.

World Bank. 2007. *World Development Report 2008: Agriculture for Development*. Washington, DC: World Bank.

_____. 2008. *World Development Indicators*. Washington, DC: World Bank.

WTO, ITC, and UNCTAD (World Trade Organization, International Trade Commission, and United Nations Conference on Trade and Development). 2007. *World Tariff Profiles 2006*. Geneva: WTO.

9

CHINA AND SOUTHEAST ASIA

*Kym Anderson and Will Martin**

In the past, farm earnings in China and Southeast Asia have often been depressed by pro-urban, antiagricultural biases of government policies in developing countries. Much progress has been made since the 1980s in reducing that policy bias, however, especially in China, where the changes have been transformational. Nonetheless, many trade-reducing price distortions remain within the agricultural sector, and some countries have moved from taxing to protecting their farmers, which involves a different but still inefficient use of national resources as compared to removing all price distortions.

The study presented in this chapter examines China (excluding Hong Kong, Macao, and Taiwan and herein referred to simply as China) and the five large Southeast Asian economies of Indonesia, Malaysia, the Philippines, Thailand, and Vietnam. Estimates of distortions are provided for as many years as data permit over the past five decades, and for an average of eight crop and livestock products per economy, which in aggregate amounts to about 70 percent of the gross value of agricultural production in those economies.[1]

There is considerable diversity within Southeast Asia in terms of stage of development, relative resource endowments, and comparative advantage—and hence trade specialization, incidence of poverty, and income inequality. These economies thus provide a rich sample for comparative study. Per capita income in

*This chapter draws on the introductory and country chapters in Anderson and Martin (2009), with data updated using Anderson and Valenzuela (2008). The authors are grateful for the distortions estimates provided by authors of the focus country case studies, and for assistance with spreadsheets by Johanna Croser, Esteban Jara, Marianne Kurzweil, Signe Nelgen, Francesca de Nicola, Damiano Sandri, and Ernesto Valenzuela. The working paper version of this chapter (Anderson and Martin 2008) contains additional background material and appendix tables.

Vietnam is barely one-twelfth the global average, while in Indonesia and the Philippines it is around one-sixth, in China more than one-quarter, in Thailand more than one-third, and in Malaysia around three-quarters. In terms of endowments of agricultural land per capita, the Philippines is the least well endowed of the group, but even Indonesia has only about one-quarter of the global average endowment, while Malaysia and Thailand have about two-fifths and China one-half.[2] That is, none of these Asian economies is relatively well endowed with crop or pasture land. This might suggest they would have a low comparative advantage in agricultural goods, were it not for two facts: these economies are at varying stages of industrial development, and the quality of and institutional arrangements/entitlement to their land and water vary greatly. As a result, there is a wide range in their comparative advantages and trade specialization. The share of agricultural and food products in the country's merchandise trade is about 60 percent of the global average share for China and the Philippines, while it is well above 100 percent for the other Southeast Asian countries examined here.

The recent decline in poverty in the region is historically unprecedented: the number of Asian people living on less than US$1 per day (2005 purchasing power parity) has more than halved since 1981, with most of that decline in East Asia (especially China). That absolute decline represents a drop from 69 to 10 percent of the population (table 9.1). During the 10 years to 2002, no less than three-quarters of that decline in the proportion of Asia's poor occurred in rural areas, and another one-sixth was due to a movement out of poverty by rural people migrating to better opportunities in urban areas (Chen and Ravallion 2007, 2008).[3]

Policy developments have made nontrivial contributions to the growth, structural changes, and poverty alleviation observed in East Asia over the past five decades. The transformational move away from planning and state-owned

Table 9.1. Changes in Poverty in Asia, 1981–2005

	1981	1987	1993	1999	2005
Number of people, millions					
China	730	412	444	302	106
Other East Asia	217	186	156	122	106
India	296	285	280	270	267
Other South Asia	91	99	61	89	84
Total, Asia	1,334	982	941	783	563
Percent of population					
East Asia	69	39	36	24	10
South Asia	42	37	29	27	24

Source: Chen and Ravallion (2008).

enterprises to greater dependence on markets and private entrepreneurship has had a particularly dramatic effect in China and Vietnam since the 1980s. Also important has been the move in market economies away from import-substituting industrialization toward export-oriented development strategies. Agricultural policies were not the only—or even the main—target of these reforms, but they were an integral part of the process.

This chapter begins with a brief summary of economic growth and structural changes in the Southeast Asia and China since the 1950s and of agricultural and other economic policies as they affected agriculture before and after various reforms—and in several cases, the fundamental regime changes—of the past half century.[4] It then summarizes new estimates of the nominal rate of assistance (NRA) and the relative rate of assistance (RRA) to farmers delivered by national farm and nonfarm policies over the past several decades (depending on data availability), and of those policies' impacts on consumer prices of farm products. Both farmer assistance and consumer taxation is negative in periods where there is an antiagricultural, pro-urban consumer bias in a country's policy regime. The final sections summarize what has been learned and draw out implications of the findings, including for poverty and inequality and for possible future directions of policies affecting agricultural incentives in this part of Asia.

Growth and Structural Changes[5]

The most striking economic characteristic of East Asia's developing economies is their generally fast rate of economic growth and industrial development over the past three decades. The recent report of the Commission on Growth and Development (Spence 2008) noted that 13 of the world's economies have had sustained growth of real per capita income of more than 7 percent for at least 25 consecutive years since World War II, and that nine of those are in East Asia.[6] Between 1980 and 2004, East Asia's per capita gross domestic product (GDP) grew at 6.3 percent per year, compared to a global average of just 4 percent and a South Asian average of 3.4 percent. Industrial growth in that period was more than three times the world's average of 2.5 percent; even agricultural growth was well above the world average of 2.0 percent per year except in Malaysia and the Philippines. As a consequence, per capita incomes of most East Asian economies have been converging rapidly—albeit from a low base—on those of rich countries, while other developing and transition economies have, on average, been slipping further away from the U.S. level.

A key driver of the rapid growth and industrialization of East Asia has been the decision by many countries in the region to become more open and switch away from an import-substituting development strategy to one that is export oriented.

That change occurred at different times in the focus countries examined here, following the experience of Taiwan, China and Korea in the 1960s. China began to make the transition in the late 1970s, and Vietnam in the mid-1980s. As a result, export volumes grew at double-digit rates, and the share of exports in GDP rose steadily for the region, more than doubling in the 30 years to 2004. The East Asian region's share of global exports of nonfood manufactures has quadrupled since 1990, thanks especially to China's industrialization. In 2006, China accounted for 11 percent of the world's manufacturing exports, compared with less than 1 percent in 1990: a 20-fold increase in current U.S. dollar terms. The increase for Southeast Asia has been five-fold, contributing to the region's growing share of global manufacturing exports since 1990.

With export-led industrial growth has come the dramatic restructuring of Asia's economies away from agriculture and toward not only manufacturing but also service activities. The farm sector's share of GDP in East Asia is now less than 30 percent of what it was in the latter 1960s. The biggest changes are in China and Indonesia, where agriculture's share of GDP dropped from more than 40 and 50 percent, respectively, in the 1960s to 13 percent in 2005. The Philippines, the slowest-growing of the economies examined here, has also been the slowest to move away from agriculture since the 1960s.

The shares of overall employment accounted for by farming activities have fallen somewhat more slowly than agriculture's GDP shares, according to statistics in the FAOSTAT Database of the Food and Agriculture Organization (FAO) of the United Nations (which, because of definitional differences, are not always consistent with national databases). These shares remain much higher than the GDP shares, implying relatively low labor productivity on farms. Malaysia has seen a major fall, from 57 to 18 percent of the workforce, but elsewhere in the region the share of the labor force still in farming is between two-fifths and two-thirds. These shares would be somewhat less in full-time equivalent terms if part-time, off-farm work activities were accounted for more carefully (see, for example, Otsuka and Yamano 2006; Otsuka, Estudillo, and Sawada 2009), but nonetheless they underscore the fact that incentives faced by farmers affect the well-being of the majority of Chinese and Southeast Asian households.

Agriculture's share of merchandise exports has declined even more dramatically than its GDP share in the past four decades, as the share of nonprimary goods has grown. Among the focus countries, only in Vietnam do more than one-sixth of exports come from farms. The declining relative importance of farm exports has been much more rapid in East Asia than in the rest of the world: the index of the revealed agricultural comparative advantage (defined as the share of agriculture and processed food in national exports as a ratio of the share of such products in worldwide merchandise exports) has fallen since the 1980s by about

two-thirds for the region. So too has the index of agricultural trade specialization (defined as net exports divided by the sum of the imports and exports of agricultural and processed food products). That index, which ranges from −1 to +1, has become less and less positive since the 1970s, and indeed has become negative in the case of China and the Philippines.

The apparent decline in agricultural comparative advantage is evident in the self-sufficiency data for primary farm products. The share of farm production exported has declined steadily for Malaysia and the Philippines but has been offset by increases in China, Thailand, and Vietnam. Since the 1980s, the share of imports in domestic consumption of farm products has also grown, though in China's case largely because of the need to import more cotton to supply its booming exports of textiles and clothing. As will become clear below, increasing dependence on imports of farm products in East Asia has occurred despite reductions in the taxation of agricultural exports and increases in incentives provided to farmers via government policy reforms.

Quantifying the Distortions to Agricultural Incentives

The main focus of the present study's methodology is on government-imposed distortions that create a gap between domestic prices and what prices would be under free markets. Since it is not possible to understand the characteristics of agricultural development with a sectoral view alone, the project's methodology both estimates the effects of direct agricultural policy measures (including distortions in the foreign exchange market) and generates estimates of distortions in nonagricultural sectors for comparative evaluation. Specifically, NRAs for farmers, including any input subsidies and non-product-specific (NPS) forms of assistance or taxation, are computed. A production-weighted average NRA for nonagricultural tradables is also generated, for comparison with that for agricultural tradables via the calculation of an RRA (see Anderson et al. 2008a, 2008b). This approach is not well suited to analysis of China's and Vietnam's policies prior to their reform era, because prices then played only an accounting function and currency exchange rates were enormously distorted. For the reform era in these countries, however, the price comparison approach provides as valuable a set of indicators as for other market economies of distortions to incentives for farm production, consumption, and trade, and of the income transfers associated with interventions.

While most of the focus of this study is on agricultural producers, the extent to which consumers are taxed or subsidized is also considered. To do so, a consumer tax equivalent (CTE) is calculated by comparing the price consumers pay for their food within a country and the international price of each food product at the

border. Differences between the NRA and the CTE arise from distortions in the domestic economy that are caused by transfer policies and taxes or subsidies that cause the prices paid by consumers (adjusted to the farmgate level) to differ from those received by producers.

To obtain dollar values of farmer assistance and consumer taxation, the country authors' NRA estimates are multiplied by the gross value of production at undistorted prices to obtain an estimate in U.S. dollars of the direct gross subsidy equivalent (GSE) of assistance to farmers. These GSE values are calculated in constant U.S. dollars, and are also expressed on a per-farm-worker basis. They (and their equivalent on the consumption side) can be added up across products for a country, and across countries for any or all products, to get regional aggregate transfer estimates for the studied economies. Throughout, it has not been possible to assess whether some interventions may have been warranted on national economic welfare grounds because of the presence of externalities, failures in land and credit markets, and policy failures such as underinvestment in public infrastructure in rural areas and interventions by local or provincial governments.[7]

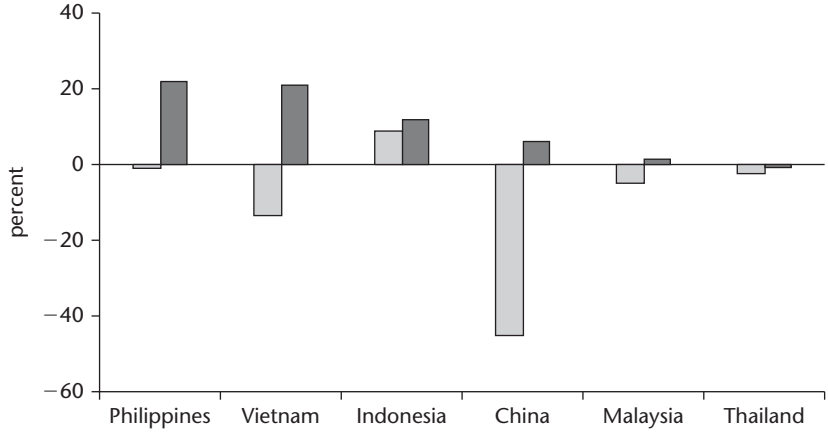
NRAs to agriculture

Prior to the 1980s, agricultural price policies, together with trade and exchange rate policies, almost always reduced farmers' earnings in China and Southeast Asia. The only exceptions were the Philippines in the latter 1960s and Indonesia in the latter 1970s. That explicit or implicit taxation declined from the early 1980s, however, and from the mid-1990s in China and 2000 in Southeast Asia the average NRA shifted so that it became slightly positive. The average hides considerable diversity within the region, however. In the Philippines, average NRAs became positive starting in the 1980s and have averaged close to 20 percent since then, while at the other extreme, average NRAs in China and Vietnam were heavily negative until the mid-1990s. Meanwhile, NRAs in Indonesia, Malaysia, and Thailand averaged much closer to zero from the early 1980s (table 9.2). A visual representation of both the differences across countries and the rise in average NRAs is clear in figure 9.1, where 2000–04 is compared with 1980–84 for all agricultural products and for rice (by far the region's most important food).

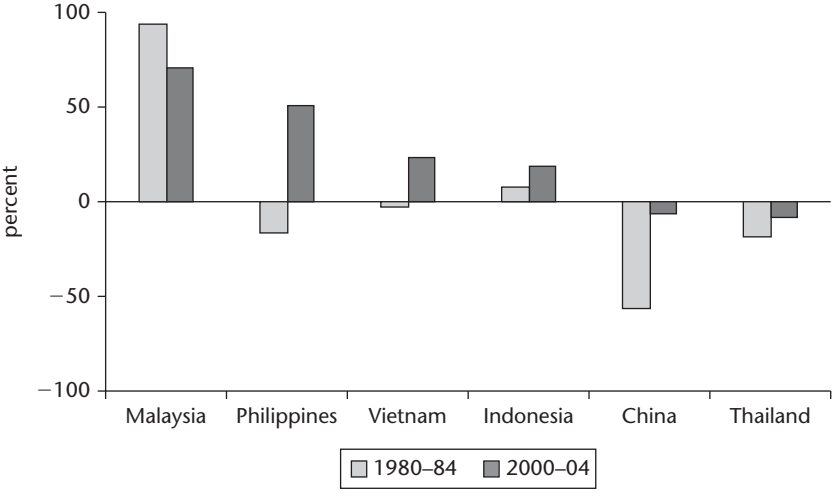
The trends are less obvious when looking at the commodity NRAs for the region. Table 9.3, which compares the Southeast Asian averages with those for China, illustrates the diversity of the region's average NRAs across farm commodities. As is true for other regions of the world, assistance is highest for sugar, but it is also high for maize, and for milk in China and rice and poultry in parts of Southeast Asia. This, together with NRA estimates for the higher-income

Figure 9.1. NRAs to All Agriculture and to Rice, China and Southeast Asian Countries, 1980–84[a] and 2000–04

a. All agriculture



b. Rice



Source: Anderson and Valenzuela (2008), drawn from NRA estimates reported in Anderson and Martin (2009).

a. Data for Vietnam are for 1985–89 because 1980–84 estimates are not available.

Table 9.2. NRAs to Agriculture,[a] China and Southeast Asia, 1960–2004
(*percent*)

	1960–64	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–04
China[b]	—	—	—	—	−45.2	−35.5	−14.3	6.6	5.9
Southeast Asia[c]	—	—	−8.8	0.0	4.6	−0.4	−4.2	0.0	11.1
Indonesia	—	—	−2.6	9.3	9.2	−1.7	−6.6	−8.6	12.0
Malaysia	−7.2	−7.5	−9.0	−13.0	−4.6	1.3	2.3	−0.2	1.2
Philippines	−5.3	14.4	−5.1	−7.1	−1.0	18.7	18.5	32.9	22.0
Thailand	—	—	−20.3	−14.0	−2.0	−6.2	−5.7	1.7	−0.2
Vietnam[b]	—	—	—	—	—	−13.9	−25.4	0.6	21.2

Source: Anderson and Valenzuela (2008), drawn from estimates reported in Anderson and Martin (2009).

Note: — = not available.

a. Weighted averages for each country, including product-specific input distortions and NPS assistance as well as authors' guesstimates for noncovered farm products, with weights based on gross value of agricultural production at undistorted prices.

b. 1980–84 data for China are for 1981–84; 1985–89 data for Vietnam are for 1986–89.

c. Weighted average for the five countries below, with weights based on gross value of agricultural production at undistorted prices.

Table 9.3. NRAs, by Covered Product, China and Southeast Asia, 1970–2005
(*percent*)

	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–04
China[a]							
Rice	—	—	−56	−34	−30	−7	−7
Maize	—	—	−35	−16	−25	5	13
Wheat	—	—	2	22	11	30	4
Sugar	—	—	44	45	12	27	29
Cotton	—	—	−34	−35	−26	−4	1
Milk	—	—	129	58	−4	18	25
Pig meat	—	—	−79	−49	−15	0	0
Poultry	—	—	25	−27	−3	0	0
All covered products[b]	—	—	−51	−41	−19	2	1
Dispersion of NRAs[c]	—	—	74	52	21	18	15
Southeast Asia							
Rice	−22	−1	1	0	−7	−1	21
Maize	−2	13	14	26	28	28	20
Sugar	−1	11	48	19	11	24	49
Coconut	−7	−1	−11	−20	−34	−23	−10
Palm oil	−15	−14	−1	−2	2	−9	−3
Rubber	−5	−17	−18	−13	−16	5	4
Pig meat	0	−3	41	9	−1	12	−6
Poultry	6	48	70	36	24	38	39
All covered products[b]	−9	0	5	0	−4	0	11
Dispersion of NRAs[c]	24	33	46	48	42	40	40

Source: Anderson and Valenzuela (2008), drawn from estimates reported in Anderson and Martin (2009).

Note: — = not available.

a. The first and last columns of NRAs for China refer to 1981–84 and 2000–05, respectively.

b. Weighted average across all covered products (including some not shown above), with weights based on the unassisted value of production.

c. Simple five-year average of the annual standard deviation around a weighted mean of the national NRAs each year.

countries of Northeast Asia (Honma and Hayami 2009), suggests the production of these products within East Asia may be far from optimally allocated from the viewpoint of efficient resource use.

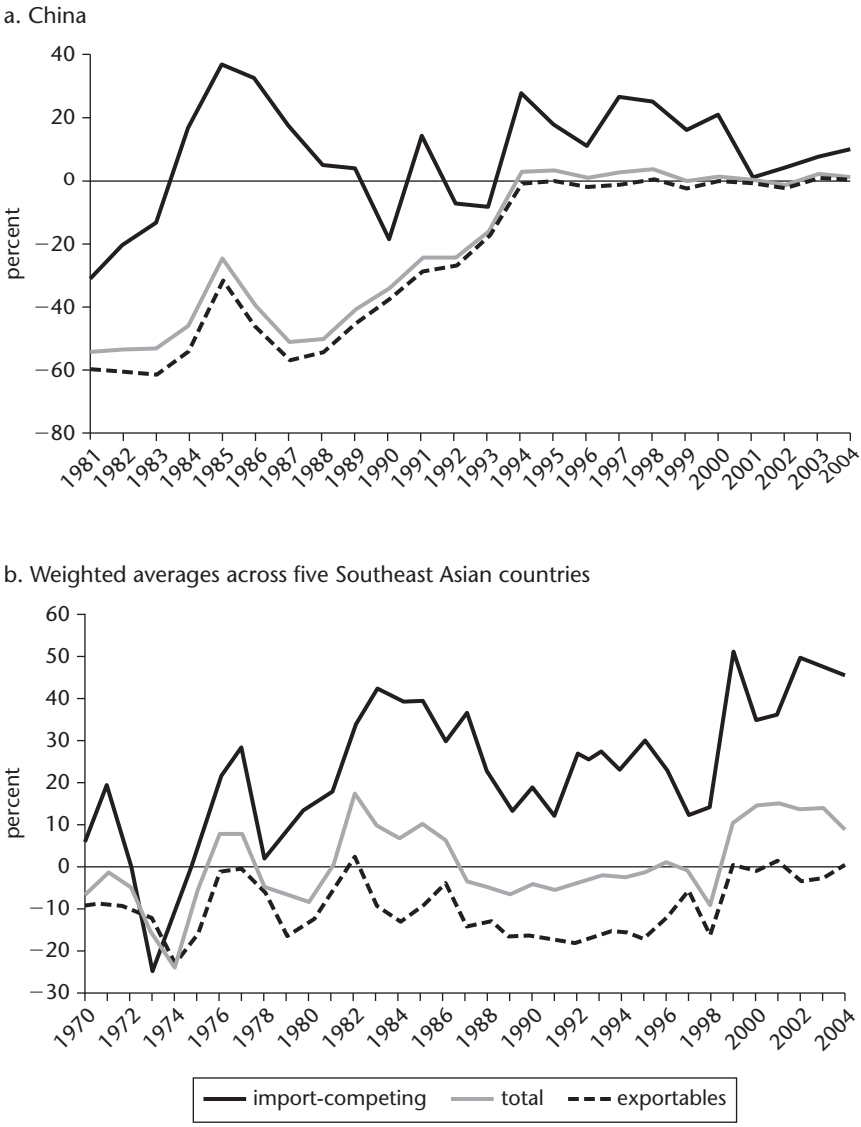
There is a great deal of NRA diversity not only across countries in their average NRA but also across commodities *within* each Asian economy's farm sector. The extent of the latter type of diversity (as measured by the standard deviation) has declined markedly in China but has been greater in Southeast Asia over the past 25 years than in the two decades prior to that (see the dispersion indicators in the middle and bottom of table 9.3). It means that there is still much that could be gained from improved resource reallocation within the agricultural sector of Asian economies were intranational differences in rates of assistance to be reduced.

A striking feature of the distortion pattern within the farm sector is its strong antitrade bias. This is evident in figure 9.2, which depicts the average NRAs for agriculture's import-competing and export subsectors for the region: the former average is almost always positive and its trend is upward-sloping, whereas the NRA average for exportables is almost always negative, although much less so in China from the mid-1980s, and it has been close to zero since the late 1990s. Though the gap between the NRAs for those two subsectors has not diminished greatly since the 1960s for the region as a whole, it clearly has narrowed for China.

The rise in the average NRAs since the 1980s is too large to be explained just by economies becoming more import-dependent as they lose their comparative advantage in farm products with industrialization: the proportion of tradable farm production that is produced by the export subsector has not declined very much for most Asian economies. Nor can the main motive for altered intervention be solely to reduce distortions, for otherwise there would not have been overshooting in going from negative to positive NRAs for some products (maize in China, for example, and rice in Indonesia), nor would there have been an increase in the average NRA for import-competing farmers.

The U.S. dollar value equivalent of the positive or negative assistance to farmers due to agricultural price and trade policies has been nontrivial, but is dominated by China, where it was a tax of more than US$100 billion per year (in constant 2000 U.S. dollars) in the early 1980s but has become a subsidy of around US$15 billion in the past decade (table 9.4a). In Southeast Asia, too, the reforms do not mean there is no intervention now. Rather, their annual transfers changed from being a net negative for farmers of US$0.7 billion in 1985–89 to a net positive of US$8 billion in 2000–04. In recent years, those totals represent transfers to farmers of around US$30 per farm worker in China and US$70 in Southeast Asia (table 9.4b).

Figure 9.2. NRAs to Exportable, Import-Competing, and All[a] Agricultural Products, China and Southeast Asia, 1970–2004



Source: Anderson and Valenzuela (2008), drawn from NRA estimates reported in Anderson and Martin (2009).

Table 9.4. Annual GSEs of Assistance to Farmers, Total and Per Farm Worker, Asian Economies,[a] 1955–2004

a. Total (*constant 2000 US$ millions, using the U.S. GDP deflator*)

	1960–64	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–04
China[b]	—	—	—	—	−118,224	−75,780	−28,381	15,667	15,644
Indonesia	—	—	−848	3,783	4,131	−785	−2,729	−4,101	4,286
Malaysia	−250	−246	−547	−1,097	−456	75	156	3	100
Philippines	−225	735	−1,082	−903	−299	1,399	1,850	3,832	1,951
Thailand	—	—	−2,434	−2,148	−324	−645	−719	260	−14
Vietnam[b]	—	—	—	—	—	−726	−1,815	−18	1,602

b. Per person engaged in agriculture (*constant 2000 US$, using the U.S. GDP deflator*)[a]

	1960–64	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–04
China[b]	—	—	—	—	−280	−163	−57	31	31
Indonesia	—	—	−27	113	113	−19	−60	−86	86
Malaysia	−135	−126	−267	−515	−213	36	79	2	56
Philippines	−33	99	−132	−99	−30	132	163	318	155
Thailand	—	—	−163	−130	−18	−34	−36	13	−1
Vietnam[b]	—	—	—	—	—	−33	−73	−1	57

Source: Anderson and Valenzuela (2008), drawn from NRA estimates reported in Anderson and Martin (2009).

Note: — = not available.

a. GSEs including assistance to nontradables and non-product-specific assistance. Farmer numbers are from FAOSTAT which may differ from national statistics.

b. 1980–84 data for China are for 1981–84; 1985–89 data for Vietnam are for 1986–89.

Assistance to nonfarm sectors and RRAs

What matters for the incentives to produce agricultural goods is not just the NRA for agricultural products alone, but this rate of assistance relative to that for other traded goods. The antiagricultural policy biases of the past were due not just to agricultural policies, but to important changes in incentives affecting intersectorally mobile resources. The latter has resulted in significant reductions in border protection to the manufacturing sector, which in turn has been the dominant intervention in the tradables part of nonagricultural sectors. That reduction in assistance to producers of nonfarm tradables has been at least as responsible for the improvement in farmer incentives as the reduction in direct taxation of agricultural industries.

It has not been possible to quantify the distortions to nonfarm tradable sectors as carefully as for agricultural tradables. Past studies typically have had to rely on applied trade taxes (for exports as well as imports), plus some adjustments for exchange rate distortions and quantitative restrictions, rather than undertaking comprehensive price comparisons. Hence they usually do not capture fully the quantitative restrictions on trade that were important in earlier decades, though decreasingly so in recent times. Nor do they capture distortions in the services sectors, some of which now produce tradables (or would in the absence of interventions preventing their emergence). As a result, the estimated NRAs for nonfarm importables are smaller and decline less rapidly than in fact was the case—while those for nonfarm exportables have in some cases been negative. Of those two elements of underestimation, the former bias certainly dominates, so the authors' estimate of the overall NRA for nonagricultural tradables should be considered a lower-bound estimate, and more so in the past than presently, so that its decline appears to have been less rapid than it has been in reality.[8]

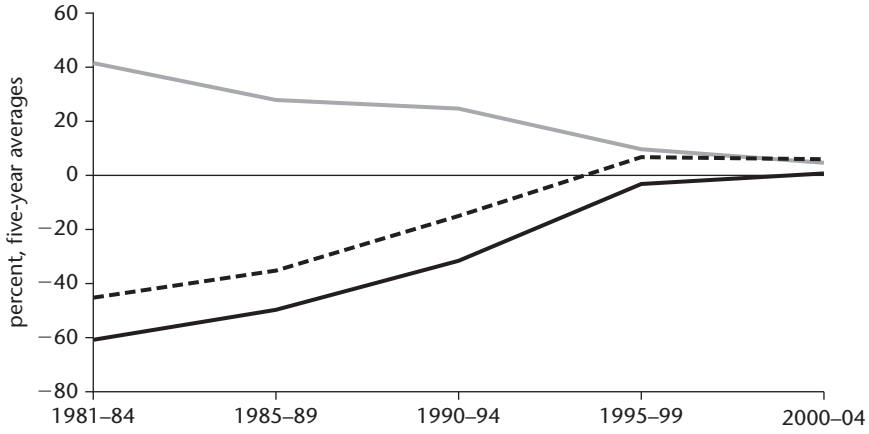
Despite these methodological limitations, the estimated NRAs for nonfarm tradables were very sizeable prior to the 1990s. For the region as a whole, the average NRA value has steadily declined since the 1980s as policy reforms have spread. This shift has contributed to a decline in the estimated negative RRA for farmers: the RRA in Southeast Asia in the early 1970s averaged −25 pecent and in China as recently as the early 1980s more than −50 percent, whereas now it averages slightly more than zero (figure 9.3). Thailand is the only country in the region with a negative RRA this decade (table 9.5).

CTEs of agricultural policies

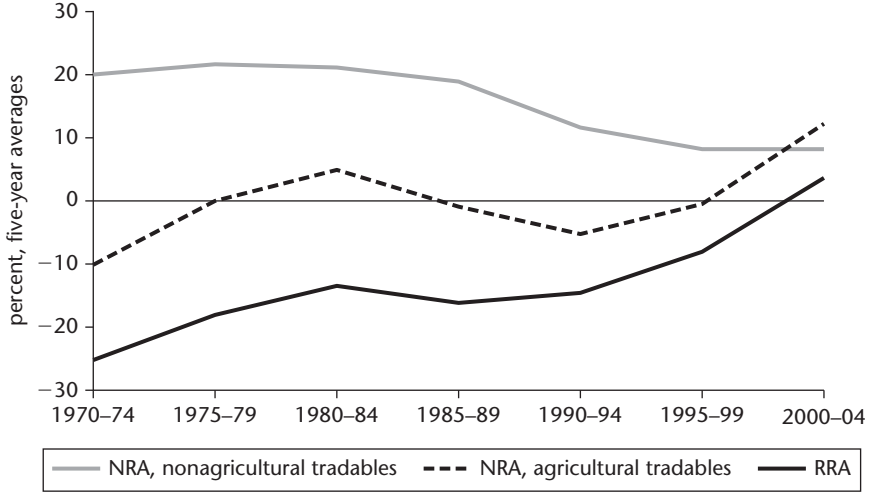
The extent to which farm policies impact the retail consumer price of food and the price of livestock feedstuffs depends on a wide range of factors, including the degree of processing undertaken and the extent of competition along the value

Figure 9.3. NRAs to Agricultural and Nonagricultural Tradable Products and RRAs,[a] China and Southeast Asia, 1970–2004

a. China



b. Weighted averages across five Southeast Asian countries



Source: Anderson and Valenzuela (2008), drawn from NRA estimates reported in Anderson and Martin (2009).

a. The RRA is defined as 100*[(100 + $NRAag^t$)/(100 + $NRAnonag^t$) − 1], where $NRAag^t$ and $NRAnonag^t$ are the percentage NRAs for the tradable parts of the agricultural and nonagricultural sectors, respectively.

Table 9.5. NRAs to Agricultural and Nonagricultural Tradable Industries and RRAs,[a] China and Southeast Asia, 1960–2004

(*percent*)

	1960–64	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–04
China[b]									
NRA, agricultural tradables	−45.2	−45.2	−45.2	−45.2	−45.2	−35.5	−14.3	6.6	5.9
NRA, nonagricultural tradables	41.6	41.6	41.6	41.6	41.6	28.3	24.9	9.9	5.0
RRA	−60.5	−60.5	−60.5	−60.5	−60.5	−49.9	−31.1	−3.0	0.9
Southeast Asia									
NRA, agricultural tradables	**−5.8**	**5.6**	**−10.2**	**0.1**	**4.9**	**−0.9**	**−4.7**	**0.0**	**12.1**
NRA, nonagricultural tradables	**11.5**	**15.4**	**20.2**	**22.0**	**21.1**	**18.0**	**11.5**	**8.2**	**8.1**
RRA	**−15.5**	**−8.5**	**−25.3**	**−18.0**	**−13.4**	**−16.1**	**−14.5**	**−7.7**	**3.7**
Indonesia									
NRA, agricultural tradables	—	—	−3.8	10.4	10.5	−1.9	−7.5	−9.7	13.9
NRA, nonagricultural tradables	—	—	27.7	27.7	27.7	26.5	17.6	10.6	8.1
RRA	—	—	−24.7	−13.6	−13.5	−22.5	−21.3	−18.3	5.4
Malaysia									
NRA, agricultural tradables	−7.6	−7.9	−9.4	−13.7	−4.9	1.4	2.6	−0.2	1.5
NRA, nonagricultural tradables	7.4	7.0	7.1	6.5	5.2	3.9	2.8	2.0	0.9
RRA	−14.0	−13.9	−15.5	−18.9	−9.6	−2.4	−0.3	−2.2	0.6

(*Table continues on the following page.*)

Table 9.5. NRAs to Agricultural and Nonagricultural Tradable Industries and RRAs,[a] China and Southeast Asia, 1960–2004 (*continued*)

(*percent*)

	1960–64	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–04
Philippines									
NRA, agricultural tradables	−1.7	14.3	−6.0	−7.2	−4.0	15.8	16.7	35.7	23.5
NRA, nonagricultural tradables	19.0	20.3	16.3	16.3	12.9	11.0	9.9	8.6	6.4
RRA	−17.4	−5.0	−19.8	−20.3	−14.9	4.3	6.1	24.9	15.9
Thailand									
NRA, agricultural tradables	—	—	−23.1	−15.9	−2.3	−6.9	−6.4	1.8	−0.2
NRA, nonagricultural tradables	—	—	16.1	16.0	14.2	11.1	10.0	8.9	7.8
RRA	—	—	−33.7	−27.5	−14.4	−16.3	−14.9	−6.5	−7.4
Vietnam[b]									
NRA, agricultural tradables	—	—	—	—	—	−15.9	−26.4	0.0	20.7
NRA, nonagricultural tradables	—	—	—	—	—	4.3	−11.2	1.5	20.8
RRA	—	—	—	—	—	−19.2	−17.4	−1.3	0.0

Source: Anderson and Valenzuela (2008), drawn from NRA and RRA estimates reported in Anderson and Martin (2009).

Note: — = not available.

a. The RRA is defined as $100*[(100 + NRAag^t)/(100 + NRAnonag^t) - 1]$, where $NRAag^t$ and $NRAnonag^t$ are the percentage NRAs for the tradable parts of the agricultural and nonagricultural sectors, respectively.

b. 1980–84 data for China are for 1981–84; 1985–89 data for Vietnam are for 1986–89.

chain. This study, like the one undertaken by the Organisation for Economic Co-operation and Development (OECD, 2007), therefore attempts only to ask how much impact policies have on the buyer's price at the point on the value chain where the farm product is first traded internationally and hence where comparisons are made between domestic and international prices (for example, for milled rice, raw sugar, or beef). To obtain weights to make it possible to sum across commodities and countries, if they were not supplied from national sources, consumption data was obtained either directly from the FAO food balance sheets or, in the case of minor products, indirectly by using FAO values for trade data and assuming the undistorted value of consumption is production valued at undistorted prices plus imports minus exports.

If there were no farm input distortions and no domestic output price distortions, so that the NRA was entirely the result of border measures such as an import or export tax or restrictions, and there were no domestic consumption taxes or subsidies, the CTE would equal the NRA for each covered product. But such domestic distortions are present in several Asian economies. In China, for example, producer prices were held below consumer prices for several important crop products at least until the early 1990s: producers of food staples were taxed more than consumers were subsidized, even taking into account the "iron rice bowl" system under which urban consumers were able to purchase foodstuffs at low prices. Also, because of international trade, the weights used to aggregate product distortion rates on the consumption side differ from those on the production side of the market. Hence, the aggregate CTE differs somewhat from the aggregate NRA for each economy, as can be seen by comparing the CTEs in table 9.6a with the NRAs in table 9.2 for the 1980s. The CTE was negative until the mid-1990s for China, Thailand, and Vietnam but above zero thereafter.

In total dollar terms, current transfers from consumers are clearly largest in China (table 9.6b), but on a per capita basis they are almost as large in the Philippines and Indonesia, at between US$22 and US$34 per capita (table 9.6c). They have been minor in Malysia and Thailand in recent years. In 2000–04, they were nontrivial as a percentage of income in Vietnam, though the introduction of export restrictions on rice in 2008 would have reduced this consumer taxation.

The role of agricultural policies in stabilizing domestic prices

An often-stated objective of food policies in Asia, as elsewhere, is to reduce fluctuations in domestic food prices and in the quantities available for consumption. For no product is that more the case than for rice, for which fluctuations in trade barriers are frequently used as a buffer against domestic or international shocks, rather than using trade as a source of cheaper imports or an opportunity for

Table 9.6. CTE of Policies Assisting Producers of Covered Farm Products,[a] China and Southeast Asia, 1970–2004

a. Percent CTE (*at primary product level*)

	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–04
China	—	—	−38.7	−35.8	−14.2	0.4	0.2
Indonesia	−9.0	6.4	8.4	−4.3	−6.7	−11.2	18.3
Malaysia	3.6	18.1	18.1	28.8	15.7	2.8	6.1
Philippines	−4.5	−7.4	−3.1	23.7	22.3	40.2	30.6
Thailand	−27.3	−19.6	−5.7	−6.1	−6.8	3.1	2.3
Vietnam	—	—	—	−11.5	−24.3	1.0	19.3

b. Aggregate CTE (*constant 2000 US$ million at primary product level*)

	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–04
China	—	—	−62,859	−33,988	923	58,257	44,497
Indonesia	−1,676	2,147	3,378	−500	−884	−2,524	4,849
Malaysia	2	163	196	208	169	43	67
Philippines	−890	−467	96	1,808	2,059	4,178	2,509
Thailand	−1,552	−1,253	−347	−229	−344	168	83
Vietnam	—	—	—	−36	−939	320	991

c. CTE per capita (*constant 2000 US$ at primary product level*)

	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–04
China	—	—	−60.9	−30.6	0.8	46.6	34.2
Indonesia	−13.3	15.3	21.6	−2.9	−4.7	−12.4	22.3
Malaysia	0.2	12.7	13.5	12.6	9.0	2.0	2.8
Philippines	−23.0	−10.5	1.9	31.7	32.2	58.6	31.9
Thailand	−40.5	−28.9	−7.2	−4.4	−6.2	2.8	1.3
Vietnam	—	—	—	−0.6	−13.6	4.3	12.3

Source: Anderson and Valenzuela (2008), derived from national NRA estimates reported in Anderson and Martin (2009).

Note: — = not available.

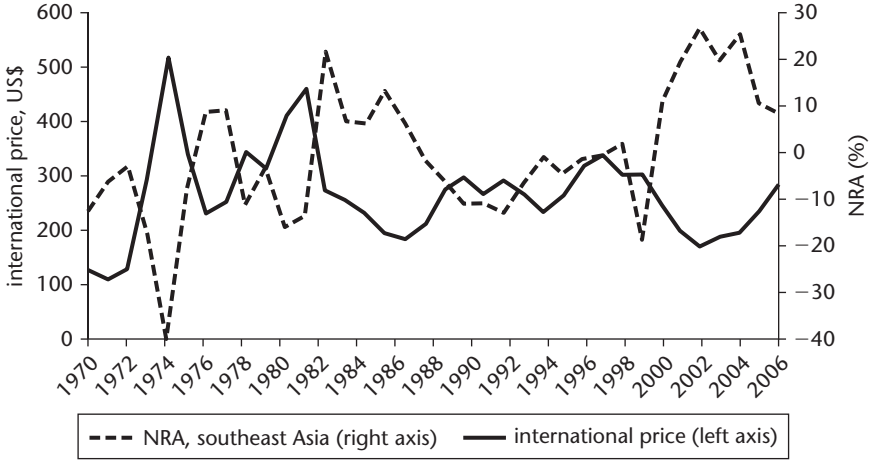
a. Assumes the CTE is the same as the NRA derived from trade measures (that is, not including any input taxes or subsidies or domestic producer price subsidies or taxes). Consumption values are production values at undistorted prices divided by the self-sufficiency ratios derived using FAO commodity balance sheets. 1985–89 data for Vietnam is 1986–89. The GDP deflator is used to bring current U.S. dollars to the level in the year 2000.

greater export earnings. Since Asia produces and consumes four-fifths of the world's rice (compared with about one-third of the world's wheat and maize), this market-insulating behavior of Asian policy makers means that even by 2000–04, only 6.9 percent of global rice production was traded internationally[9] (compared with 14 and 24 percent for maize and wheat). Nominal rates of protection for rice have been above trend in years of low international prices and below trend in years when international prices for rice are high. The effect of a thin market and price insulation has been much more volatile for international prices for rice than for other grains.

Figure 9.4 confirms that volatility. Even when averaging over all the focus countries in Southeast Asia, the negative correlation between the rice NRAs and the international rice price is very high, at −0.59. Moreover, that volatility is evident whether the NRA trend is upward or downward. A clear illustration of the latter point is provided by Malaysia, where policy was reformed during its financial crisis years of 1985–87. Even though the growth in rice protection was reversed (figure 9.5), insulation of prices around the trend level of protection continued.

This begger-thy-neighbor dimension of each economy's food policy dramatically reduces the international public good role that trade between nations can play in bringing stability to the world's food markets. The more some countries insulate their domestic markets, the more they export their volatility to the international market, and the greater the resulting volatility in that marketplace. This,

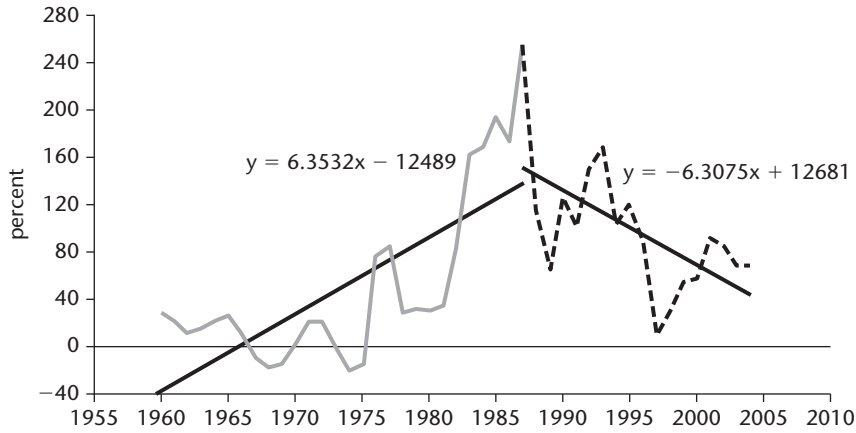
Figure 9.4. Rice NRA and International Rice Price, Southeast Asia, 1970–2005



Source: Authors' compilation based on data in Anderson and Valenzuela (2008).

Note: Correlation coefficient is −0.59.

Figure 9.5. NRA for Rice, Malaysia, 1960–2004



Source: Authors' compilation based on data in Anderson and Valenzuela (2008).

in turn, creates a perceived need for other countries to insulate. In most cases, volatility is exported through changes in import tariffs; but export taxes and export controls are sometimes also used by exporting countries. When NRAs in enough countries are adjusted in this way to changes in international prices, changes in world prices are exacerbated, so that even larger changes in NRAs are needed to achieve any given target level of stability in domestic prices—a classic collective action problem.

A multilateral agreement to desist is thus needed. That is precisely what was sought during the Uruguay Round Agreement on Agriculture of the General Agreement on Tariffs and Trade (GATT) and through mechanisms such as tariff bindings and disciplines on administered domestic prices and export subsidies. Tariff bindings can reduce the extent of the problem by restricting the range over which tariffs can increase in response to low prices. To date, however, the bindings are so far above applied import tariffs that this discipline on food-importing members in years of low international prices is very weak. Moreover, there is no corresponding GATT or World Trade Organization (WTO) discipline on food export restrictions, which—as 2008 has starkly revealed—can be extremely problematic in years of high international prices.

What Have We Learned?

One of the most salient features of price and trade policies in Southeast Asia and China since the 1980s is the spate of major economic reforms, including significant trade liberalization. A key feature has been a reduction in the taxation

of exportable agriculture. Another has been an upward trend in protection to import-competing agriculture in the region—any liberalization in this subsector has been outweighed by increases in protection of other products. Overall, levels of nonagricultural protection have declined considerably, which has improved the competitiveness of the agricultural sector in many economies, especially in China and Vietnam.

These trends are captured in figure 9.6, which shows agriculture's trade bias index (TBI) on the horizontal axis and the RRA on the vertical axis. An economy with no antiagricultural bias (RRA = 0) and no antitrade bias within the farm sector (TBI = 0) would be located at the intersection of the two zero lines in figure 9.6. Though China and all the focus countries of Southeast Asia were to the southwest of that neutral point as of 1980–84, by 2000–04 all but Indonesia and the Philippines had become closer to the vertical axis (meaning they had reduced their antitrade bias in agriculture). All had shifted up also, except for the Philippines, which had become closer to the horizontal axis—although some are now above rather than below that axis, which means they are assisting farmers relative to producers of other tradable products, a scenario that can lead to just as much waste of resources as the earlier, antiagricultural, policy bias. More specifically, the several features of the region's experience of the past four decades are worth highlighting by way of summarizing the key findings of this regional study.

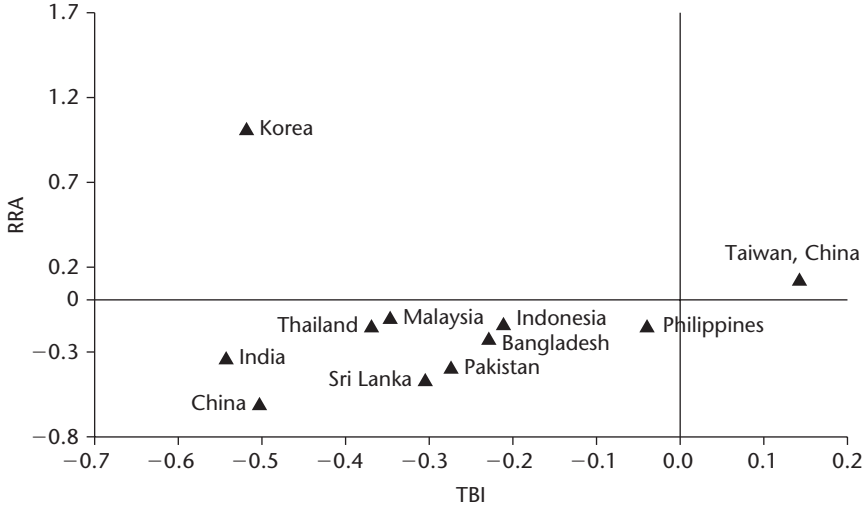
First, China and the focus countries in Southeast Asia have experienced both a gradual movement away from taxing farmers relative to nonagricultural producers and, over the past decade, the emergence of slightly positive assistance on average for farmers. The gradual fall in the estimated (negative) RRA for the region has been not dissimilar to but is more dramatic than the trends in other developing countries. Instead of being efffectively taxed more than US$100 billion per year as in the early 1980s (more than US$200 per person working in agriculture), farmers in the region now receive support of more than US$30 per person employed on farms in China and US$70 in Southeast Asia.

Second, the dispersion in NRAs to farmers has diminished in China but has increased in Southeast Asian countries on average. This result means there is still scope for reducing distortions in resource use within agriculture, even in countries with an average NRA for agriculture and an RRA close to zero.

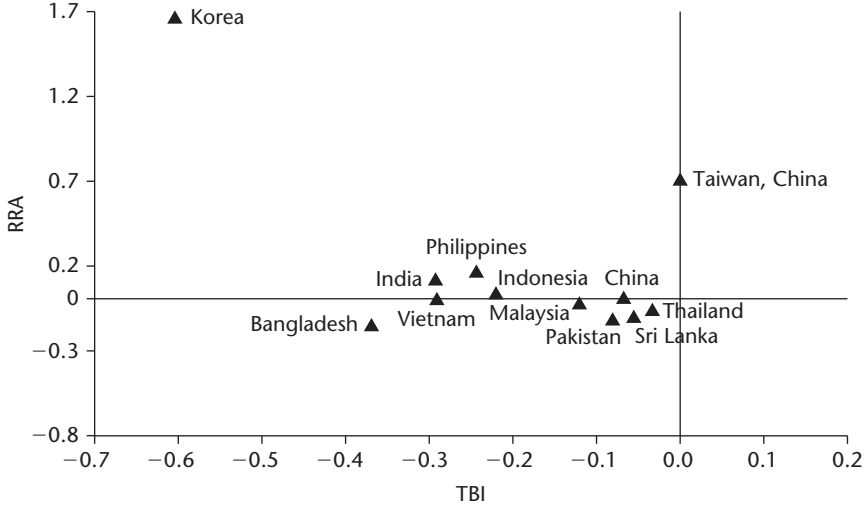
Third, the antitrade bias in assistance rates within the farm sectors of Southeast Asia remains in place. The NRA for import-competing farm industries has increased over the decades studied, while the negative NRA for agricultural exportables has been reduced in absolute value. The fact that the average NRAs for import-competing and exportable agricultural industries have risen roughly in parallel in Southeast Asia (though not in China) means that those countries'

Figure 9.6. Relationship between RRA and the TBI for Agriculture, China and Southeast Asian Countries, 1980–84 and 2000–04

a. 1980–84[a]



b. 2000–04



Source: Authors' compilation based on data in Anderson and Valenzuela (2008).

a. Data for Vietnam are for 1985–89 because 1980–84 estimates are not available.

antitrade bias within agriculture has not fallen much from the high levels of the past. This may be understandable from a political economy viewpoint, but it nonetheless means that resources are not allocated efficiently within the farm sector and, since openness tends to promote economic growth (Spence et al. 2008), that total factor productivity growth in Southeast Asian agriculture is slower than it would be if remaining interventions were removed.

Fourth, movements in CTEs closely replicate changes in farm support and taxation, because agricultural taxation and assistance are mostly due to trade measures, although consumer subsidies in China prior to 1994 were an important exception. This broad pattern means that whereas food price reforms were kept artificially low, in recent years they have been above international levels on average in the region (although only trivially thus far for Malaysia and Thailand). It also means there is considerable variation in CTEs across countries in the region. The current level of taxation of food consumers for the region as a whole is rising. In 2000–04, it amounted to more than US$30 per capita per year in China and the Philippines.

Fifth, the decline in negative RRAs has been due as much to cuts in protection for nonagricultural sectors as to reforms of agricultural policies. This underscores the fact that reductions in distortions to agricultural incentives in the region have been part of a series of economy-wide reform programs and not just due to farm policy reforms.

Sixth, food policies continue to seek to reduce fluctuations in domestic food prices and in the quantities available for consumption via fluctuations in barriers to trade. This begger-thy-neighbor dimension of each economy's food policy reduces the international public good role that trade between nations can play in bringing stability to the world's food markets tremendously. This is especially the case for rice, for several reasons: because it is the main staple food in Asia, because countries in the region heavily intervene to insulate their markets from international price developments, and because Asia accounts for five-sixths of the global market for rice.

Where to from Here?

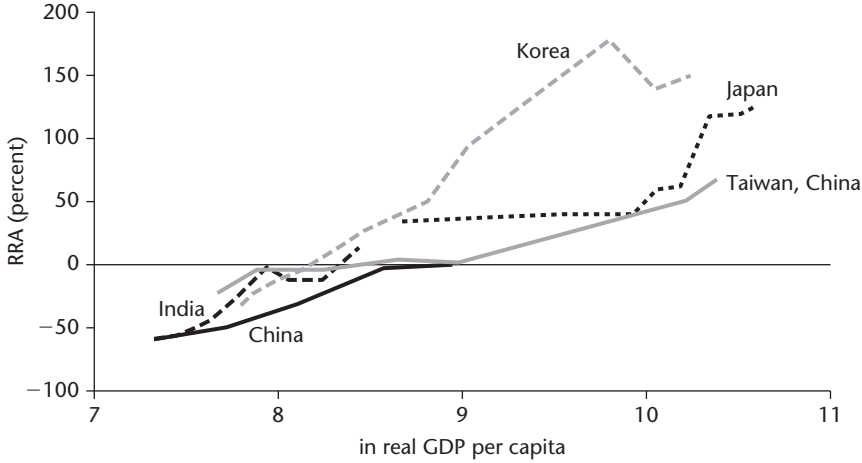
Provided they remain open and continue to free up domestic markets and practice good macroeconomic governance, East Asia's developing economies will keep growing rapidly in the foreseeable future, and growth there will be more rapid in manufacturing and service activities than in agriculture. In the more densely populated economies of the region, that growth will be accompanied by rapid increases in per capita incomes of low-skilled workers where labor-intensive exports boom. Agricultural comparative advantage is thus likely to decline in such

economies. Whether these economies become more dependent on imports of farm products depends, however, on what happens to the RRA. The first wave of Asian industrializers (Japan, and then Korea and Taiwan, China) chose to slow the growth of food import dependence by raising their NRA for agriculture even as they were bringing down their NRAs for nonfarm tradables, such that their RRAs became increasingly above the neutral zero level (Honma and Hayami 2009). A key question is: will later industrializers follow suit, given the past close association of RRAs with rising per capita income and falling agricultural comparative advantage?

When the RRAs for Japan, Korea, and Taiwan, China are mapped against real per capita income, it is possible to superimpose the RRAs for low-income economies on that same graph to see how they are tracking relative to the first industrializers. Figure 9.7 does that for China (and India), showing that its RRA trend of the past 25 years is on the same trajectory as wealthier Northeast Asian countries. A glance at figure 9.3 suggests the same is true for Southeast Asia.

One reason one might expect different government behavior now, compared to several decades ago, is because countries that industrialized early were not bound under GATT to restrict their agricultural protection. Had there been strict discipline on farm trade measures at the time Japan and Korea joined GATT in 1955 and 1967, respectively, their NRAs may have been halted at less than 20 percent. At the time of China's accession to the WTO in December 2001, its NRA was less

Figure 9.7. RRAs and Log of Real Per Capita GDP, Select Asian Countries, 1955[a]–2005



Source: Based on estimates in Anderson and Valenzuela (2008).

a. Data begin in 1981 for China and in 1965 for India.

than 5 percent, or 7.3 percent for just import-competing agricultural products. By 2005, China's average bound import tariff commitment was about twice that (16 percent), but what matters most is China's out-of-quota bindings on the items whose imports are restricted by tariff rate quotas. The latter tariff bindings as of 2005 were 65 percent for grains, 50 percent for sugar and 40 percent for cotton (WTO, ITC, and UNCTAD 2007). China also has bindings on farm product-specific domestic supports of 8.5 percent, and can provide another 8.5 percent as NPS assistance if it so wishes—a total 17 percent NRA from domestic support measures alone, in addition to what is available through out-of-quota tariff protection.

Clearly, the legal commitments China made on acceding to the WTO are a long way from current levels of domestic and border support for its farmers, and so are unlikely to constrain the government very much in the next decade or so.[10] The legal constraints on Asia's developing countries that joined the WTO earlier (except for Korea) are even less constraining. One can only hope that China and Southeast Asia will not make use of the legal wiggle room they have allowed themselves in their WTO bindings and thereby follow Japan, Korea, and Taiwan, China into high agricultural protection.[11] A much more efficient and equitable strategy would be for these countries to treat agriculture in the same way they have been treating nonfarm tradable sectors.

It might be argued that such a laissez faire strategy is likely to increase rural-urban inequality and poverty, thereby generating social unrest. On the other hand, policies that lead to high prices for staple foods, in particular, involve potentially serious risks for the urban and rural poor who are net buyers of food in developing countries, as has been demonstrated by concerns about the recent increases in prices of these goods (Ivanic and Martin 2008). Available evidence suggests that problems of rural-urban poverty gaps have been alleviated in parts of Asia by some of the more mobile members of farm households finding full- or part-time work off the farm and repatriating part of their higher earnings back to their farm households (Otsuka and Yamano 2006; World Bank 2007). Concerted government intervention through social policy measures is hugely important both in reducing the gaps between rural and urban incomes (Hayami 2007) and in raising national incomes overall (Winters, McCulloch, and McKay 2004). Efficient ways of assisting any left-behind groups of poor (nonfarm as well as farm) households include public investment measures in areas that have high social payoffs—basic education, health, and rural infrastructure—as well as in agricultural research and development.

What do the above lessons and implications suggest developing country policymakers should do when confronted, as in recent years, with a sharp upward movement in international food prices? In the past, as illustrated for rice in figures 9.4 and 9.5, many governments have simply either increased their export

restrictions or lowered their import restrictions on food staples for the duration of the spike. Projections by international agencies in 2008 suggest that prices could remain high for the foreseeable future, and that growth in net food imports by rapidly industrializing economies of Asia is one of the significant contributors.[12] The sudden fall in food prices in the latter half of 2008 does not necessarily mean those long-run projections are invalid, especially if large developing countries return to rapid growth once the current recession passes.

Over the past two or more decades, China and India have steadily raised their RRAs, which previously had been sufficient to keep both countries very close to self-sufficiency in primary agricultural products. In terms of all agricultural and processed food trade, though, China became a net importer for the first time in 2000–04 (Sandri, Valenzuela, and Anderson 2007).[13] Should the countries examined here choose to keep their RRAs at current (close to zero) levels, their import dependence in agriculture could well increase over time. If so, other developing countries might well reconsider their current position in the WTO's Doha Round of trade negotiations. By agreeing to lower substantially their bound tariffs and subsidies on agricultural products over the next decade, the region's governments might well be able to extract greater concessions from high-income countries without having to reduce their actual applied RRAs for the foreseeable future should international food prices to return to the historically high levels of the middle half of the present decade.

Notes

1. The time series and commodity coverage greatly exceeds that of earlier studies. Krueger, Schiff, and Valdés (1991) analyze Malaysia, the Philippines, and Thailand but for only three or four crops from 1960 to 1984; Orden et al. (2007) provide producer support estimates for China, Indonesia, and Vietnam for the period since 1985; and the OECD has begun examining China (OECD 2005). A common finding of these earlier studies is that the average nominal rate of assistance to farmers is higher in higher-income settings and where agricultural comparative advantage is weaker, and that it is much higher for the import-competing subsector than for exporters of farm products in each economy.

2. In terms of overall (as compared to just crop and pasture) land endowment per capita, China is only one-third of the global average.

3. Income inequality has risen a little over the past two decades but is still low throughout much of the region compared with the rest of the world: as of 2004, the Gini coefficient is between 0.40 and 0.49 for Malaysia, the Philippines, and Thailand. Likewise, the Gini coefficient for land distribution is relatively low, at just 0.41 for China, less than 0.50 in Indonesia and Thailand, and 0.5 in Vietnam. This implies reasonably even distributions of land compared with, say, Latin America, where the Gini coefficient for land distribution is above 0.7 for major countries such as Argentina and Brazil (World Bank 2007).

4. Apart from the regime changes that occurred during this period, such as the move from socialism to market economy in China and Vietnam, the region saw the end of colonization between the late 1940s and late 1950s: Indonesia from the Netherlands in 1949, Indochina from France in 1954, and Malaya from Britain in 1957.

5. The rest of this chapter draws in part on Anderson (2008).

6. The nine economies in East Asia are China, Japan, Hong Kong (China), Indonesia, Korea, Malaysia, Singapore, Taiwan (China), and Thailand. Brazil is the only other large economy in the set, and the other three are Botswana, Malta, and Oman.

7. In addition to the present study's estimation of price wedges, the latter would require a sophisticated economic model of the national economy with some quantification of the difference between private and social marginal costs. Such welfare analysis is thus beyond the scope of the present study.

8. This bias is accentuated in cases in which distortions to exchange rates are not included, as noted above in the methodology section. Exchange rate distortions were included in the studies for China, Malaysia, and Vietnam. Their impact was greatest in China, where it made the RRA more negative, to the extent of about 2 percenatage points in the 1970s, 6 percentage points in the 1980s, and 3 points in the 1990s (Huang et al. 2009).

9. This was up from the pre-1990s half-decade global shares, which are all less than 4.5 percent (for example, 4.1 percent in 1985–89), and is greater than the Asian share of just 5.7 percent in 2000–04, according to the project's database (Anderson and Valenzuela 2008).

10. For more on this point, see Anderson, Martin, and Valenzuela (forthcoming).

11. Indications in the ongoing Doha Round of multilateral trade negotiations at the WTO are not encouraging. The Group of 33 developing countries, led by Indonesia but strongly supported by India and the Philippines, among others, is arguing for additional "special and differential treatment" for developing countries in the form of exemptions from agricultural tariff cuts for so-called "special products," and for a special safeguard mechanism that would allow such countries to impose even higher than bound tariffs in years of likely import surges.

12. According to the World Bank's May 2008 commodity forecast, by 2020, grain prices in real terms will still be 10 percent above 2006 levels, which in turn were 20 percent above the average for 2001–05. The International Food Policy Research Institute (Von Braun 2007) and the OECD and FAO (2008) similarly expect food prices to remain high well into next decade and beyond.

13. This change for China was largely due to increases in imports of cotton needed to supply China's surging production of textiles and clothing for export.

References

Anderson, K. 2008. "Distorted Agricultural Incentives and Economic Development: Asia's Experience." *The World Economy* 32 (3): 351–84.

Anderson, K., M. Kurzweil, W. Martin, D. Sandri, and E. Valenzuela. 2008a. "Methodology for Measuring Distortions to Agricultural Incentives." Agricultural Distortions Working Paper 02, World Bank, Washington, DC (and appendix A of this volume).

_____. 2008b. "Measuring Distortions to Agricultural Incentives, Revisited." *World Trade Review* 7 (4): 1–30.

Anderson K., and W. Martin. 2008. "Distortions to Agricultural Incentives in China and Southeast Asia." Agricultural Distortions Working Paper 69, World Bank, Washington, DC.

_____, eds. 2009. *Distortions to Agricultural Incentives in Asia*. Washington, DC: World Bank.

Anderson, K., W. Martin, and E. Valenzuela. Forthcoming. "Long Run Implications of WTO Accession for Agriculture in China." In *China's Agricultural Trade: Issues and Prospects*, ed. C. Carter and I. Sheldon. St. Paul, MN: International Agricultural Trade Research Consortium.

Anderson, K., and E. Valenzuela. 2008. *Global Estimates of Distortions to Agricultural Incentives, 1955 to 2007*. Core database at http://www.worldbank.org/agdistortions.

Chen, S., and M. Ravallion. 2007. "Absolute Poverty Measures for the Developing World, 1981–2004." Policy Research Working Paper 4211, World Bank, Washington, DC.

_____. 2008. "The Developing World Is Poorer Than We Thought, But No Less Successful in the Fight Against Poverty." Policy Research Working Paper 4703, World Bank, Washington, DC.

Hayami, Y. 2007. "An Emerging Agricultural Problem in High-Performing Asian Economies." Policy Research Working Paper 4312, World Bank, Washington, DC.

Honma, M., and Y. Hayami. 2009. "Distortions to Agricultural Incentives in Japan, Korea, and Taiwan, China." Chapter 2 in this volume.

Huang, J., S. Rozelle, W. Martin, and Y. Liu. 2007. "Distortions to Agricultural Incentives in China." Chapter 3 in this volume.

Ivanic, M., and W. Martin. 2008. "Implications of Higher Global Food Prices for Poverty in Low-Income Countries." Policy Research Working Paper 4594, World Bank, Washington, DC.

Krueger, A., M. Schiff, and A. Valdés. 1991. *The Political Economy of Agricultural Pricing Policy, Volume 2: Asia*. Baltimore: Johns Hopkins University Press for the World Bank.

OECD (Organisation for Economic Co-operation and Development). 2005. *Review of Agricultural Policies: China*. Paris: OECD.

_____. 2007. *Agricultural Policies in OECD Countries: Monitoring and Evaluation 2007*. Paris: OECD.

OECD and FAO (Food and Agriculture Organization). 2008. *OECD-FAO Agricultural Outlook 2008–2017*. Paris: OECD.

Orden, D., F. Cheng, H. Nguyen, U. Grote, M. Thomas, K. Mullen, and D. Sun. 2007. "Agricultural Producer Support Estimates for Developing Countries: Measurement Issues and Evidence from India, Indonesia, China, and Vietnam." IFPRI Research Report 152, International Food Policy Research Institute, Washington, DC.

Otsuka, K., J. P. Estudillo, and Y. Sawada, eds. 2009. *Rural Poverty and Income Dynamics in Asia and Africa*. London and New York: Routledge.

Otsuka, K., and T. Yamano. 2006. "Introduction to the Special Issue on the Role of Nonfarm Income in Poverty Reduction: Evidence from Asia and East Africa." *Agricultural Economics* 35 (supplement): 373–97.

Sandri, D., E. Valenzuela, and K. Anderson. 2007. "Economic and Trade Indicators for Asia." Agricultural Distortions Working Paper 20, World Bank, Washington, DC. http://www.worldbank.org/agdistortions.

Spence, M., et al. 2008. *The Growth Report: Strategies For Sustained Growth and Inclusive Development.* Washington, DC: World Bank.

Von Braun, J. 2007. "The World Food Situation: New Driving Forces and Required Actions." Food Policy Report, International Food Policy Research Institute, Washington, DC.

Winters, L. A., N. McCulloch, and A. McKay. 2004. "Trade Liberalization and Poverty: The Empirical Evidence." *Journal of Economic Literature* 62 (1): 72–115.

World Bank. 2007. *World Development Report 2008: Agriculture for Development*. Washington, DC: World Bank.

WTO, ITC, and UNCTAD (World Trade Organization, International Trade Commission, United Nations Conference on Trade and Development). 2007. *World Tariff Profiles 2006*. Geneva: World Trade Organization.

10

INDIA AND OTHER SOUTH ASIAN COUNTRIES

*Ashok Gulati and Garry Pursell**

Distortions to price incentives for agriculture from trade, exchange rate, and domestic policies in place in South Asian countries are sometimes significant. The analysis here presents the effects of such policies on several countries in the region—Bangladesh, India, Pakistan, and Sri Lanka—centering on India, which accounts for around four-fifths of South Asia's population, gross domestic product (GDP), and agricultural GDP.[1] The principal focus is on the level of and trends in distortions for agriculture[2] and how these have changed over time relative to distortions for nonagricultural traded sectors (principally manufacturing). Previous studies have established that in India, Pakistan, and Sri Lanka, policies strongly favored manufacturing over the principal agricultural crops, although the extent of antiagricultural bias diminished considerably between the 1970s and 1995 (Pursell 1999).[3] These new country studies, in addition to extending the earlier estimates up to 2005 and back to 1965, provide long-term estimates of distortions to relative agricultural incentives in Bangladesh for the first time.[4] The new studies also broaden the coverage of previous research by including estimates for

* The authors are grateful for the distortion estimates provided by authors of the focus-country case studies, and for assistance with spreadsheets by Johanna Croser, Esteban Jara, Marianne Kurzweil, Signe Nelgen, Francesca de Nicola, Damiano Sandri, and Ernesto Valenzuela. The working paper version of this chapter (Gulati and Pursell 2008) contains additional background material and appendix tables. This chapter is a synthesis of the authors' paper on India (Pursell, Gulati, and Gupta 2009) and three other South Asian country studies, namely Ahmed et al. (2009); Bandara and Jayasuriya (2009); and Dorosh and Salam (2009). The analytical narratives are available in Anderson and Martin (2009), and the detailed estimates have been integrated into the project's global database (Anderson and Valenzuela 2008). An attempt is made to summarize the findings in a coherent manner rather than provide a critique of the findings and of quantitative estimates in the individual country studies.

fresh fruits and vegetables in India and for dairy in India and Pakistan. Both of these sectors account for a large share of the rural economy in South Asia as measured by their contribution to GDP.

The chapter is organized into six sections. The first summarizes how agriculture has steadily declined as a percentage of GDP and trade in South Asian countries over the past four decades. This is followed by a discussion of how agriculture nevertheless still accounts for more than half of South Asian employment, that the share of food in household budgets remains very high, and that on both counts agricultural policies are highly sensitive politically. The third section describes how South Asian countries' trade policies have evolved and interacted with exchange rate changes, especially during the period of the steady and, in the end, massive devaluation of the Indian rupee between 1984 and 1992. The fourth section presents quantitative evidence on the long-term evolution of nominal rates of assistance (NRAs) to various agricultural subsectors (including via input subsidies) and to agriculture as a whole. This leads into a discussion of trends in incentives for farmers relative to incentives for producers of nonagricultural tradables (mainly manufactures). Finally, the sixth section examines the political economy forces that are likely to influence the direction of future policies in the region, including the possibility that a strong pro-agricultural bias may emerge along the lines followed by more advanced, densely populated countries in East Asia and elsewhere.

Agriculture and the South Asian Economies

At 77 percent of the regional total as of 2000, India accounts for by far the largest proportion of agricultural activity in South Asia, while Pakistan represents 11 percent, Bangladesh 8 percent, and Sri Lanka 2.2 percent, and Nepal 1.5 percent. Agriculture is more specialized in the smaller countries. Pakistan, for example, specializes in wheat and Bangladesh in rice, but even so their production is much less than India's. The share of agriculture in the South Asian economies has steadily declined over time (table 10.1). Most of the decline has been in crop agriculture and horticulture. At independence, these two sectors represented more than half of GDP in India; by 2003, they had dropped to 15 percent of GDP. The livestock sectors in India and Pakistan, by contrast, have grown faster than the rest of the rural primary sector. In India, livestock represents about a quarter of agricultural GDP, and in Pakistan close to half (while having a much smaller role in the rural economies of Bangladesh and Sri Lanka).

Fisheries and forestry are not included in the agricultural aggregates or the quantitative analysis of this project. They have relatively low GDP shares in India, Pakistan, and Sri Lanka. However, given the importance of fishing in Bangladesh

Table 10.1. Shares of Agriculture in GDP and Employment, South Asian Countries, 1965–2004

(*percent*)

	1965–69	1975–79	1985–89	2000–04
Share of GDP				
India	44	36	29	21
Pakistan	35	29	24	22
Bangladesh	—	55	31	22
Sri Lanka	29	28	24	17
South Asia (four-country sample)	43	36	29	21
Share of employment				
India	73	70	66	59
Pakistan	65	64	55	46
Bangladesh	—	76	67	54
Sri Lanka	55	53	49	45
South Asia (four-country sample)	74	70	65	57

Source: Sandri, Valenzuela, and Anderson (2007). Compiled from the World Bank's *World Development Indicators* and U.N. Food and Agriculture Organization Statistics Database (FAOSTAT).

Note: — = not available.

a. Aggregates for South Asia exclude Nepal, Bhutan, and the Maldives, which together account for about 1.5 percent of South Asian agricultural GDP. Separate data not available for Bangladesh before it separated from Pakistan in 1971.

(it comprised 4.9 percent of total GDP and almost one quarter of more broadly defined agricultural GDP in 2004), caution is in order in making generalizations from the analysis below for Bangladesh's broader rural economy.

Agriculture and trade

For India, international trade in agricultural products (including livestock, fish, and forest products) has always been tiny in relation to the size of India's agricultural sector. In 2003/04, imports of these products were only 0.6 percent of the value of sectoral production (2.4 percent with edible oil imports included) and exports were 5.7 percent of production. In earlier periods, agricultural imports and exports represented major portions of India's trade (in 1961, for example, they were 27 percent and 44 percent of total merchandise imports and exports, respectively), but each still only accounted for just above 3 percent of agricultural production. In the late 1960s, agricultural imports began to be replaced by domestic

production, and since then they have constituted very small shares of total imports, even in years when essential products such as wheat and sugar had to be imported due to poor harvests.

Over time, the share of agricultural products in India's total merchandise exports has also declined, in recent years to around 10 percent. However, the products exported are quite diverse. They include fish and fish preparations, oil cakes, cashew kernels, tea, coffee, tobacco, spices, fruit and vegetables, pulses, basmati rice, and, periodically, large quantities of sugar and common rice (more than 4 million tons of rice were exported in 2004, for example). Since the late 1980s, manufactures have typically accounted for 70–80 percent of India's total merchandise exports, compared to between 40 and 50 percent during the 1950s and 1960s. Indian service exports have also grown rapidly in recent years, with software, other information technology, and services outsourcing representing the most dynamic components. Together, exports from these activities were about US$20 billion in 2004, reached US$50 billion in 2008, and were increasing at a rate of 20–25 percent annually. Thus far, there has been no similar development in other South Asian countries.

Agricultural trade has also declined in Bangladesh, Pakistan, and Sri Lanka, both in relation to total agricultural production and as a share of total exports and imports. On the import side, as in India, the decline was mainly a consequence of policies aimed at foodgrain self-sufficiency, especially through green revolution technologies. Currently, Pakistan exports rice and during normal seasons is self-sufficient in wheat. Similarly, Bangladesh is self-sufficient in rice during normal seasons and imports small quantities of wheat. Sri Lanka is normally self-sufficient in rice, though this is an outcome of substantial imports of wheat, which (as flour) has inceased over time as a share of household consumption.

The outcome of these changes is that in Pakistan, primary commodities (including cotton) are currently around 11 percent of total imports and 11 percent of total exports, compared with 26 percent of total imports and 39 percent of total exports in 1973 (Hamid, Nabi, and Nasim 1990). In Sri Lanka, agricultural products (mainly tea, rubber, and coconut products) represented more than 90 percent of total exports during the 1960s and 1970s, but by 2005 their share had declined to 18 percent; the remainder was industrial exports, almost entirely ready-made garments. Over the same period, agricultural and processed food imports declined from almost half of total imports to around 11 percent: most imports are now intermediate manufactured materials (especially textiles for the ready-made garment exporters), machinery and equipment, and manufactured consumer goods.

In Bangladesh, the pattern is somewhat different. Ready-made garments now dominate total exports. Agricultural exports (at present almost entirely jute and

shrimp), meanwhile, are usually about 7–8 percent of total exports, compared with 40 percent (mainly jute and tea) in the mid-1970s. However, Bangladesh imports a wide range of agricultural products—wheat, cotton, sugar, edible oils, dairy products, spices, oil seeds, tobacco, and periodically rice. According to official trade statistics, imports of these products varied between about 12 and 18 percent of total imports between 2001 and 2005, a share that declined only slightly compared to the mid-1990s. But the share of agricultural products in Bangladesh's total imports would be considerably higher than this if an allowance were made for the very substantial unrecorded imports from India, especially of sugar and cattle.

The largest consistent quasi-agricultural imports in South Asia are edible oils. In India, these expanded rapidly during the 1970s and early 1980s, triggering a major government program during the 1980s to substitute domestically produced oils for the imports. Edible oil imports declined for some time under the program, but despite very high tariffs, import growth resumed during the 1990s and the 2000s (the tariff on palm oil, for example, was 80 percent in 2006, though it was brought down to 5 percent in 2008 in the wake of surging global prices). During 2000–04, India's imports of edible oils ran about US$2.5 billion annually and accounted for about 40 percent of domestic consumption. Edible oils (mainly palm oil from Malaysia and Indonesia) are also major imports in Bangladesh, Nepal, Pakistan, and Sri Lanka. Tariffs are high in these countries, but not nearly as high as in India,[5] a scenario that creates strong incentives for edible oils to be smuggled into India from neighboring countries, particularly Bangladesh and Nepal.

Employment, food expenditure, and food safety nets

While agriculture's contribution to GDP in India has declined by almost two-thirds since independence in 1947, in 2003, it still accounted for 58 percent of national employment. Bangladesh, Pakistan, and Sri Lanka experienced a similar decline in agricultural employment over the past 40 years but, as in India, at a much slower rate than the decline in agriculture's share in GDP (table 10.1).[6] The share of food expenditure in South Asian household budgets, meanwhile, remains very high, although it is slowly declining. As of 2003, rural and urban households in India dedicated 54 percent and 42 percent, respectively, of total per capita consumption expenditure to food. The share of food in the budgets of the poorest 10 percent of households was significantly higher, around 62 percent in rural areas and 58 percent in urban areas. With such high shares of family budgets, it is not surprising that food prices and food availability are highly sensitive politically.

Since independence, the Indian government has worked to permanently eliminate the incidence of catastrophic famines that occurred during the colonial period and ensure basic foods to its citizens at affordable prices. In pursuit of these objectives, the government intervened in food grain markets through the Food Corporation of India (FCI) and established the present public distribution system (PDS), which had its roots in the rationing system introduced during prewar years, in 1958. The current PDS sells basic foods at subsidized prices through a large number (currently about 460,000) of "fair price" shops. In June 1997, the system was modified to targeted PDS by distinguishing "below poverty line" and "above poverty line" buyers, with the former eligible for especially low prices and the latter eligible to buy at prices only slightly below free market prices. In 2004, the total central government food subsidy was estimated to be Rs 258 billion (about US$5.7 billion, or 0.83 percent of GDP), defined as the excess of the FCI's total procurement, handling and distribution costs over the subsidized sales value.

In Bangladesh, Pakistan, and Sri Lanka, food policies similar to those in India have now been phased out. In Pakistan, ration shops were abolished in the late 1980s, although the government continues to subsidize wheat to private flour mills to keep flour prices low for consumers. The system of public grain distribution (rice and wheat) that Bangladesh inherited upon independence, which became especially important following a 1974 famine, continued during the 1980s but was gradually phased out starting in the early 1990s. Currently, the principal safety net for the poor in Bangladesh consists of food-for-work and food transfers, mainly of wheat. Postindependence Sri Lanka also operated subsidy schemes for food grains distributed through ration shops. During the 1950s and 1960s, this mainly consisted of imported rice, but later, as in Bangladesh, wheat became the principal vehicle for the subsidies, as it could be purchased more cheaply than rice on world markets. The subsidies were very large (some rice was distributed free) and had high budgetary costs, especially during the 1970s world price boom. In part due to the budgetary expense, the subsidies were reduced after 1977 and the rice ration scheme was abolished in 1979. Since then, the main objective of policy has been to keep consumer prices stable around "reasonable" price levels, balancing this objective against maintaining protection for paddy rice farmers.

Input subsidies

For the four South Asian countries, self-sufficiency in the production of food grains is a major policy objective, and green revolution development packages developed in the pursuit of self-sufficiency have comprised an array of government initiatives and subsidies for farmers. In India, for example, the largest of

Table 10.2. Distribution of Fertilizer and Electricity Subsidies and Subsidy Rates for Key Crops, India, 2004[a]

	Percent of total subsidy	Subsidy as percent of gross value of production at:	
		Domestic price	Reference price
Rice	37.1	18.3	15.4
Wheat	35.2	27.2	18.9
Maize	2.1	9.3	8.8
Sorghum	1.8	12.4	11.5
Chickpeas	2.7	11.4	10.9
Groundnuts	2.7	8.4	5.7
Rape/mustard seeds	4.5	11.7	18.0
Soybeans	1.1	4.3	2.9
Sunflower seeds	0.5	8.8	8.6
Sugar	6.6	12.5	15.4
Cotton	5.6	13.2	12.3
Total: 11 crops	100.0	16.9	13.0

Source: Pursell, Gulati, and Gupta (2009).

a. The total value of the input subsidies for these 11 crops this year was US$7.8 billion (US$1.9 billion for fertilizer and US$5.9 billion for electricity).

these subsidies are for electricity and fertilizers (Gulati and Narayanan 2003). Estimates of the totals of these two subsidies across 11 crops in 2004 are summarized in table 10.2. By 2008, as global prices of fertilizers rose sharply, the fertilizer subsidy took on gigantic proportions, touching almost US$25 billion. The subsidy did, however, allow domestic prices to remain largely unchanged.

In Pakistan, about 80 percent of cropped area is irrigated. However, except for urea, most input subsidies were phased out or substantially reduced during the 1990s. Bangladesh inherited upon independence a complex system by which fertilizers, pesticides, seeds, and irrigation (tubewell) equipment were supplied to farmers at subsidized prices by monopoly government organizations. With the important exception of the fertilizer, however, these subsidies and their accompanying controls were withdrawn in the late 1970s. Since then, the principal farm input subsidy has been for urea: subsidies for nonnitrogenous fertilizers, all of which are imported, were abolished in 1991 but reintroduced in 2005. In Sri Lanka, a canal irrigation system built by the government starting in 1979 supplies water at subsidized prices. Sri Lanka also provides subsidies for fertilizers, seeds, extension, and research, the largest amount of which goes to fertilizer subsidies.

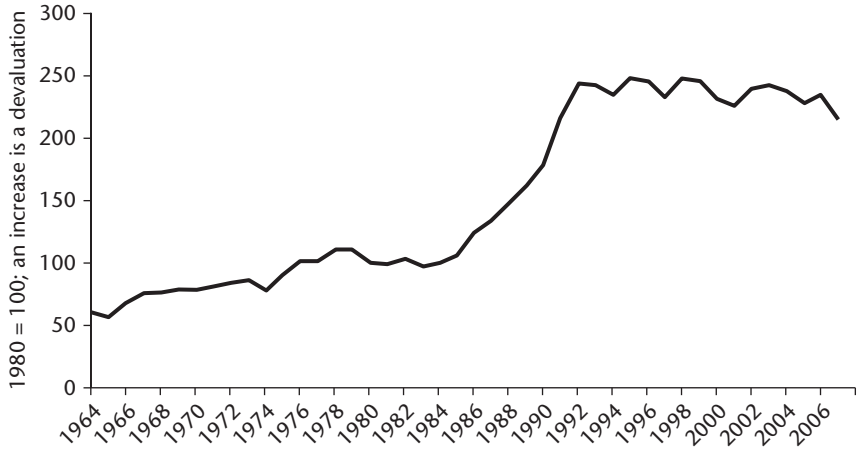
Trade and exchange rate policies: India

For 45 years after independence, India followed restrictive trade policies. During the 1950s and 1960s, agricultural exports were heavily controlled. When exports were allowed, they were subject to high export taxes, for example on jute and jute products, oilcakes, cotton, tea, and black pepper. Nearly all imports were either subject to discretionary import licensing or were "canalized" by monopoly government trading organizations. Import licensing was regularly tightened in response to the steadily worsening foreign exchange situation, and tariffs were increased and reached very high levels by early 1966. The period's policies were characterized by a marked antiagricultural bias, which probably increased along with the rising overvaluation of the exchange rate and the countermeasures for industry that concentrated on providing higher incentives to manufacturers, both in the domestic market and in export markets, while attempting to keep agricultural prices low and stable.

In June 1966, the devaluation of the rupee was accompanied by a brief liberalization episode during which import licensing was relaxed, tariffs were cut, and export subsidies were abolished or reduced. However, the import licensing system remained intact and by 1968, most of the liberalizing initiatives had been reversed and tight import and domestic controls reinstated. This remained the situation until the end of the 1970s, when a new phase of very slow partial liberalization commenced. During these years, inflation was steadily reduced, and by 1980 the real effective exchange rate (REER) had declined by 46 percent (figure 10.1). A balance of payments crisis was averted in 1980 and 1981 and the real value of the rupee maintained with the help of an International Monetary Fund loan, but from about April 1985 a new policy commenced under which the currency was steadily devalued in real terms. This trend continued uninterrupted for the next six years, almost on a monthly basis, until a sharp devaluation was imposed in July 1991. This was followed by more than a year of further depreciations, until September 1992. Over the whole period between 1985 and 1992, the rupee was devalued in real terms by around 145 percent (figure 10.1).

The devaluations of the rupee radically changed, among other things, the environment for India's trade policies. They also had important repurcussions for manufacturing, the first sector to be exposed to liberalization policies, and in making the trade liberalization program started in 1991 quite painless. In addition, many Indian manufacturing firms that previously felt vulnerable to import competition now found, following the correction of the earlier exchange rate overvaluation, they could not only easily compete with foreign manufacturers' imports but could outcompete foreign manufacturers in export markets. Combined with sweeping new domestic deregulation of manufacturing that accompanied the 1991 trade policy reform program, this created new momentum in the

Figure 10.1. Real Effective Exchange Rate Index, India, 1964–2007



Source: Authors' calculations based on official data.

manufacturing sector in terms of investment, productivity improvements, and output expansion. A four-year program of tariff reductions also commenced: this brought tariffs down to levels far below the extremely high or prohibitive rates (averaging over 100 percent) of the 1980s, even though tariffs were still very high by international standards. But both domestic and trade policies affecting the rural sector were basically untouched by the 1991 reforms.

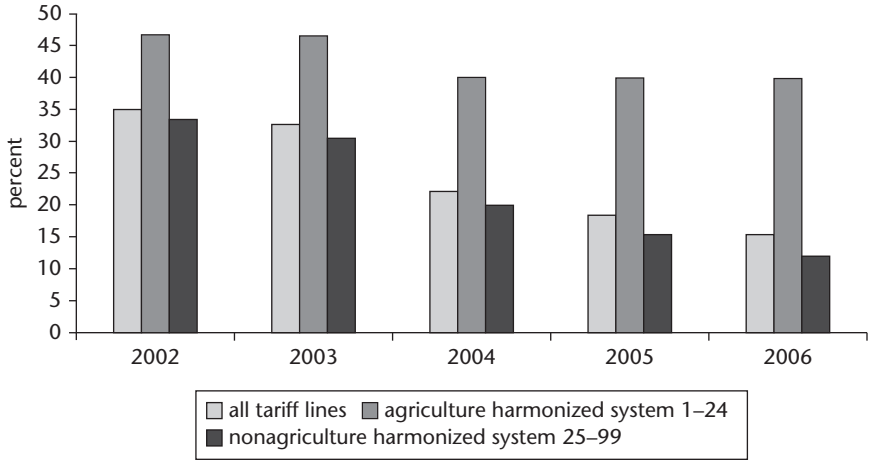
Since 1992, the exchange rate has been managed by regular adjustments of the nominal rates (figure 10.1). However, as of the mid 1990s—five years after the 1991 reforms—about two-thirds of tradable GDP was still protected by some type of explicit nontariff barrier: about 36 percent of manufacturing, 84 percent of agriculture, and 40 percent of mining. During the second half of the 1990s, this began to change, in large measure as a response to international pressures linked to agreements and negotiations associated with the conclusion of the Uruguay Round of the General Agreement on Tariffs and Trade. Starting in 1998, India's general import licensing system was gradually dismantled, and on April 1, 2001, the last 715 of 2,714 tariff lines (including nearly all the agricultural tariff lines) were removed and the system itself was abolished.

After the lifting of the import licensing controls, existing tariffs proved more than adequate to keep out competing imports, both manufactured and agricultural. At the same time, manufactured exports entered a new phase of very rapid expansion (20–25 percent annually during 2001–08), a trend that was bolstered by

similarly fast growth of services exports. Together with increased capital inflows, these developments created a strong balance of payments and historically high foreign exchange reserves (more than US$300 billion by August 2008), and were accompanied by fast economic growth (almost 9 percent per year during 2005–08).

In response to the new confidence that these changes created, drastic reductions in industrial tariffs were begun in April 2003. Over the next four years, the average industrial tariff was reduced by approximately two-thirds, from over 33 percent to about 12 percent (figure 10.2). A further tariff reduction was launched in the 2007 budget. All told, as measured by average ad valorem industrial tariffs, these cuts allowed India to shift from being one of the world's most protected countries to one of the world's lowest-protection countries. The tariff reduction programs of the 2000s, however, did not include agriculture and processed foods. In 2006, unweighted average tariffs protecting these sectors (Harmonized System 01–24) were about 40 percent (figure 10.2), almost four times the level of India's average industrial tariffs and among the highest in the world. This high level of formal agricultural protection, combined with high input subsidies, allows considerable scope for the past antiagricultural bias of the system to move to a pro-agricutural policy bias. The situation on the agricultural

Figure 10.2. Unweighted Average Tariffs on Imports of Agricultural and Nonagricultural Goods, India, 2002–06



Source: Authors' computation based on data in Goyal (2007–08 and earlier years).

Note: Tariffs for 2002 and 2003 include para-tariffs that were abolished in 2004. Averages are of ad valorem tariffs only and do not account for specific components of compound duties.

tariff front, however, changed dramatically in 2007–08, when global commodity prices shot up: India lowered tariffs on edible oils, grains, and other food commodities and imposed export controls on rice, wheat, and corn.

Trade and exchange rate policies: Pakistan, Bangladesh, and Sri Lanka

Because of their common history as British colonies, it is not surprising that there are many similarities between the trade and exchange rate policies of Bangladesh, India, Pakistan, and Sri Lanka. Soon after independence, Pakistan adopted an import substitution strategy that protected manufacturing firms against imports behind tariff and nontariff barriers. Sri Lanka followed similar highly interventionist trade policies. When it seceeded from Pakistan in 1971, Bangladesh gave special emphasis to the import substitution policies it inherited, since up to that point few manufacturing activities had been established in its territory. Like India, Pakistan and Sri Lanka fixed their nominal exchange rates during the 1960s but inflation rapidly appreciated their real exchange rates. Both countries attempted to manage the resulting current account pressures through schemes that raised the rupee price of foreign exchange for manufactured exports and for remittances from nationals working in foreign countries. However, the "traditional" agricultural exports that accounted for the largest share of total export earnings (about 90 percent in Sri Lanka) were subject not only to the overvalued official rate, but also to export controls and high export taxes. In Pakistan, trade policies strongly discriminated against rice and cotton and, prior to 1971, against jute and tea, which were produced in East Pakistan. In Sri Lanka, policies discriminated against the principal export crops—tea, rubber, and coconut products.

In Pakistan, a big devaluation of the rupee in 1971/72—by about half in relation to the U.S. dollar—reduced growing foreign exchange distortions for some time. But during the rest of the 1970s, domestic inflation continued to appreciate the real exchange rate and erode export competitiveness. This changed in 1981, when a long series of nominal devalutions that consistently exceeded the excess of Pakistan's domestic inflation over average inflation in its principal trading partners commenced. Real devaluation (as measured by Pakistan's REER index), which occurred in nearly every year between 1981 and 2004 and totalled about 137 percent over the 23 years, was particularly steep between 1984 and 1990 (about 67 percent).[7] As in India, this long-term devaluation underpinned sweeping trade liberalization reforms during the 1990s that removed most quantitative restrictions and drastically cut tariffs. However, Pakistan has retained its "positive list" system (a by-product of its difficult political relations with India) which prohibits imports from India of products not on the list. Combined with rules (enforced

by both countries) against trade across the land border and bureaucratic obstacles to trade with Pakistan on the Indian side, bilateral trade—especially of agricultural products—has been reduced to very low levels compared with its potential.

During Bangladesh's early independence years after 1971, the taka exchange rate initially reflected the simultaneous devaluation of the Pakistani rupee. But the general political, social, and economic disruption caused by the war surrounding the secession was exacerbated by drought and floods and led to high inflation. Despite continuing use of quantitative import restrictions and high tariffs, this created serious problems for the tradable sectors, prompting the government to respond in 1975 with a very large taka devaluation, estimated at about 66 percent in real terms (Rahman 1994). The taka continued to be devalued until 1980, in real terms by about another 16 percent. Since 1980, in marked contrast to India and Pakistan, Bangladesh has managed its exchange rate so as to keep the REER index quite stable around a slowly devaluing long-term trend of just under 1 percent per year. During the 1980s, this was sufficient to ensure that the secondary rate did not diverge substantially from the official rate, and made it possible to gradually merge the two rates and unify them in January 1992. Bangladesh's action was also sufficient to support a sweeeping trade liberalization program that started slowly in the second half of the 1980s and accelerated between 1991 and 1996 with drastic tariff reductions and the removal of most quantitative restrictions. This was possible principally because of the expansion of foreign exchange earnings from workers' remittances and garment exports. However, further trade liberalization stalled and went into reverse starting in 1997, with increasing use of para-tariffs on top of customs duties and tariff escalation to protect import substitution manufacturing and a number of agricultural products.

In Sri Lanka, from the late 1950s to 1977, under the government's import substitution strategy, exchange controls, tariffs and nontariff barriers, and a formal dual exchange rate system after 1968, supported the official exchange rate at increasingly overvalued levels. This was followed by a major trade policy liberalization in 1977 that included a nominal devaluation of about 75 percent, abolition of the dual exchange rate system, substantial reductions in quantitative restrictions, and tariff protection of manufacturing and of some agricultural industries. Export taxes on plantation crops were reduced during the 1980s and eventually removed in 1992. A second wave of trade liberalization started in 1991/92 and continued—albeit erratically and with some backtracking—during the 1990s and into the 2000s. As in Bangladesh, this was made possible by the rapid and sustained expansion of garment exports, which now account for about 60 percent of total exports, compared with less than 10 percent before the 1977 reforms. Currently, Sri Lanka has an open trade policy regime without nontariff barriers and

with moderate tariff-based protection of agriculture approximately equivalent to the tariffs protecting the import-competing sectors of manufacturing. Within agriculture, the most intervention-prone products are rice and several other import-competing food products, notably potatoes, onions, and chilies. Input subsidies for agriculture have also continued, especially very substantial fertilizer subsidies.

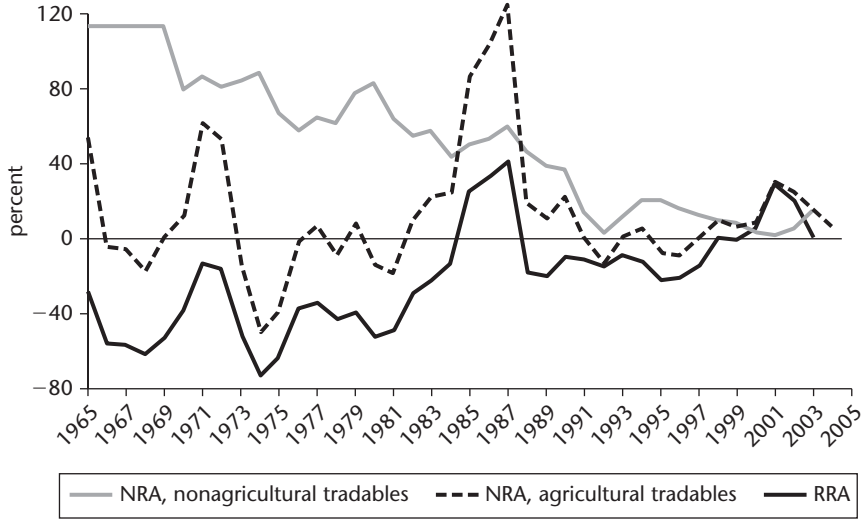
Regional agricultural trade

A by-product of India's highly protective agricultural trade policies is that trade in primary and processed agricultural and livestock products between India and its South Asian neighbors has been badly hindered.[8] Ironically, the biggest hindrance very likely has been to Indian exports to these countries rather than to Indian imports from the region. However, in Bangladesh and Sri Lanka, it also reflects a realistic assessment that agricultural free trade with India would generate more agricultural imports from India than exports to India, in the process threatening the viability of some of these countries' more highly protected agricultural industries, such as sugar, various fresh fruits and vegetables, and a wide range of processed foods in Bangladesh; and rice, potatoes, onions, and possibly dairy products in Sri Lanka. Bilateral trade between India and Pakistan is also hostage to the two countries' difficult political relationship, as reflected in Pakistan's "positive list" of products that can be legally imported from India. This list includes almost no agricultural products, and rules enforced in both countries (with a few minor exceptions) do not allow trade over the land border.[9]

Long-Run Trends in Assistance to Agriculture

The main focus of the present study's methodology is on government-imposed distortions that create a gap between actual domestic prices and what they would be under free markets. Since it is not possible to fully comprehend the characteristics of agricultural development with a sectoral view alone, the project's methodology estimates both the effects of direct agricultural policy measures (including distortions in the foreign exchange market) and distortions in nonagricultural sectors for comparative evaluation. Specifically, NRAs are computed for farmers including any input subsidies and non-product-specific (NPS) forms of assistance or taxation. A production-weighted average NRA for nonagricultural tradables, for comparison with that for agricultural tradables via the calculation of a relative rate of assistance (RRA; see Anderson et al. 2008a, 2008b), is also generated. Figures 10.3 to 10.6 show long-run trends in aggregate NRAs for agriculture, aggregate NRAs for manufacturing (plus mining, in the case of India), and

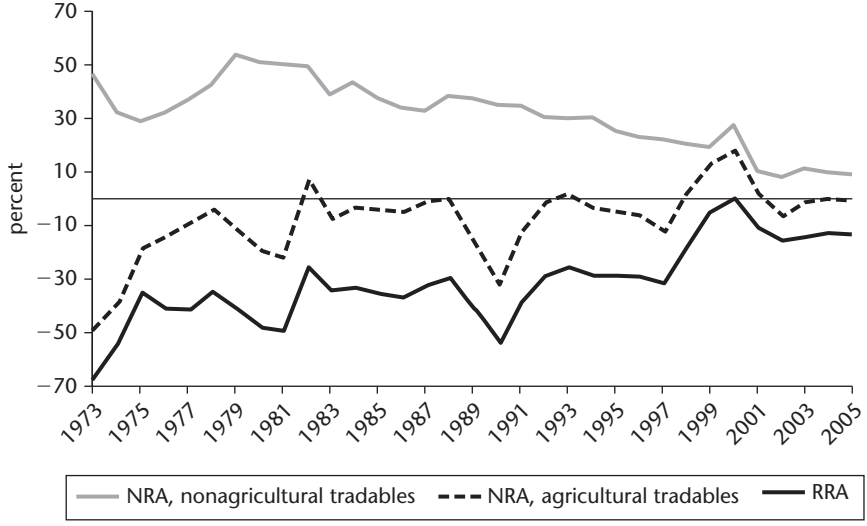
Figure 10.3. NRAs to all Agricultural Tradable Industries, All Nonagricultural Tradables, and RRAs,[a] India, 1965–2004



Source: Pursell, Gulati, and Gupta (2009).

a. The RRA is defined as 100*[(100 + $NRAag^t$)/(100 + $NRAnonag^t$) − 1], where $NRAag^t$ and $NRAnonag^t$ are the percentage NRAs for the tradable parts of the agricultural and nonagricultural sectors, respectively. The 1965–69 manufacturing and mining NRAs are guesstimates.

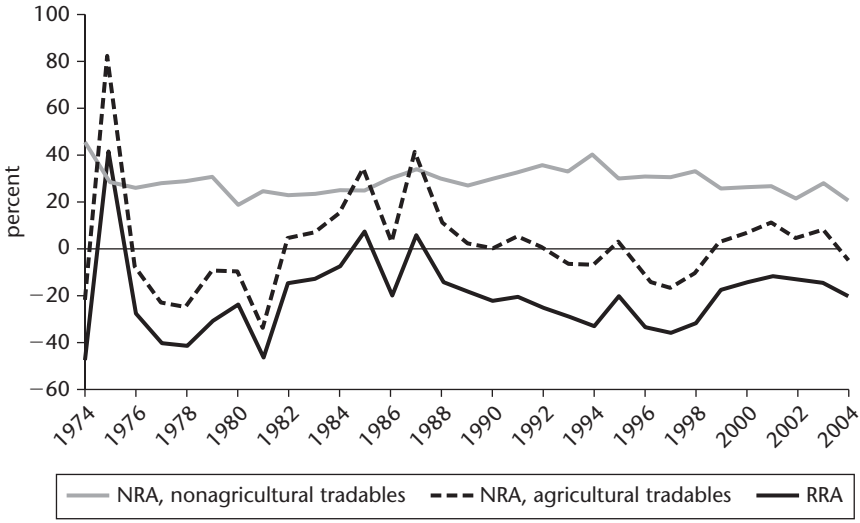
Figure 10.4. NRAs to all Agricultural Tradable Industries, All Nonagricultural Tradables, and RRAs, Pakistan, 1973–2005



Source: Dorosh and Salam (2009).

a. The RRA is defined in the note to figure 10.3.

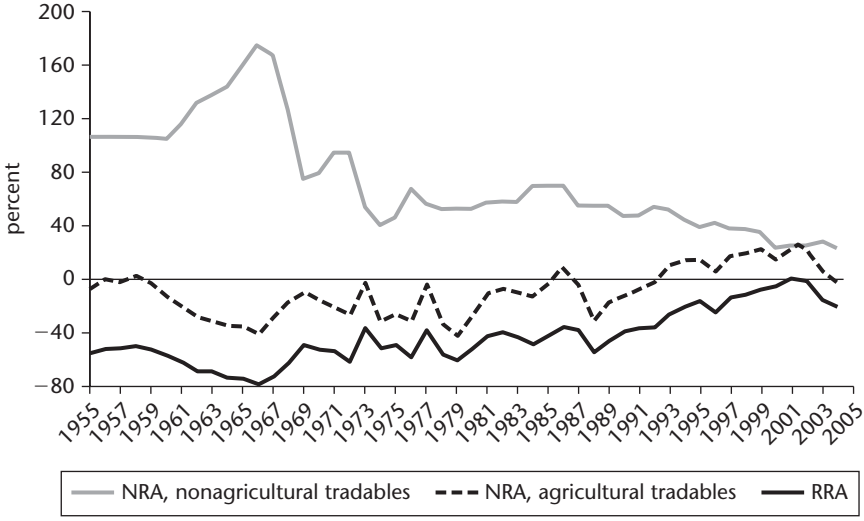
Figure 10.5. NRAs to All Agricultural Tradable Industries, All Nonagricultural Tradables, and RRAs, Bangladesh, 1974–2004



Source: Ahmed, Bakht, Dorosh, and Shahabuddin (2009).

a. The RRA is defined in the note to figure 10.3.

Figure 10.6. NRAs to all Agricultural Tradable Industries, All Nonagricultural Tradables, and RRAs, Sri Lanka, 1955–2004



Source: Bandara and Jayasuriya (2009).

a. The RRA is defined in the note to figure 10.3.

aggregate RRAs over 1965–2005 for the four South Asian countries included in the study.

NRAs

Table 10.3 shows the agricultural sector products for which there are long-term NRA estimates and that are included in the country aggregations. At undistorted prices, on average during 2000–04, these products accounted for about 70 percent of the total value of Indian agricultural production. Following this project's methodology, the total includes all crops and livestock production but excludes fisheries and forestry. At the end of the four-year period, fruit and vegetables accounted for about one-third of the value of production in the Indian sample, raw milk for about one-fifth, paddy rice for 17 percent, wheat for 9 percent, and the other nine crops (sorghum, maize, pulses, four types of oilseeds, sugar cane, and seed cotton) for the remaining 20 percent. In the 1960s and early 1970s, wheat and rice represented more than half the sample and fruit and vegetables about a quarter.

Because the agricultural sectors in Bangladesh, Pakistan, and Sri Lanka are much less diversified than India's, a small number of products account for a large share of total agricultural production. Long-term NRA estimates examined here include seven products that accounted for 72 percent, 71 percent, and 64 percent, respectively, of the total value of production of their agricultural and livestock sectors during 2000–05. In Pakistan, the dominant product is wheat, followed by milk—together, these are generally just under half of total agricultural production and two-thirds of Pakistan's aggregate NRA time series. In Bangladesh, the dominant product is rice, which is generally 55–60 percent of the value of agricultural production and represents three-quarters to four-fifths of Bangladesh's aggregate NRA time series. The other five products in the Bangladesh sample (wheat, sugar cane, fresh vegetables [represented by potatoes], jute, and tea) together are only around 15 percent of agricultural production and have about a 20 percent weight in the aggregate NRA series.[10]

Table 10.3 also indicates the tradable status of the covered products. Over the 40 years analyzed for India, four of the 13 products were importable or nontradable; two were either exportable or nontradable; and the remaining seven fluctuated between importable, exportable, and nontraded status. However, the country studies for Bangladesh, Pakistan, and Sri Lanka treated all the products included in their long-run NRA samples as either importable or exportable over the whole period, with the exception of potatoes in Bangladesh (representing fresh vegetables), which is classified as nontradable in every year. These differences in the treatment of tradable status in the case studies—and therefore in the way NRAs are estimated—complicate comparisons of NRAs among the four countries.[11]

Table 10.3. Trade Status of Farm Commodities, South Asian Countries,[a] 1965–2005

	India	Pakistan	Bangladesh	Sri Lanka
Common rice/paddy	X/NT	X	M	M
Basmati rice/paddy		X		
Wheat	M/X/NT	M	M	
Maize	M/X/NT	M		
Sorghum	M/X/NT			
Pulses (chickpeas)	M/NT			
Groundnuts	M/X/NT			
Rape/mustard seeds	M/NT			
Soya beans	M/X/NT			
Sunflower seeds	M/NT			
Sugar/sugar cane	M/X/NT	M	M	
Cotton lint/seed cotton	M/X/NT	X		
Jute			X	
Tea			X	X
Rubber				X
Coconut/coconut products				X
Chilies				M
Potatoes			NT	M
Onions				M
6 fresh fruits and 7 vegetables	X/NT			
Processed and raw milk	M/NT	M		
% coverage, 2000–04 or 2000–05	70	72	71	64

Source: Authors' compilation, based on the country case study spreadsheets.

a. M, X and NT indicate whether the product was classified as importable (M), exportable (X), or as a nontraded tradable (NT). In Pakistan, Bangladesh, and Sri Lanka all the covered products were classified as M or X for the entire period (except for potatoes in Bangladesh, which were classified NT and asumed to represent all vegetables). The India study recognized that tradable status can change from year to year depending on the location of domestic prices with respect to import and export parity prices, so for example M/X/NT means that wheat was importable in some years, exportable in some years, and nontraded in others. The Bangladesh and Sri Lanka country studies do not allow for the port and domestic handling costs of imports and exports and compare domestic prices directly with cif or fob prices. Blank cells mean that a long term NRA series is not available for that product. The coverage percentages are the share of the total value of the output of the covered products in the country's total agricultural output, both measured at undistorted prices. The total value of agricultural output is at farm level and excludes fisheries and forestry activities. Including fisheries in total agricultural production would substantially reduce the Bangladesh coverage percentage.

In addition to output price distortions, the aggregate long-term NRA series in figures 10.3 to 10.6 also include the output price equivalent of input subsidies expressed as a percentage of the undistorted price. In India, these are the sum of fertilizer and electricity subsidies, for which estimates have been available since 1984. They have been allocated to the various crops in the manner summarized in table 10.4. The Pakistan and Bangladesh NRA estimates include just fertilizer

Table 10.4. NRAs, TBIs and Dispersion of Covered Farm Products,[a] South Asia, 1965–2004
(percent)

	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–04
India								
NRA, importables	41	53	74	59	82	38	23	34
NRA, exportables	−30	−22	−36	−28	−7	−15	−12	−6
NRA, all agricultural products	0	0	−6	2	25	2	1	16
TBI[b]	−0.51	−0.50	−0.63	−0.55	−0.48	−0.38	−0.28	−0.29
Dispersion[c] (13 products)	43	18	7	19	49	47	13	24
Pakistan								
NRA, importables	45	19	−4	−2	5	−8	−2	3
NRA, exportables	−35	−20	−33	−29	−32	−17	−4	−7
Total agricultural NRA	15	7	−8	−6	−4	−7	−2	1
TBI[b]	−0.55	−0.27	−0.31	−0.28	−0.35	−0.10	−0.02	−0.09
Dispersion[c] (7 products)	106	75	43	50	65	32	28	40
Bangladesh								
NRA, importables	—	−21	7	−2	24	0	−8	6
NRA, exportables	—	−29	−35	−26	−32	−33	−10	−33
Total agricultural NRA	—	−21	3	−4	17	−2	−8	4
TBI[b]	—	−0.10	−0.30	−0.23	−0.45	−0.33	0.00	−0.37
Dispersion[c] (6 products)	—	52	71	68	191	78	68	101

Sri Lanka								
NRA, importables	−6	9	−4	−1	−2	22	32	13
NRA, exportables	−39	−41	−45	−31	−21	−24	−2	6
Total agricultural NRA	−25	−16	−26	−14	−10	−1	12	9
TBI[b]	−0.35	−0.45	−0.43	−0.31	−0.18	−0.38	−0.25	−0.05
Dispersion[c] (7 products)	21	32	25	23	22	25	21	13

Source: From Anderson and Valenzuela (2008), based on the country case study spreadsheets.

Note: — = not available.

a. The Pakistan statistics in the last column are the averages for 2000–05. The statistics for Bangladesh in the 1970–74 column are for 1974 only. The NRA for total agriculture include guesstimates of the average NRA of the noncovered section of the agricultural sector (which are not based on explicit price comparisons). Because of differences in the way importables and exportables are defined the NRAs and TBIs for India cannot be compared with the TBIs for the other countries (see notes to table 10.3).

b. The trade bias index, TBI = $(1 + NRAag_x/100)/(1 + NRAag_m/100) - 1$, where $NRAag_m$ and $NRAag_x$ are the average percentage NRAs for the import-competing and exportable parts of the agricultural sector.

c. Dispersion of the NRAs of the covered products (including products classified as nontraded) is the simple five-year average of the annual standard deviation around the weighted mean NRA of all covered products (in other words, importables, exportables and nontradeds).

subsidies. Sri Lanka's estimates, however, could not be quantified and allocated to the covered crops.

There are a number of striking features of the aggregate NRA time series. First, in Bangladesh, India, and Pakistan, they average close to or just slightly below zero over the whole period, albeit with large fluctuations. Sri Lanka is different, with negative average NRAs up to 1993. The zero or negative NRAs in each of the four countries are despite pervasive nontariff barriers to imports—especially during the earlier years—and high tariffs continuing into the 2000s.

Second, in Bangladesh, India, and Pakistan, there is practically no trend in the agricultural NRAs over the four decades surveyed, while in Sri Lanka there is a slowly increasing trend from about the late 1970s. This is despite a long-term, very substantial decline in world agricultural prices during the same period.

Third, in all four countries during most periods, NRAs for importables have been positive, while NRAs for exportables generally have been negative, so that the trade bias indexes (TBIs) for exportables over the period have mostly been negative and quite high (table 10.3). This is consistent with the policies followed until the early 1990s, whereby export earnings from traditional agricultural exports were exchanged at overvalued official exchange rates and also subject to export taxes, and only nontraditional exports (in practice manufactures) received more favorable exchange rates or were eligible for export subsidies of various kinds.

Fourth, in all four countries the NRAs fluctuate widely around their trend values. These fluctuations are mainly due to large gyrations in international prices combined with largely successful efforts by South Asian governments to stabilize domestic prices. In India, for example, the NRAs were lowest in 1974 when international agricultural prices were at record highs, and highest around 1987 when (in real terms) international agricultural prices were at record lows. For most of the past four decades, as in 2007–08, export restrictions have generated an implicit export tax that has varied substantially as international prices have moved up.

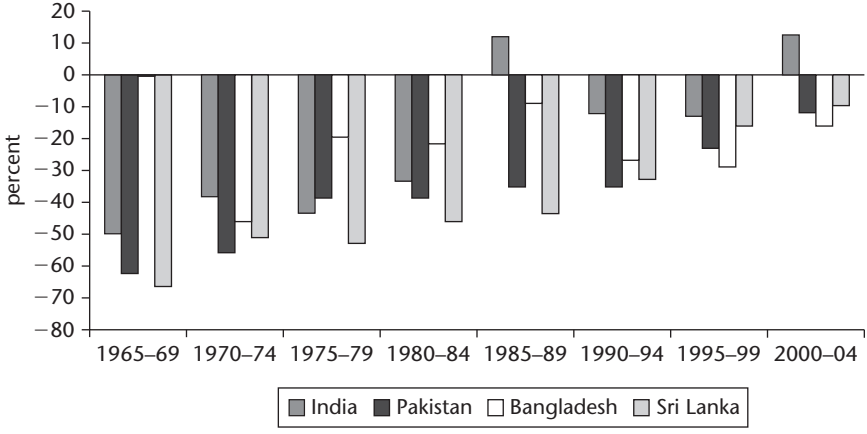
Fifth, the dispersion of NRAs across the covered products is quite wide in each of the countries (table 10.3). It is highest in Bangladesh and Pakistan, mainly due to the contrast between the high protection of sugar cane in both countries and (pre-1990) of milk in Pakistan, and also the export taxes and hence negative NRAs of these countries' exportables. In India, NRA dispersion is affected by high protection of sugar cane, rape and mustard seeds, and (until the mid-1990s) dairy (milk). In Sri Lanka, the extent of the dispersion is mainly due to high protection of import substitution potatoes, onions, and chilies contrasted with the taxation of agricultural exports. No obvious long-term trend in dispersion is apparent in Bangladesh and India, but since about 1990 previously very high NRA dispersion seems to have come down in Pakistan, and was markedly lower in Sri Lanka during 2000–04 than in previous years.

Sixth, the contribution of covered products from fertilizer and electricity subsidies to the NRA has steadily increased in India. During 2000–04, subsidies contributed almost 10 percentage points to an average NRA of 16 percent. The Pakistan country study estimates that after 1990, the fertilizer subsidy added about 3 percentage points to the NRAs for wheat, paddy rice, cotton, and sugar cane, compared to about 7 percentage points before 1990 when non-nitrogenous fertilizers were also subsidized. The estimated contribution to NRAs in Bangladesh appears to be considerably lower, however, with only about 1 or 2 percentage points added to the wheat and potato NRAs.

RRAs

The incentives facing farmers depend not only on the agricultural NRAs but also on how trade and other price-distorting policies affect incentives facing producers in other tradable sectors. In order to see how relative incentives have evolved in the four countries, figures 10.3 to 10.6 compare the NRAs for agriculture (the middle line in each graph) with estimates of NRAs for nonagricultural tradables (the top line). Comparing these gives the RRA, or the percentage difference between the agricultural NRA and the nonagricultural NRA,[12] shown (except for a few years in India) as the bottom line in each graph. Five-year averages of each country's RRAs are shown in figure 10.7.

Figure 10.7. RRAs, South Asia, 1965–2004



Source: From Anderson and Valenzuela (2008), based on the country case study spreadsheets.

a. The RRA is defined in the note to figure 10.3.

The nonagricultural NRA series for India is a weighted average of estimated NRAs for manufacturing and mining. In Pakistan, it covers all of nonagriculture tradables (mainly manufacturing), while in Bangladesh and Sri Lanka just manufacturing. The services sectors of the four countries are assumed to be nontradable. Because estimating a long-term assistance rate series for a country's manufacturing and other tradable sectors would be a major research task in itself, the reliability of the estimates for these four countries depends on the availability of prior empirical research and the plausibility of the shortcuts used. In this regard, a major problem in South Asia is that owing to their often prohibitively high levels and to pervasive quantitative trade restrictions in the past, tariffs are not reliable guides to protection levels, especially for manufacturing. Though the India case study was able to use the results of previous detailed research on trends in implicit manufacturing protection (Pursell, Kishor, and Gupta 2007) combined with new estimates for India's mining sector, estimates for the other three countries are more problematic, particularly those for Bangladesh and Sri Lanka, which rely on inferences from changing tariff levels plus the assumption that the NRAs of manufactured exports were zero over the entire period. Consequently, the nonagricultural NRA series and hence the RRAs are at best rough approximations that could change with further research.

Despite these shortcomings, the India and Pakistan nonagricultural NRA series are broadly consistent with the known history of these countries' trade policies, including periodic devaluations, long-term trends in their real exchange rates, and trade policy liberalization episodes. In India, in particular, the downward trend of India's nonagricultural NRA from very high levels in the 1960s was associated with the long-term real rupee devaluation between 1966 and 1979 and between 1985 and 1992, and the trade policy liberalizations that began in the 1980s and continued into the 2000s (figure 10.1). The Pakistan series (figure 10.4) reflects the sharp devaluation in 1971 that more than doubled rupee border prices and correspondingly cut estimated implicit protection, the long-term real devaluation that started in 1981, and the trade liberalization reforms of the 1990s. Nonagricultural NRAs trended down in Bangladesh (from 1994) and in Sri Lanka (from 1986), consistent with the timing of import policy liberalization and both countries' rapidly growing garment export sectors. However, in other respects, the connections between these series and real exchange rate changes and trade policy developments in the two countries is less apparent and could benefit from further research.[13]

Subject to these caveats, the South Asian RRAs tell some interesting stories. First, for all four countries, they are negative in all years except the last four in India, indicating that incentives for these countries' rural sectors have been less than incentives for their nonagricultural tradable sectors. Second, the RRAs

confirm earlier research indicating that up to the mid-1980s there were very high antiagricultural biases in the RRAs (here estimated at between minus 40 to minus 60 percent) for India, Pakistan, and Sri Lanka, and expand this result to include Bangladesh, where, according to these estimates, there was a similar very high antiagricultural bias during the first half of the 1970s and a negative but less marked antiagricultural bias into the mid-1980s. Third, in India, Pakistan, and Sri Lanka, there has been a clear, long-term decline in antiagricultural bias: by the first five years of the 2000s, the RRA indicator for India had turned slightly positive (about +10 percent), while those for Pakistan and Sri Lanka RRA were only mildly negative (about −12 percent on average). There are no equivalent long-run trends in the Bangladesh series. According to these estimates, the antiagricultural bias was still very high during the 1990s (between −20 and −36 percent), but this too came down between 1999 and 2004, to an average of about −16 percent. Fourth, in India and Pakistan, the long-run downward trends in nonagricultural NRAs—especially falling manufacturing protection rates—have been by far the main force squeezing out the antiagricultural bias. As discussed above, over the 41 years of the study there was no clear long-term upward trend in these countries' agricultural NRAs. However, the pattern was different in Sri Lanka, where the long-term increasing (less negative) trend of the RRAs resulted from both declining manufacturing NRAs and increasing (less negative) agricultural NRAs. Finally, the absence of any clear long-term trend in Bangladesh's consistently negative RRAs is the result of approximately trendless NRAs for both agriculture and manufacturing. The latter is a somewhat unexpected result in view of the fairly comprehensive trade policy liberalization that occurred during the late 1980s and early 1990s, and the rapid expansion of Bangladesh's garment export industry.

Where Are South Asian Agricultural Policies Heading?

Between 2000 and 2005, RRA indicators in South Asia indicate that, with the exception of Bangladesh, past antiagricultural discrimination created by trade and other policies evolved to approximate neutrality between the agricultural and nonagricultural traded sectors. What is the likely direction of future policies in the region? Since what matters is relative protection or assistance, the answer to this question depends on the probable direction of the trade and trade-related policies affecting these countries' nonagricultural (especially manufacturing but also mining and, increasingly, internationally traded services) and agricultural sectors.

Regarding nonagricultural trade policies, protection levels in the manufacturing and mining sectors in India are now constrained by low tariffs. Even in the few industries that are still protected by high tariffs—such as textile fabrics, garments,

and automotive assembly—growing exports and domestic competition suggest that it is unlikely prices will rise much above world prices in the foreseeable future. India's large, low-cost export-oriented services sector is highly competitive internationally, a scenario that is also not likely to change in the short term. In Bangladesh, Pakistan, and Sri Lanka, while nearly all manufacturing quantitative restrictions have been removed, tariffs protecting import-substituting manufacturing are on average higher than in India. This is especially the case in Bangladesh, where, since about 1997, the increasing use of para-tariffs on top of customs duties and steep tariff escalation is providing very high nominal and effective protection for many import-substitution industries. However, these countries have large, rapidly growing export industries, notably textiles and clothing in Pakistan and clothing (ready-made garments) in Bangladesh and Sri Lanka. These export-oriented industries account for much larger shares of total manufacturing GDP than do India's manufactured exports—about 40 percent in Pakistan, and probably a quarter to a third in Bangladesh and Sri Lanka. As long as the export expansion of these industries continues and is not slowed down or blocked by restrictive import policies, especially in developed countries, it seems unlikely that overall manufacturing protection will increase in the future, at least in Pakistan and Sri Lanka. The likely future direction of average manufacturing sector NRAs in Bangladesh is less certain, however, in view of the protectionist import-substitution policies that have been in place for the past 10 years.

If South Asia's nonagricultural trade policies do not become more protective in the future, the trajectory of relative assistance for agriculture will depend principally on the future path of agricultural protection and subsidy policies. The political economy surrounding this issue is complex, with some forces and arguments making it likely that a protectionist path for agriculture will be followed, and others constraining this kind of development.

Politically, important considerations that favor protection over open trade policies are the very high share of employment in the South Asian rural sector, the desire to insulate farmers from the large price fluctuations that occur in world agricultural markets, and the feeling that each country should be self-sufficient (or nearly self-sufficient) in the production of basic foods and other agricultural commodities. The surge in global food prices in 2007–08, during which export bans of staple food products were instituted by some countries, served to reinforce this feeling of self-sufficiency. In India, the argument for self-sufficiency, and thereby protection, is further reinforced by the widely shared belief that Indian demand is too large to rely on world markets for supplies in the event of serious crop failures or other disruptions to supplies. In Sri Lanka, agricultural protection has an ethnic dimension, as past agricultural trade liberalization mostly affected Tamil farming areas and protection and subsidies favored Sinhalese farmers.

In India, the political economy forces enumerated above are the basic reasons for the exclusion of agriculture and the food processing industries from trade liberalization reforms in 1991, for the fixing of very high tariff bindings (the majority at 100 percent or 150 percent) during the Uruguay Round negotiations, and for leaving agriculture out of the unilateral tariff reduction program that began in 2003. Most of the Uruguay Round Agreement on Agriculture tariff bindings of Pakistan (100 percent) and Bangladesh (200 percent) are also prohibitive or almost prohibitive: only Sri Lanka's bindings (all at 50 percent) seem to envisage limiting increases in applied tariffs to levels at which imports might be possible. But average applied agricultural tariffs in Pakistan and Sri Lanka (23 percent and 28 percent, respectively, in 2003) are well below the average in India (40 percent in 2005).

However, because of the very high share of food in South Asian family budgets, there are strong pressures to keep agricultural prices low. For many years, this was a major objective of agricultural policies and was compatible with expanding production and increasing national self-sufficiency, largely resulting from successful adoption of green revolution technologies in crop agriculture. There were further benefits to low-income households from subsidized rice and wheat supplied through the PDS system in India and equivalent schemes in Bangladesh, Pakistan, and Sri Lanka.

There are no organized groups in South Asia representing the interests of food consumers, like those that represent farmers and food processors. Nevertheless, in all the South Asian countries politicians and bureaucrats are aware of and sensitive to the consumer interest in food prices, especially mass staple products. In this way, consumer interests remain important counter-forces to producer lobbies pressing for higher agricultural prices. However, it appears that consumer interests are unlikely to provide much resistance to increasing agricultural protection if domestic and external conditions create strong producer pressures in that direction. Medium- or long-term scenarios favoring increasing protection could include the following elements: domestic production of major crops such as rice and wheat falling behind domestic demand, resulting in pressure for price increases or increases in input subsidies to maintain self-sufficiency; falling world prices but (in real terms) stable or even slowly increasing domestic prices; real exchange rate appreciation reducing national currency border prices while domestic prices remain about the same or slowly increase; and no or limited progress in reducing agricultural protection in developed countries in World Trade Organization (WTO) negotiations.

Scenarios that might reduce or slow down pressures for increased agricultural protection include a long-term trend of increasing and more stable world prices. In this regard, the medium- and long-term outcomes of the surge in world

agricultural commodity prices during 2007 and 2008 will be very important. If world prices stabilize at significantly higher levels than past averages, South Asian countries are likely to reduce tariffs on agricultural products, or even impose export bans (as India has done on common rice, wheat, and corn), thereby reintroducing substantial antiagriculural bias into their incentive systems. Other scenarios that might work against increased agricultural sector protection include yield and other productivity increases—especially productivity increases in transport, storage, and marketing—or successful WTO negotiations on the reduction of developed-country protection and subsidies (especially export subsidies and domestic support) leading to greater willingness in South Asia to consider more open agricultural trade policies.

Notes

1. These four countries account for more than 98 percent of South Asian agricultural GDP. The region's smaller economies of Nepal, Bhutan, and the Maldives were not included in the project, nor was Afghanistan.

2. Here and in other places in this chapter, the term "agriculture" is used broadly to include not only crop agriculture (including horticulture) and livestock activities- the focus of the global Agricultural Distortions Project—but also inland and ocean fisheries and forestry activities. In the tables and figures reporting nominal rate of assistance (NRA) estimates and in most of the rest of the text, the word "agriculture" means crop agriculture, horticulture, and livestock activities. Whether the broad or narrower meaning of the term is intended should be apparent from the context.

3. Unless otherwise indicated, national fiscal years are measured as in the following examples: India 1997 = fiscal 1997/98 (April 1, 1997–March 31, 1998); Pakistan and Bangladesh 1997 = fiscal 1996/97 (July 1, 1996–June 30, 1997); and Sri Lanka 1997 = fiscal 1997 (January 1, 1997–December 31, 1997).

4. Bangladesh became independent from Pakistan in 1971 but separate data on the Bangladesh agricultural sector were not available until 1974. Before 1971, limited data and NRA estimates on agriculture in the then East Pakistan are included in the Pakistan country study. In particular, there is no information on rice production, NRAs, or policies in East Pakistan.

5. Indian palm oil and other edible oil tariffs were drastically reduced in 2008 in order to stabilize domestic prices during the global spike in commodity prices.

6. According to these statistics, the overall agricultural employment share of the four countries during 2000-04 was 57 percent, but somewhat surprisingly, compared to India, the agricultural employment share was lower in Bangladesh (54 percent) and much lower (46 percent) in Pakistan. These contrasts between the South Asian countries' agricultural employment rates are very likely to a large extent the result of differences in the design of national employment surveys.

7. For a discussion of real exchange rate changes in South Asia after 1980, see World Bank (2004).

8. Two exceptions are Bangladesh's rice imports from India and India's imports of raw jute from Bangladesh, both of which are subject to low tariffs. The bilateral rice trade was interrupted in 2008, however, as a result of export restrictions India imposed on rice in order to insulate its domestic market from sharp increases in world rice prices.

9. For a discussion of the constraints on and potential of Indian-Pakistan bilateral trade see Naqvi and Schuler (2007).

10. Generalizations from this product sample to Bangladesh's rural sector as a whole need to be qualified, owing to the importance of fisheries (omitted from this study) in Bangladesh.

11. Another difference is that in the India and Pakistan case studies, these price comparisons start with estimated free on board (fob) and cost, insurance, and freight (cif) prices at the border, which are

adjusted for port costs and domestic transport costs and margins and give import or export reference prices. However, the NRAs reported in the Bangladesh and Sri Lanka studies compare domestic prices directly with cif or fob prices without accounting for port or domestic handling costs and margins.

12. The RRA is defined as $100*[(100 + NRAag)/(100 + NRAnonag) - 1]$.

13. For example, the 1977 devaluation and trade policy reforms are not reflected in the Sri Lanka series, while the Bangladesh NRA series increases during the trade policy reform period in Bangladesh under which quantitative restrictions were removed and tariffs were reduced during the late 1980s and the first half of the 1990s.

References

Ahmed, N., Z. Bakht, P. A. Dorosh, and Q. Shahabuddin. 2009. "Bangladesh." In *Distortions to Agricultural Incentives in Asia,* ed. K. Anderson and W. Martin, 305–37. Washington, DC: World Bank.

Anderson, K., M. Kurzweil, W. Martin, D. Sandri, and E. Valenzuela. 2008a. "Methodology for Measuring Distortions to Agricultural Incentives." Agricultural Distortions Working Paper 02, World Bank, Washington, DC (and appendix A of this volume).

_____. 2008b. "Measuring Distortions to Agricultural Incentives, Revisited." *World Trade Review* 7 (4): 1–30.

Anderson, K., and W. Martin, eds. 2009. *Distortions to Agricultural Incentives in Asia*. Washington, DC: World Bank.

Anderson, K., and E. Valenzuela. 2008. *Global Estimates of Distortions to Agricultural Incentives, 1955 to 2007*. Core database at http://www.worldbank.org/agdistortions.

Bandara, J., and S. Jayasuriya. 2009. "Sri Lanka." In *Distortions to Agricultural Incentives in Asia,* ed. K. Anderson and W. Martin, 409–40. Washington, DC: World Bank.

Dorosh, P. A., and A. Salam. 2009. "Pakistan." In *Distortions to Agricultural Incentives in Asia,* ed. K. Anderson and W. Martin, 379–407. Washington, DC: World Bank.

Goyal, A. 2007–08 and earlier years. *BIG's Easy Reference Customs Tariff*. New Delhi: Academy of Business Studies.

Gulati, A., and G. Pursell. 2008. "Distortions to Agricultural Incentives in India and Other South Asia." Agricultural Distortions Working Paper 63, Washington, DC, World Bank.

Gulati, A., and S. Narayanan. 2003. *Subsidy Syndrome in Indian Agriculture*. New Delhi: Oxford University Press.

Hamid, N., I. Nabi, and A. Nasim. 1990. *Trade, Exchange Rate and Agricultural Pricing Policies in Pakistan*. Washington, DC: World Bank.

Naqvi, Z., and P. Schuler, eds. 2007. *The Challenges and Potential of Pakistan-India Trade*. Washington, DC: World Bank.

Pursell, G. 1999. "Some Aspects of the Liberalization of South Asian Agricultural Policies: How Can the WTO Help?" In *Implications of the Uruguay Round for South Asia: The Case of Agriculture*, ed. B. Blarel, G. Pursell, and A. Valdés, New Delhi: Allied Publishers for the World Bank.

Pursell, G., A. Gulati, and K. Gupta. 2009. "India." In *Distortions to Agricultural Incentives in Asia,* ed. K. Anderson and W. Martin, 339–77. Washington, DC: World Bank.

Pursell, G., N. Kishor, and K. Gupta. 2007. "Manufacturing Protection in India Since Independence." Australia South Asia Research Centre Working Paper 2007/7, Australian National University, Canberra.

Rahman, S. H. 1994. "The Impact of Trade and Exchange Rate Policies on Economic Incentives in Bangladesh Agriculture." Working Paper on Food Policy in Bangladesh 8, International Food Policy Research Institute , Washington, DC.

Sandri, D., E. Valenzuela, and K. Anderson. 2007. "Economic and Trade Indicators for Asia." Agricultural Distortions Working Paper 20, World Bank, Washington, DC. http://www.worldbank.org/agdistortions.

World Bank. 2004. "Trade Policies in South Asia: An Overview." Report 29949. World Bank, Washington, DC.

PART IV

GLOBAL MARKET AND WELFARE EFFECTS OF DISTORTIONS

11

WELFARE-BASED AND TRADE-BASED INDICATORS OF NATIONAL AGRICULTURAL DISTORTIONS

*Peter J. Lloyd, Johanna L. Croser, and Kym Anderson**

The methodology outlined in Anderson et al. (2008a, 2008b) and appendix A of this volume provides a number of ways to indicate the extent of distortions within the agricultural sector of a country (as distinct from between agriculture and other sectors, for which the relative rate of assistance indicator is used). They include the unweighted or weighted mean nominal rate of assistance (NRA) of covered products, the standard deviation of covered product NRAs, the weighted mean NRA for exportable versus import-competing covered products, and the trade bias index (TBI) defined as $[(1 + NRAag_x/100)/(1 + NRAag_m/100) - 1]$, where $NRAag_x$ and $NRAag_m$ are the weighted average percentage NRAs for the exportable and import-competing parts, respectively, of the agricultural sectors' covered plus noncovered products. The reason for reporting the latter indicators of dispersion in addition to the means—apart from being informative in their own right—is that theory suggests the national economic welfare cost of government policy distortions to incentives in terms of resource misallocation tends to be greater when the degree of substitution in production is greater (Lloyd 1974). In the case of agriculture, which involves the use of farmland that is sector-specific but very transferable among farm activities, the greater the variation of

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NRAs across industries within the sector, the higher the welfare cost of those market interventions.

While those various indicators of dispersion are useful, it would also be helpful to have a single indicator to capture the overall welfare or trade effect of each country's agricultural price distortion regime in place at any time. To that end, a theoretical literature has developed in recent years. This literature seeks to overcome aggregation problems across different intervention measures and across the product range by using a theoretically sound aggregation procedure that answers precise questions regarding the welfare and trade distortions imposed by each country's price and trade policies. The literature has developed considerably over the past two decades, particularly with the theoretical advances by Anderson and Neary (summarized in and extended beyond their 2005 book) and the theoretical simplifications by Feenstra (1995).

Notwithstanding these advances, few series of consistently estimated indexes have yet been estimated across time and even fewer across countries. A prominent exception is Kee, Nicita, and Olarreaga (2008, 2009), which estimates a series for developing and high-income countries, though it provides estimates for only a snapshot ìn time (the early 2000s). Other country-specific studies include an application to Mexican agriculture in the late 1980s (Anderson, Bannister, and Neary 1995) and a long time series for U.S. trade policy (Irwin forthcoming).

The purpose of this chapter is to provide estimates of indexes that are comparable across the focus countries and over the time period of the present study of global distortions to agricultural incentives. The estimates presented below make a significant contribution to the empirical literature in terms of welfare reduction indexes (WRIs) and trade reduction indexes (TRIs), as they provide the first panel set of consistent indexes for the agricultural sector for both developing and high-income countries. It is a global panel dataset that contains comparable estimates of annual NRAs and consumer tax equivalents (CTEs)[1] for a wide range of agricultural products (around a dozen per country) over the past half century for 75 countries that together account for nine-tenths of the world's population and agricultural production and 96 percent of global gross domestic product (GDP).[2]

The indexes estimated in this chapter are well grounded in theory: they belong to the family of indexes first developed by Anderson and Neary (2005) under the catch-all name of trade restrictiveness indexes. To date, members of that family of indexes sometimes have been distinguished by using various adjectives; at the same time, others have used the trade restrictiveness index term for measures that have a different theoretical backing (for example, the one used by the International Monetary Fund [IMF]—see Allen 2005). To avoid confusion, more precise descriptors of the distortions imposed by each country's border and domestic policies on its economic welfare and its trade volume are coined here: TRI and

WRI. The WRI is computed from subindexes that herein are called the producer distortion index (PDI) and the consumer distortion index (CDI). The PDI and CDI are needed if any product's NRA and CTE differ—that is, whenever there are domestic subsidies or taxes on production or consumption in addition to border measures, as there so often are for staple foods and other farm products.

Thus the indexes estimated here capture the welfare-reducing and trade-reducing effects of all policies directly affecting consumer and producer prices of farm products from all agricultural and food policy measures in place.[3] On the production side, by calculating the percentages by which domestic prices exceed border prices, the NRA estimates include assistance provided by all tariff and non-tariff trade measures, plus any domestic price support measures, plus an adjustment for the output-price equivalent of direct interventions on farm inputs. Where multiple exchange rates operate, an estimate of the import or export tax equivalents of that distortion are included as well (see Anderson et al. 2008a and appendix A of this volume). On the consumption side, CTE measures—also expressed as ad valorem rates—estimate the extent to which consumers are taxed or subsidized by various agricultural, social welfare, trade, and exchange rate policy measures. Like NRAs, the range of measures included in the CTE estimates is wide, including domestic consumer and border taxes and subsidies, and quantitative measures, so as to fully capture the wedge between the price that consumers pay for each commodity and the international price at the border adjusted to account for marketing margins, quality differences, and the like.

The TRI (or WRI) has the advantage of providing a theoretically sound partial equilibrium indicator of the trade (or welfare) effect in a single sectoral measure that is comparable across time and place. In this way, the TRI and WRI get somewhat closer to what a computable general equilibrium (CGE) can provide in the way of estimates of the trade and welfare (and other) effects of the price distortions captured by the product NRA and CTE estimates—and have the advantage of being able to indicate trends over time, which a comparative static CGE model can do only if it is calibrated to a series of past years rather than to just one particular year.[4] The TRI (or WRI) is defined as the ad valorem trade tax rate which, if applied uniformly across all tradable agricultural commodities in a country, would generate the same reduction in trade (or economic welfare loss) as the actual cross-product structure of NRAs and CTEs for that country.[5]

Because it is a mean of order two, the WRI measure better reflects the true partial equilibrium welfare cost of agricultural price-distorting policies than the NRA or CTE. In particular, the WRI captures the disproportionately higher welfare costs of peak levels of assistance or taxation. Also, the WRI and TRI measures overcome aggregation problems when there are different NRAs for subsectors within agriculture. For example, if policies affecting the import-competing and

exporting subsectors had offsetting effects on farmer incentives, the aggregate NRA estimate may be close to zero even though the welfare- and trade-restricting consequences are considerable. Anderson et al. (2008a, 2008b) deal with that by estimating separate NRAs and CTEs for each product and then for the import-competing and exporting (and nontradable) product subgroups, and by using those subsector means to calculate their TBI. The WRI and TRI are a more succinct and accurate method of summarizing that information.

Defining the WRI and TRI

The initial theoretical work on international trade distortions by Anderson and Neary, leading to their 2005 book, sought to derive a general equilibrium measure of the welfare-reducing effects of trade restrictions in a country's import-competing sector. They called this a trade restrictiveness index. The work was important in that it solved the problem of how to aggregate assistance across commodities in a theoretically meaningful way. Anderson and Neary (2005) solved the problem for a small, open economy in which imports are restricted by tariffs and nontariff measures (NTMs). They then provided variants of the trade restrictiveness index, including one based not on a welfare criterion but instead on an import volume criterion (the mercantilist trade restrictiveness index). In this chapter, a more general version of each of the Anderson and Neary indexes is developed for situations where, in addition to import measures, there are also export measures and possibly also direct domestic producer and consumer price distortions.[6] The two indexes presented here are developed first for agriculture's import-competing subsector and then for its exporting subsector.

The import-competing subsector

The theory presented here considers an individual country, assuming it has a small, open economy in which all markets are competitive. However, the market for an import good may be distorted by a tariff and other nontariff border measures or by behind-the-border measures such as domestic subsidies and price controls. First, the measure of the effect of a country's distortions on its import volume, the TRI, is examined. The TRI is defined as the uniform tariff rate which, if applied to all goods in the place of all actual tariffs and NTMs and other price distortions, would result in the same reduction in the volume of imports as the actual distortions.

Consider the market for one good, good i, which is distorted by a combination of measures that distort the consumer and producer prices. For the producers of the good, the distorted domestic producer price, p_i^P, is related to the world price,

$p_i^\star$, by the relation $p_i^P = p_i^\star(1 + s_i)$, where s_i is the rate of distortion of the producer price in percentage terms. For consumers of the good, the distorted domestic consumer price, p_i^C, is related to the world price by the relation $p_i^C = p_i^\star(1 + r_i)$, where r_i is the rate of distortion of the consumer price in percentage terms. In general, $r_i \neq s_i$. Using these relations, the change in imports in the market for good i is given by:

$$\Delta M_i = p_i^\star dx_i - p_i^\star dy_i \tag{11.1}$$

$$= p_i^{\star 2} dx_i / dp_i^C r_i - p_i^{\star 2} dy_i / dp_i^P s_i, \tag{11.2}$$

where the demand and the supply for good i, x_i and y_i, are functions of domestic price alone: $x_i = x_i(p_i^C)$ and $y_i = y_i(p_i^P)$, respectively. The neglect of cross-price effects, among other things, makes the analysis partial equilibrium.

Strictly speaking, this result holds only for small distortions. In reality, rates of distortion are not small. If, however, it is assumed that the demand and supply functions are linear, then the reduction in imports is given by equation 11.2 with the slopes of the demand and supply curves in price–quantity space (dx_i/dp_i^C and dy_i/dp_i^P, respectively) constant.

If the functions are not linear, this expression provides an approximation to the loss.

With n importable goods subject to different levels of distortions, the aggregate reduction in imports, in the absence of cross-price effects in all markets, is given by:

$$\Delta M_i = \sum_{i=1}^{n} p_i^{\star 2} dx_i / dp_i^C r_i - \sum_{i=1}^{n} p_i^{\star 2} dy_i / dp_i^P s_i. \tag{11.3}$$

Setting the result equal to the reduction in imports from a uniform tariff results in:

$$\sum_{i=1}^{n} p_i^{\star 2} dx_i / dp_i^C r_i - \sum_{i=1}^{n} p_i^{\star 2} dy_i / dp_i^P s_i = \sum_{i=1}^{n} p_i^{\star 2} dm_i / dp_i T. \tag{11.4a}$$

Solving for T results in:

$$T = \{Ra + Sb\}, \tag{11.4b}$$

where $R = \left[\sum_{i=1}^{n} r_i u_i \right]$ with $u_1 = p_i^{\star 2} dx_i / dp_i^C \Big/ \sum_i p_i^{\star 2} dx_i / dp_i^C$, (11.4c)

$$S = \left[\sum_{i=1}^{n} s_i v_i \right] \quad \text{with } v_i = p_i^{\star 2} dy_i / dp_i^P \Big/ \sum_i p_i^{\star 2} dy_i / dp_i^P, \tag{11.4d}$$

and $a = \sum_i p_i^{\star 2} dx_i / dp_i^C \Big/ \sum_i p_i^{\star 2} dm_i / dp_i$

$$b = -\sum_i p_i^{\star 2} dy_i / dp_i^P \Big/ \sum_i p_i^{\star 2} dm_i / dp_i. \tag{11.4e}$$

The TRI is best regarded as a true index of average distortion rates. More precisely, what is held constant is the value of imports in constant prices. R and S are indexes of average consumer and producer price distortions, respectively. They are arithmetic means. In the empirical section of this study, these are referred to as the NRA and the CTE.

Evidently, T can be written as a weighted average of the level of distortions of consumer and producer prices. An important advantage of using this decomposition of the index into producer and consumer effects is that it correctly treats the effects of NTMs and domestic distortions. It also allows one to deal with, and analyze, the production and consumption sides of the economy separately.[7]

In equations 11.4c and 11.4d, the weights for each commodity are proportional to the marginal response of domestic production (or consumption) to changes in international free-trade prices. These weights can be written as functions of the domestic price elasticities at the free trade points of supply (σ_i^*) (demand [ρ_i^*]) and the value of domestic production (consumption) at undistorted prices:

$$\begin{aligned} u_i &= \rho_i^*(p_i^* x_i^*) \Big/ \sum_i^n \rho_i^*(p_i^* x_i^*) \\ v_i &= -\sigma_i^*(p_i^* y_i^*) \Big/ \sum_i^n \sigma_i^*(p_i^* y_i^*). \end{aligned} \tag{11.5}$$

If, further, domestic price elasticities of supply (demand) are assumed to be equal across commodities, the elasticities in the numerator and denominator cancel, allowing R (S) by aggregating the change in consumer (producer) prices across commodities, using as weights the share of each commodity's domestic value of consumption (production) at undistorted prices.

Estimating T in equation 11.4b also requires an assumption about the weights a and b (equation 11.4e). The weight a (b) is proportional to the ratio of the marginal response of domestic demand (supply) to a price change relative to the marginal response of imports to a price change. If the domestic demand and supply curves have the same slope, then $a = b = 0.5$.

As a special case, if $r_i = s_i$ for all i—that is, if tariff rates are the only distortion, equation 11.4b reduces to a much simpler form:

$$T = \sum_{i=1}^{n} t_i w_i \qquad w_i = \varepsilon_i^*(p_i^* m_i^*) \Big/ \sum_i^n \varepsilon_i^*(p_i^* m_i^*). \tag{11.6}$$

Here, t_i is the ad valorem tariff rate, which is equal to the rate of distortion of both consumer and producer prices, and ε_i^* is the elasticity of import demand at the free trade point. T is the mean of the tariff rates. This case can be used to obtain an alternative expression for the general case. But one must be careful, as this alternative form requires computing an import-equivalent tariff rate for each tariff item when there is some distortion other than an ad valorem tariff. (The appendix to

Lloyd, Croser, and Anderson [2009a] derives the import-equivalent tariff and the alternative expression.)

The measure of the effect of a country's distortions on its welfare, the WRI, is examined next. The derivation follows the same steps as the derivation of the TRI, leading to a simple comparison of the two indexes.

The distortions in the market for good i create a welfare loss, L_i. This loss is given by the sum of the change in producer plus consumer surplus net of the tariff revenue. This loss of producer and consumer surplus is given simply by:

$$L_i = \frac{1}{2}\{(p_i^* s_i)^2 dy_i/dp_i^P - (p_i^* r_i)^2 dx_i/dp_i^C\}, \tag{11.7}$$

where demand and the supply for good i are again functions of domestic price alone.

Strictly speaking, this result too holds only for small distortions. For larger distortions, welfare losses are defined by the triangular-shaped areas under the demand and supply curves for the good. These areas can be obtained by integration. On the assumption that the demand and supply functions are linear, the welfare loss is given by equation 11.7 with dy_i/dp_i and dx_i/dp_i being constant.

If the functions are not linear, this expression provides an approximation to the loss.

In the special case where $r_i = s_i = t_i$, the expression reduces to

$$L_i = -\frac{1}{2}(p_i^* t_i)^2 dx_i/dp_i. \tag{11.8}$$

Equation 11.8 yields the fundamental result that the loss from a tariff is proportional to the square of the tariff rate. This holds because the tariff rate determines both the price adjustment and the quantity response to this adjustment.[8] If $r_i \neq s_i$, as is frequently true in agricultural markets, the expression in equation 11.7 yields the result that the consumer and the producer losses are each proportional to the square of the rate of distortion of the consumer or producer price, respectively.

With n importable goods subject to different levels of distortions, the aggregate welfare loss, in the absence of cross-price effects in all markets, is given by:

$$L = \frac{1}{2}\left\{\sum_{i=1}^{n}(p_i^* s_i)^2 dy_i/dp_i^P - \sum_{i=1}^{n}(p_i^* r_i)^2 dx_i/dp_i^C\right\}. \tag{11.9}$$

The uniform tariff rate that generates an aggregate deadweight loss identical to that of the differentiated set of tariffs is determined by the following equation:

$$\sum_{i=1}^{n}(p_i^* s_i)^2 dy_i/dp_i^P - \sum_{i=1}^{n}(p_i^* r_i)^2 dx_i/dp_i^C = -\sum_{i=1}^{n}(p_i^* W)^2\, dm_i/dp_i, \tag{11.10}$$

where W is the uniform tariff, which, if applied to all goods in the place of all actual tariffs and NTMs and other distortions, would result in the same aggregate loss of welfare as the actual distortions. Solving for W results in:

$$W = \{R'^2 a + S'^2 b\}^{1/2}, \tag{11.11a}$$

$$\text{where } R' = \left[\sum_{i=1}^{n} r_i^2 u_i\right]^{1/2} \quad \text{with } u_i = p_i^{*2}\, dx_i/dp_i^C \Big/ \sum_i p_i^{*2}\, dx_i/dp_i^C, \tag{11.11b}$$

$$S' = \left[\sum_{i=1}^{n} s_i^2 v_i\right]^{1/2} \quad \text{with } v_i = -p_i^{*2}\, dy_i/dp_i^P \Big/ \sum_i p_i^{*2}\, dy_i/dp_i^P, \tag{11.11c}$$

and

$$\begin{aligned} a &= \sum_i p_i^{*2} dx_i/dp_i^C \Big/ \sum_i p_i^{*2}\, dm_i/dp_i \\ b &= \sum_i p_i^{*2} dy_i/dp_i^P \Big/ \sum_i p_i^{*2}\, dm_i/dp_i. \end{aligned} \tag{11.11d}$$

W is the desired WRI. R' and S' are measures of the average levels of consumer and producer price distortions, respectively. They are means of order two. In the empirical section, R' and S' are referred to as the PDI and the CDI to distinguish them from the arithmetic mean forms, the NRA and CTE.

Evidently, W can be written as an appropriately weighted average of the level of distortions of consumer and producer prices. It too is a mean of order two. As with the index T, the production and consumption sides of the economy for W can be dealt with and analyzed separately.

Comparing the expression for the WRI in equation 11.11a with that for the TRI in equation 11.4b, it is clear that the weights in the construction of R', S', and W are the same as the weights for R, S and T. The only difference in the expressions for R', S' and W is that, in the case of the TRI, one constructs arithmetic means (which are the means of order one) whereas, in the case of the WRI, one constructs means of order two.[9] This difference is all due to the fact that the losses of import volume in each market are all proportional to the distortion rate whereas the losses of welfare are proportional to the squares of the distortions rates (compare equation 11.2 with equation 11.7). The tariff rate enters only once in the determination of the import loss, whereas the tariff rate enters twice in the determination of the welfare loss, once in the base and once in the height of the familiar dead-weight loss triangle of the supply–demand diagram for a small open economy.

In the special case where $r_i = s_i = t_i$ for all i, equation 11.11 reduces to a much simpler form:

$$W = \left[\sum_{i=n}^{n} (t_i)^2 w_i\right]^{1/2}, \text{ where} \tag{11.12}$$

$$w_i = \varepsilon_i^*(p_i^* m_i^*) \Big/ \sum_i^n \varepsilon_i^*(p_i^* m_i^*).$$

Further, if it is assumed that the elasticities of import demand are all equal, the weights are the share of imports of each good in total imports. This case can be used to obtain an alternative expression of the general case of the WRI. This is done in the appendix to Lloyd, Croser, and Anderson (2009a).

Adding the exportables subsector

The WRI and TRI indexes can each be extended to include the exportables subsector. For exportables, an export subsidy reduces welfare in the same way as an import tax in the import-competing sector, but it also increases trade, whereas the tariff reduces trade. It is necessary to keep track of import and export price distortions separately, for both producers and consumers, for the purpose of estimating the full WRIs and TRIs. In essence, this extension is done by extending the commodity set and keeping separate track of the subsets of import-competing and exportable goods.

The WRI for the whole tradables sector can be written as an expansion of equation 11.11 where goods 1 to n are import-competing products and goods $n + 1$ to z are exportables:

$$W = \{(R_M'^2\omega_{PM} + R_X'^2\omega_{PX})a + (S_M'^2\omega_{CM} + S_X'^2\omega_{CX})b\}^{1/2}, \tag{11.13a}$$

where $\omega_{PX} = \frac{\sum_{i=n+1}^{z} y_i p_i}{\sum_{i=1}^{z} y_i p_i}$, $\omega_{PM} = \frac{\sum_{i=1}^{n} y_i p_i}{\sum_{i=1}^{z} y_i p_i}$, $\omega_{CX} = \frac{\sum_{i=n+1}^{z} x_i p_i}{\sum_{i=1}^{z} x_i p_i}$, $\omega_{CM} = \frac{\sum_{i=1}^{n} x_i p_i}{\sum_{i=1}^{z} x_i p_i}$. (11.13b)

For both import-competing and exportable subsectors in this study, producers and consumers continue to be aggregated separately, where the weights for each subsector are the share of the subsector's value of production (consumption) in the total value of production (consumption). Producer and consumer distortions are aggregated in the last step with the assumption that the aggregate demand and supply curves have the same slope (that is, $a = b = 0.5$). The resulting measure can be regarded as the import tax or export subsidy, which, if applied uniformly, would give the same loss of welfare as the combinations of measures distorting consumer and producer prices in the import-competing and exportable subsectors.

The TRI can be similarly decomposed as follows:

$$T = (R_M\omega_{PM} + R_X\omega_{PX})a + (S_M\omega_{CM} + S_X\omega_{CX})b, \tag{11.14}$$

where ω, a, and b are as already defined; R_M and S_M are R and S from equations 11.4c and 11.4d; and

$$R_X = \left[\sum_{i=1+n}^{z} - r_i u_i\right]; \quad S_X = \left[\sum_{i=1+n}^{z} - s_i v_i\right]. \tag{11.15}$$

The aggregates in equation 11.15 are the weighted average levels of distortions to consumer and producer prices in the exportables subsector, respectively, with weights u_i and v_i given in equations 11.4c and 11.4d. Importantly, distortions to the exportables subsector enter equation 11.15 as negative values. This is because while a lowering of r_i (the distortion of the consumer price of good *i)* or s_i (the distortion of the producer price of good *i)* in the import-competing subsector reduces the reduction index, a lowering of r_i or s_i in the exportables subsector increases it.

These extensions of the TRI and the WRI have precisely the same properties as the indexes for the import-competing sector.

The World Bank's Agricultural Distortions Project Database

The database generated by the World Bank's Distortions to Agricultural Incentives Project (Anderson and Valenzuela 2008) contains around 30,000 consistent estimates of annual NRAs to the agricultural sector and the same number of CTEs for a total of 75 countries between 1955 and 2007. Country coverage in the 1950s is much less than from 1960, however, so the series of index estimates presented here begins in that latter year; NRA and CTE estimates, meanwhile, are available for 2005–07 only for high-income and European transition economies (tables 11.1 and 11.2). The series contains data at the commodity level for a subset of agricultural products (called covered products) that account for around 70 percent of total agricultural production in each country examined. Aggregate NRAs and CTEs for various sectors and subsectors (including import-competing and exporting subsectors) are estimated using, respectively, the values of production and consumption at undistorted prices as weights.[10]

The range of policy measures included in the NRA estimates in the Distortions to Agricultural Incentives database is wide. By calculating domestic-to-border price ratios, the estimates include assistance provided by all tariff and nontariff trade measures, plus any domestic price support measures (positive or negative), plus an adjustment for the output-price equivalent of direct interventions on inputs. Where multiple exchange rates operate, an estimate of the import or export tax equivalents of that distortion are included as well. The range of measures included in the CTE estimates include both domestic consumer taxes and subsidies and trade and exchange rate policies, all of which drive a wedge between the price that consumers pay for each commodity and the international price at the border.

The most aggregated summaries of NRA and CTE estimates for covered products for developing and high-income countries are provided in figures 11.1 and 11.2. Figure 11.1 supports two widely held views: that developing-country

Table 11.1. NRAs[a] for Africa, Asia, Latin America, European Transition Economies, and High-Income Countries, All Farm Products, 1960–2007

(percent)

	1960–64	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–04	2005–07
NRA, covered import-competing products										
Africa	12	4	−7	8	8	65	2	7	3	—
Asia	4	34	26	31	21	45	28	28	35	—
Latin America	20	3	−4	2	10	4	17	9	19	—
All developing countries	11	26	17	23	17	39	22	22	28	—
European transition economies	—	—	—	—	—	—	31	34	34	30
High-income countries	54	59	42	56	70	84	73	64	60	31
World	48	50	37	46	46	66	51	43	44	—
NRA, covered exportables										
Africa	−31	−39	−44	−45	−36	−36	−39	−26	−28	—
Asia	−13	−26	−20	−25	−44	−39	−19	−4	0	—
Latin America	−23	−17	−30	−26	−27	−24	−9	−3	−4	—
All developing countries	−25	−29	−29	−30	−40	−37	−19	−5	−3	—
European transition economies	—	—	—	—	—	—	−4	−1	0	15
High-income countries	4	10	8	7	8	17	13	6	5	3
World	−2	−4	−7	−11	−24	−21	−8	−1	0	—

(*Table continues on the following page.*)

Table 11.1. NRAs[a] for Africa, Asia, Latin America, European Transition Economies, and High-Income Countries, All Farm Products, 1960–2007 (*continued*)

(percent)

	1960–64	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–04	2005–07
NRA, all covered farm products[b]										
Africa	−13	−18	−22	−20	−12	1	−12	−7	−9	—
Asia	−3	3	0	0	−21	−15	−5	6	10	—
Latin America	−13	−13	−25	−20	−15	−14	1	1	3	—
All developing countries	−9	−5	−9	−8	−20	−13	−5	4	7	—
European transition economies	—	—	—	—	—	—	7	15	15	21
High-income countries	32	39	29	36	43	58	49	36	32	16
World	24	24	15	18	6	16	18	16	16	—
NRA, all agriculture[c]										
Africa	−8	−11	−15	−13	−8	−1	−9	−6	−7	—
Asia[d]	−27	−25	−25	−24	−21	−9	−2	8	12	—
Latin America	−8	−7	−21	−18	−13	−11	4	5	5	—
All developing countries	−23	−22	−24	−22	−18	−8	−2	6	9	—
European transition economies	—	—	—	—	—	—	10	18	18	25
High-income countries	29	35	25	32	41	53	46	35	32	17
World	22	21	13	15	8	17	18	17	18	—

Source: Anderson and Valenzuela (2008).

Note: — = not available.

a. Weighted using the value of production at undistorted prices.

b. Includes nontradables.

c. Includes covered and noncovered products.

d. Estimates for China pre-1981 and India pre-1965 are based on the assumption that the NRAs to agriculture in those years were the same as the average NRA estimates for those economies for 1981–84 and 1965–69, and that the gross value of production in those missing years is that which gives the same average share of value of production in total world production in 1981–84 and 1965–69, respectively. This NRA assumption is conservative in the sense that for both countries, the average NRA was probably even lower in earlier years.

Table 11.2. CTEs[a] for Africa, Asia, Latin America, European Transition Economies, and High-Income Countries, All Covered Farm Products, 1960–2007

(percent)

	1960–64	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–04	2005–07
Import-competing products										
Africa	7	0	−8	7	3	76	5	9	5	—
Asia	1	14	8	24	24	44	32	27	35	—
Latin America	23	11	0	8	4	1	28	11	18	—
All developing countries	6	11	4	18	17	39	29	22	27	—
European transition economies	—	—	—	—	—	—	12	21	31	30
High-income countries	53	56	41	54	65	66	57	55	50	30
World	46	44	32	43	43	55	41	38	39	—
Exportable products										
Africa	−29	−36	−42	−34	−28	−31	−38	−20	−24	—
Asia	−3	−38	−29	−32	−42	−40	−20	−5	0	—
Latin America	−25	−14	−25	−24	−27	−21	−12	1	0	—
All developing countries	−23	−36	−33	−30	−38	−37	−20	−5	−1	—
European transition economies	—	—	—	—	—	—	−6	−4	2	−1
High-income countries	4	11	9	9	6	11	8	−2	−3	0
World	0	−8	−9	−11	−24	−24	−11	−4	−2	—
All covered farm products[b]										
Africa	−8	−12	−16	−9	−6	16	−8	0	−3	—
Asia	0	−12	−15	−2	−15	−14	−3	5	10	—
Latin America	−7	−7	−18	−13	−12	−10	13	6	8	—
All developing countries	−5	−12	−16	−5	−14	−10	0	5	8	—
European transition economies	—	—	—	—	—	—	−2	9	17	11
High-income countries	35	42	30	40	45	49	41	32	27	16
World	28	23	14	21	10	15	16	15	16	—

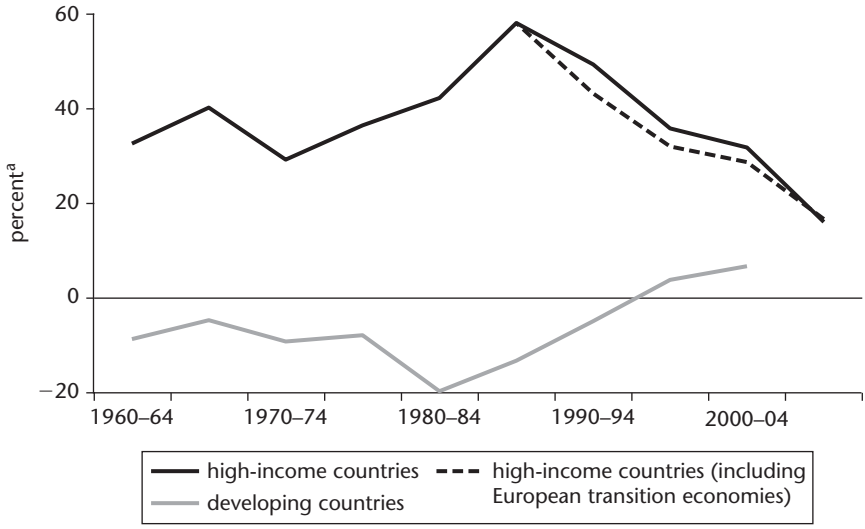
Source: Anderson and Valenzuela (2008).

Note: — = not available.

a. Weighted using the value of consumption at undistorted prices.

b. Includes nontradables.

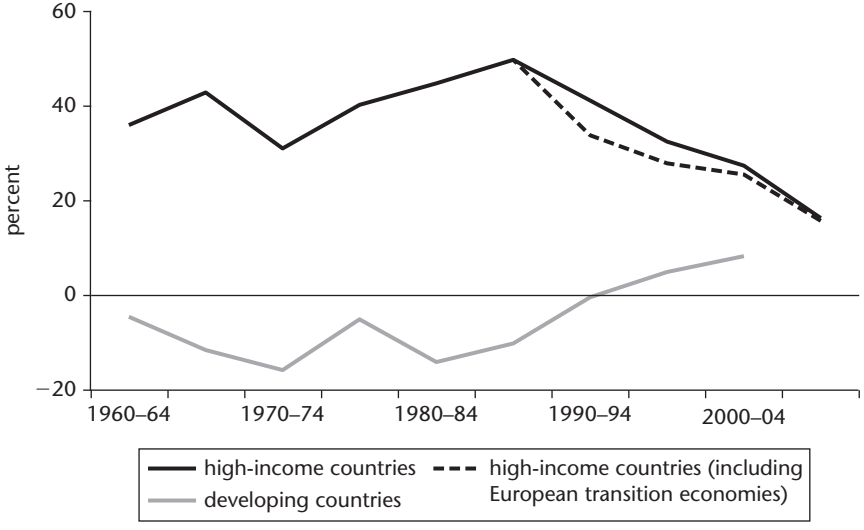
Figure 11.1. NRAs to Farmers in High-Income and Developing Countries, for All Covered Farm Products, 1960–2007



Source: Anderson and Valenzuela (2008).

a. Percent is averaged using weights based on the gross value of agricultural production at undistorted prices.

Figure 11.2. CTEs Affecting Covered Farm Products in High-Income and Developing Countries, 1960–2007

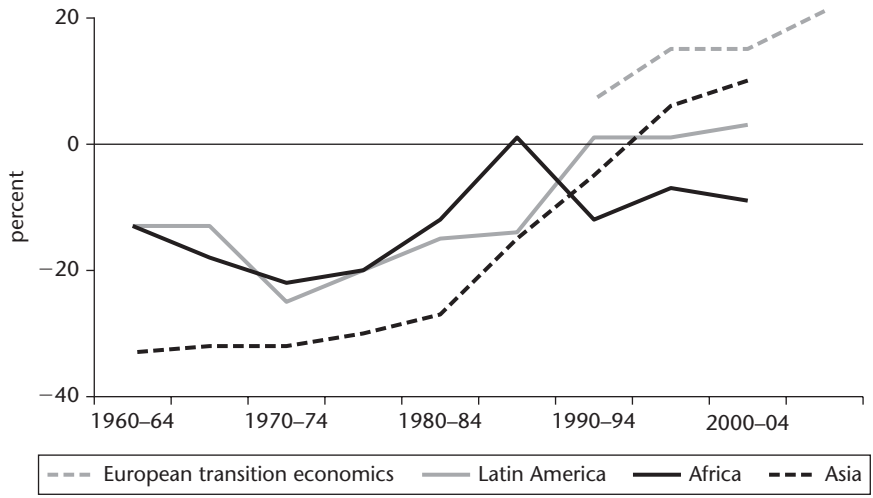


Source: Anderson and Valenzuela (2008).

governments had in place agricultural policies that effectively taxed their farmers through to the 1980s, and that the extent of those disincentives has lessened since then. The extent of taxation was of the order of more than 15 percent from the early 1960s to the mid-1980s. Since then, it has not only diminished but, on average, has become slightly positive. Figure 11.1 also supports the view that the growth of agricultural protection in high-income countries has been in progress since the 1950s and began to reverse only after the 1980s (at which time there was a reinstrumentation toward other forms of support—not included here—that are somewhat decoupled from production). It is clear from figure 11.2 that consumers have experienced changes similar to producers in recent years. In developing countries, taxation was negative (that is, consumer subsidization was positive) for most of the last 50 years, though less so since the 1990s. In high-income countries, the implicit taxation of consumers from agricultural support rose until the early 1990s but has since fallen.

Figures 11.3 and 11.4 show trends in NRAs and CTEs, respectively, for European transition economies and the three developing-country regions of Africa,

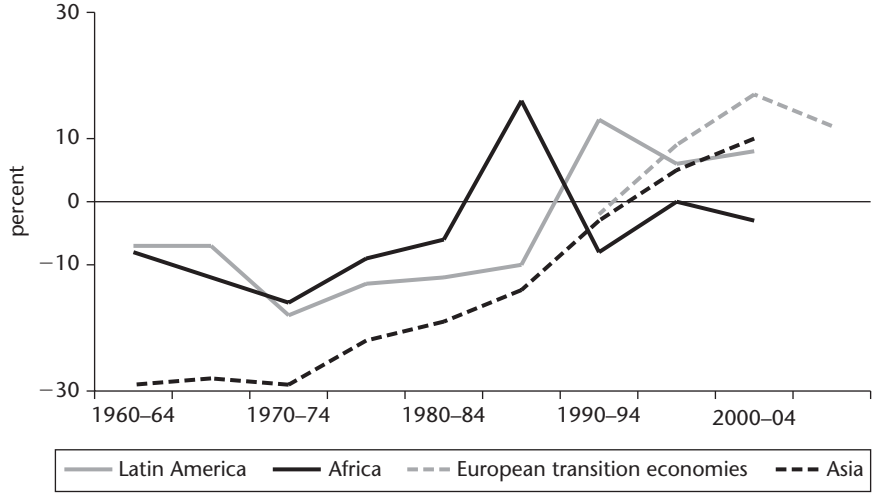
Figure 11.3. NRAs Affecting Covered Farm Products in Africa, Asia, Latin America, and European Transition Economies, 1960–2007



Source: Anderson and Valenzuela (2008).

Note: Estimates for China pre-1981 and India pre-1965 are based on the assumption that the NRAs to covered products in those years were the same as the average NRA estimates for those economies for 1981–84 and 1965–69, and that the gross value of production in those missing years is that which gives the same average share of value of production in total world production in 1981–84 and 1965–69, respectively. This NRA assumption is conservative in the sense that for both countries, the average NRA was probably even lower in earlier years.

Figure 11.4. CTEs Affecting Covered Farm Products in Africa, Asia, Latin America, and European Transition Economies, 1960–2007



Source: Anderson and Valenzuela (2008).

Note: Estimates for China pre-1981 and India pre-1965 are based on the assumption that the NRAs to covered products in those years were the same as the average NRA estimates for those economies for 1981–84 and 1965–69, and that the gross value of production in those missing years is that which gives the same average share of value of production in total world production in 1981–84 and 1965–69, respectively. This NRA assumption is conservative in the sense that for both countries, the average NRA was probably even lower in earlier years.

Asia, and Latin America. On the production side, Africa is where there has been the least tendency to reduce taxation of farmers and subsidization of consumers of covered farm products. Indeed, its average NRA has been negative in all five-year periods except in the mid-1980s, when international prices of farm products reached an all-time low in real terms. By contrast, for both Asia and Latin America, NRAs crossed over from negative to positive after the 1980s. And in European transition economies, nominal assistance to farmers has trended upward following their initial shock in the early 1990s. For consumers in all four regions, agricultural policies have almost always involved consumer subsidization. Since the 1980s, however, food consumer subsidization in Asia, Latin America, and European transition economies has gradually disappeared and been replaced by a small degree of taxation.

Within the farm sector of all developing regions, assistance to the import-competing subsector is typically well above that for the export sector (Lloyd, Croser, and Anderson 2009a and appendix tables B.1 to B.4 in this volume), meaning there is an antitrade bias in the structure of distortions. In the case of

developing countries, where the former NRA is positive and the latter negative, the two tend to offset each other such that the overall sectoral NRA is close to zero. Such a sectoral average can be misleading as an indication of the aggregate extent of price distortion within the sector. It can also be misleading when compared across countries that have varying degrees of dispersion in their NRAs for farm products (see Anderson et al. 2009).

Measuring the WRIs and TRIs

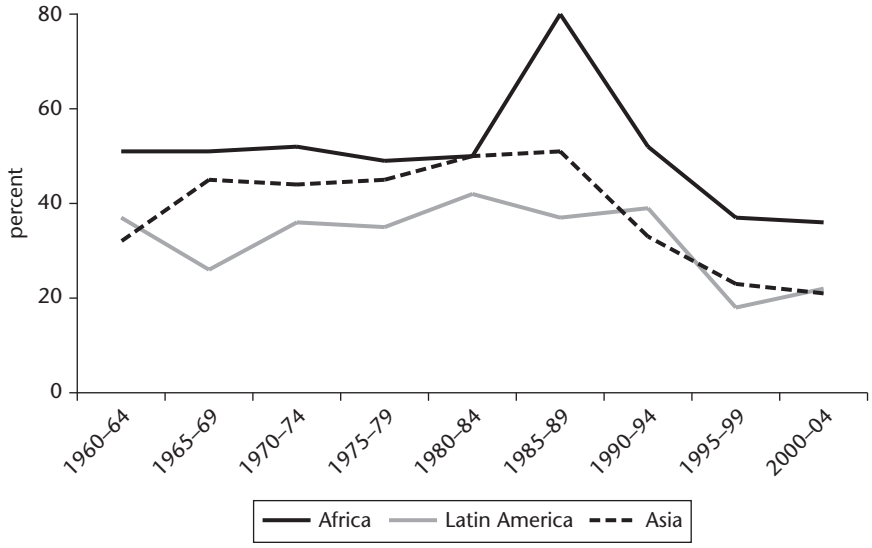
Table 11.3 reports WRIs for agricultural import-competing products, exportables, and all covered tradable products from 1960 to 2007 for the five main regions studied here and for the world as a whole.[11] The WRI results for covered products show a similar pattern over the five regions: there is constant or increasing tendency for policies to reduce welfare from the 1960s to the mid-1980s, but thereafter the opposite occurs in all regions, as can be seen from figure 11.5. This pattern is generated by different policy regimes in different regions. In high-income countries, agriculture was assisted throughout the period, peaking in the 1980s and falling thereafter. By contrast, in developing countries, agriculture was disprotected until the mid-1980s, and only thereafter did taxation of developing country farmers decline to the point that they received positive assistance by the turn of the century. The first point to note, then, is that the WRI has the desirable property of correctly reflecting the welfare consequences that result from both positive and negative assistance regimes for the agricultural sector. Note also that the WRI for high-income countries is above that for developing countries throughout the five decades shown in figure 11.5b.

A second point to note is that the WRI provides a better indicator of the welfare cost of distortions than the average level of assistance or taxation in the Distortions to Agricultural Incentives database (NRA and CTE). Although the latter make a significant contribution in their own right (for example, as inputs into global commodity or economy-wide models), they can be misleading as indicators of the extent of the welfare cost of assistance, due to the inclusion in the WRI of the "power of two." That is, a weighted arithmetic mean does not fully reflect the welfare effects of agricultural distortions because the dispersion of that support or taxation across products has been ignored. By contrast, the WRI captures the higher welfare costs of high and peak levels of assistance or taxation. A good example of this is the WRI for high-income countries. For high-income countries, the WRI series in figure 11.5 is higher than the NRA series in figure 11.1, owing to its capturing of the dispersion of the NRA. That is, the WRI reflects the disparity issue discussed in Lloyd (1974): the larger the variance in assistance levels, the greater the potential for resources to be used in activities that do not maximize economic welfare.

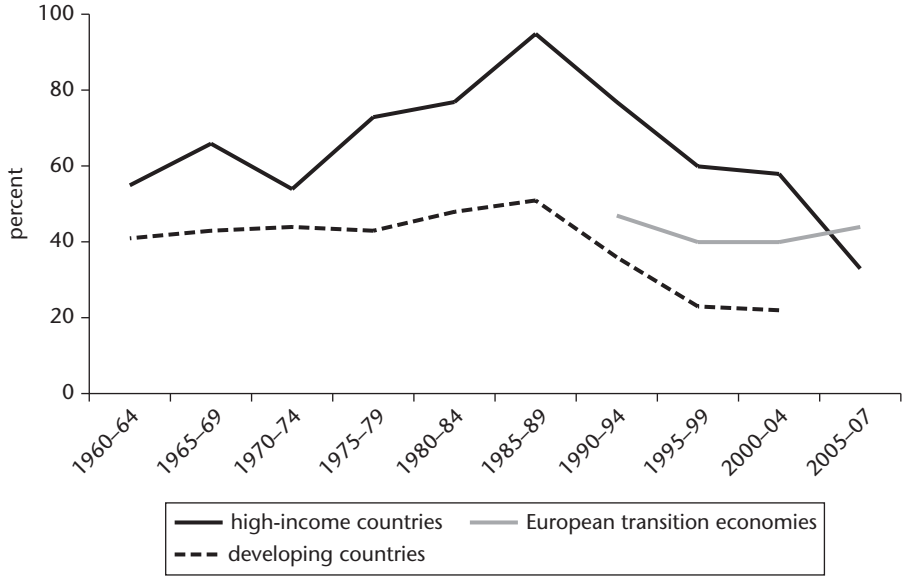
A third point to note is that the WRI and its two components (PDI and CDI, reported in tables 11.5 and 11.6) reflect the true welfare cost of agricultural policies

Figure 11.5. WRIs for Covered Tradable Farm Products, by Region, 1960–2007

a. Africa, Asia, and Latin America



b. Developing countries, high-income countries, and European transition economies



Source: Anderson and Croser (2009), based on NRAs and CTEs in Anderson and Valenzuela (2008).

Table 11.3. WRIs for Asia, Africa, Latin America, European Transition Economies, and High-Income Countries,[a] All Covered Tradable Farm Products, 1960–2007

(percent)

	1960–64	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–04	2005–07
Import-competing products										
Africa	59	52	53	47	51	98	43	32	30	—
Asia	36	45	46	50	48	62	48	44	48	—
Latin America	54	34	27	37	47	40	46	26	32	—
All developing countries	47	45	45	47	48	62	48	40	43	—
European transition economies	—	—	—	—	—	—	60	44	45	43
High-income countries	77	85	69	99	106	123	102	91	87	50
World	72	75	64	84	81	100	78	65	65	—
Exportable products										
Africa	37	44	48	49	48	55	58	41	40	—
Asia	24	43	34	34	48	45	24	10	7	—
Latin America	28	22	36	32	36	33	29	12	15	—
All developing countries	31	39	38	36	46	44	27	11	10	—
European transition economies	—	—	—	—	—	—	37	33	31	42
High-income countries	11	19	15	12	11	25	22	11	11	10
World	15	26	25	24	34	39	26	13	12	—
All covered farm tradables										—
Africa	51	51	52	49	50	80	52	37	36	—
Asia	32	45	44	45	50	51	33	23	21	—
Latin America	37	26	36	35	42	37	39	18	22	—
All developing countries	41	43	44	43	48	51	36	23	22	—
European transition economies	—	—	—	—	—	—	47	40	40	44
High-income countries	55	66	54	73	77	95	77	60	58	33
World	53	59	51	62	61	70	54	39	38	—

Source: Authors' calculations based on product NRAs and CTEs in Anderson and Valenzuela (2008).

Note: — = not available.

a. Regional aggregates are weighted using the average of the value of production and the value of consumption at undistorted prices.

when they have offsetting components, unlike the arithmetic mean measures of assistance, the NRA and CTE. This can be seen most clearly in the case of Africa, which, in the latter half of 1980s, was still taxing exportables but had moved (temporarily) from low to very high positive levels of protection for import-competing farm products (table 11.1). Figure 11.3 indicates that in 1985–89, the weighted average NRA for import-competing and exporting farmers in Africa was close to zero. However, figure 11.5a shows that the WRI for Africa peaked in this time period. Thus, while at the aggregate level African farmers received almost no government assistance during the late 1980s, the welfare cost of the mixture of agricultural programs as a whole was at its highest.

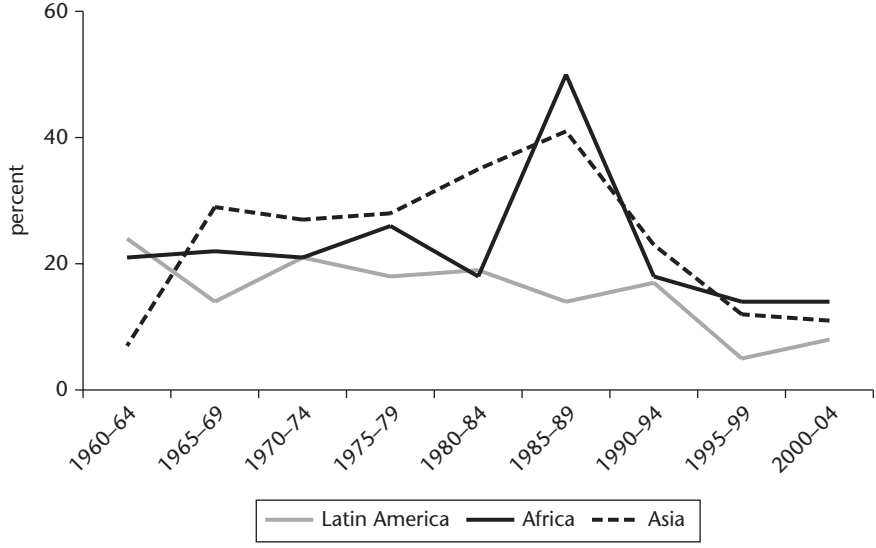
For developing countries as a group, the trade restrictiveness of agricultural policy was slightly increasing until the early 1990s. Thereafter, it declined, especially for Africa and Asia, according to the TRI estimates for the five main regions and for different subsectors (figure 11.6 and table 11.4). For high-income countries, the TRI time path was similar. The aggregate results for developing countries are driven by the exportables subsector, which is being taxed, and the import-competing subsector, which is being protected (albeit by less than in high-income countries—see tables 11.1 and 11.4). For high-income countries, policies support both exporting and import-competing agricultural products and, even though they favor the latter much more heavily (figure 11.1), the assistance to exporters somewhat offsets the antitrade bias from the protection of import-competing producers in terms of impacts on those countries' aggregate volume of trade in farm products. This is reflected in a much smaller TRI for high-income countries in the third as compared with the first row for high-income countries in table 11.4.

Like the WRI, the TRI correctly aggregates the restrictiveness of subsector policies that are masked in aggregate NRA and CTE measures, because they offset one another. Again using the example of Africa in 1985–89, when the NRA was closest to zero, the TRI peaks at this time in a way that correctly identifies the trade-reducing effect of positive protection to the import-competing subsector and disprotection to the exportables subsector.

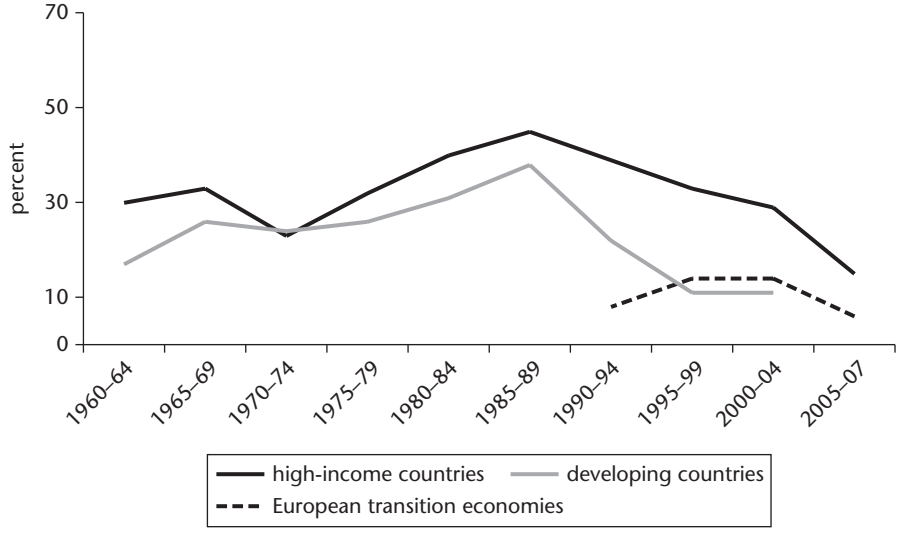
For completeness, PDI and CDI estimates (tables 11.5 and 11.6) and the national WRI and TRI estimates (tables 11.7 and 11.8) are also included. The PDI and CDI estimates are not identical, but their similarity reflects the fact that most of the distortions to agricultural incentives, as compiled in Anderson and Valenzuela (2008), are due to price distortions at national borders rather than to domestic measures. Even so, it is important to keep the PDI and CDI separate because they can be very different for some products. Likewise, the country detail in tables 11.7 and 11.8 reveals that considerable differences within each region are concealed in the regional aggregates reported in earlier tables and figures. Those differences are illustrated clearly for 2000–04 in figure 11.7, where individual

Figure 11.6. TRIs for Covered Tradable Farm Products, by Region, 1960–2007

a. Africa, Asia, and Latin America



b. Developing countries, high-income countries, and European transition economies



Source: Anderson and Croser (2009), based on NRAs and CTEs in Anderson and Valenzuela (2008).

Table 11.4. TRIs for Asia, Africa, Latin America, European Transition Economies, and High-Income Countries,[a] All Covered Tradable Farm Products, 1960–2007

(percent)

	1960–64	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–04	2005–07
Import-competing products										
Africa	9	2	−7	7	5	71	4	8	4	—
Asia	3	24	17	27	22	45	31	28	36	—
Latin America	22	8	−2	5	7	2	23	10	19	—
All developing countries	8	19	11	21	17	39	26	22	28	—
European transition economies	—	—	—	—	—	—	22	28	33	30
High-income countries	51	56	40	54	68	75	66	60	56	31
World	45	46	33	44	45	61	46	41	42	—
Exportable products										
Africa	30	38	43	39	32	33	38	23	26	—
Asia	9	32	24	28	42	40	20	4	0	—
Latin America	24	15	28	24	26	22	10	1	2	—
All developing countries	23	31	30	29	39	37	20	5	2	—
European transition economies	—	—	—	—	—	—	5	2	−2	−9
High-income countries	−3	−10	−8	−7	−7	−14	−11	−2	−1	−2
World	2	6	8	11	24	22	10	3	1	—
All covered farm tradables										
Africa	21	22	21	26	18	50	18	14	14	—
Asia	7	29	27	28	35	41	23	12	11	—
Latin America	24	14	21	18	19	14	17	5	8	—
All developing countries	17	26	24	26	31	38	22	11	11	—
European transition economies	—	—	—	—	—	—	8	14	14	6
High-income countries	30	33	23	32	40	45	39	33	29	15
World	27	30	23	30	34	41	28	20	18	—

Source: Authors' calculations based on product NRAs and CTEs in Anderson and Valenzuela (2008).

Note: — = not available.

a. Regional aggregates are weighted using the average of the value of production and consumption at undistorted prices.

Figure 11.7. WRIs and TRIs for Covered Tradable Farm Products, by Country, 2000–04



Source: Anderson and Croser (2009), based on NRAs and CTEs in Anderson and Valenzuela (2008).

Table 11.5. PDIs for Asia, Africa, Latin America, European Transition Economies, and High-Income Countries,[a] All Covered Farm Products, 1960–2007

(percent)

	1960–64	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–04	2005–07
Import-competing products										
Africa	60	54	53	48	52	93	43	32	31	—
Asia	39	53	52	52	48	60	46	43	46	—
Latin America	53	32	26	34	50	44	43	25	37	—
All developing countries	49	51	50	49	49	61	45	39	43	—
European transition economies	—	—	—	—	—	—	58	49	48	43
High-income countries	77	85	71	101	108	130	106	90	87	47
Exportable products										
Africa	38	45	49	52	50	53	56	39	39	—
Asia	24	37	29	31	49	44	24	9	7	—
Latin America	27	22	38	33	36	34	29	13	16	—
All developing countries	31	36	37	36	47	44	27	11	10	—
European transition economies	—	—	—	—	—	—	38	34	31	37
High-income countries	10	18	15	11	11	24	19	9	10	9
All covered farm products[b]										
Africa	44	46	45	46	42	55	39	28	26	—
Asia	32	41	37	41	48	49	32	22	20	—
Latin America	29	24	36	34	42	39	35	18	23	—
All developing countries	45	48	49	48	51	55	36	24	23	—
European transition economies	—	—	—	—	—	—	46	43	40	40
High-income countries	52	62	51	69	73	95	76	56	54	31

Source: Authors' calculations based on product NRAs and CTEs in Anderson and Valenzuela (2008).

Note: — = not available.

a. Regional aggregates are weighted using the value of production at undistorted prices.

b. Includes nontradables.

Table 11.6. CDIs for Asia, Africa, Latin America, European Transition Economies, and High-Income Countries,[a] All Covered Farm Products, 1960–2007

(percent)

	1960–64	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–04	2005–07
Import-competing products										
Africa	58	51	52	46	50	101	43	32	29	—
Asia	31	32	35	48	48	62	49	44	48	—
Latin America	55	35	27	39	43	34	45	25	24	—
All developing countries	43	36	37	46	47	62	48	39	41	—
European transition economies	—	—	—	—	—	—	61	38	42	43
High-income countries	77	84	68	96	101	114	94	88	84	50
Exportable products										
Africa	36	43	47	45	46	58	62	42	41	—
Asia	28	50	39	37	47	46	24	10	6	—
Latin America	30	21	34	31	36	32	29	9	12	—
All developing countries	33	43	41	37	45	45	27	11	9	—
European transition economies	—	—	—	—	—	—	36	32	30	47
High-income countries	10	19	15	12	10	25	22	11	11	10
All covered farm products[b]										
Africa	44	43	44	39	40	62	39	27	26	—
Asia	29	39	38	42	46	49	33	24	21	—
Latin America	33	26	34	35	40	34	40	18	19	—
All developing countries	48	43	44	48	49	58	38	26	24	—
European transition economies	—	—	—	—	—	—	48	37	39	48
High-income countries	57	68	54	75	77	91	74	62	58	36

Source: Authors' calculations based on product NRAs and CTEs in Anderson and Valenzuela (2008).

Note: — = not available.

a. Regional aggregates are weighted using the value of consumption at undistorted prices.

b. Includes nontradables.

Table 11.7. WRIs, by Country and Region[a], All Covered Tradable Farm Products, 1960–2007
(percent)

	1960–64	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–04	2005–07
Africa	**51**	**51**	**52**	**49**	**50**	**80**	**52**	**37**	**36**	—
Cameroon	29	37	42	54	38	23	20	18	11	—
Côte d'Ivoire	35	47	45	48	44	39	37	32	41	—
Egypt, Arab Rep. of	49	53	54	40	46	134	32	29	21	—
Ethiopia	—	—	—	—	44	56	58	52	47	—
Ghana	24	44	40	62	89	75	39	21	30	—
Kenya	39	39	29	19	31	27	36	22	26	—
Madagascar	26	28	26	45	58	46	30	16	15	—
Mozambique	—	—	—	72	65	75	33	31	56	—
Nigeria	148	129	121	105	102	127	94	75	58	—
Senegal	19	18	44	46	41	60	66	12	19	—
South Africa	20	18	25	34	48	39	31	22	20	—
Sudan	35	40	51	40	40	65	79	42	44	—
Tanzania	—	—	—	71	72	68	62	54	50	—
Uganda	11	16	44	83	58	60	11	10	10	—
Zambia	26	38	48	59	32	70	59	40	43	—
Zimbabwe	41	45	50	56	46	42	47	40	72	—
Asia	**32**	**45**	**44**	**45**	**50**	**51**	**33**	**23**	**21**	—
Bangladesh	—	—	30	41	29	49	29	25	31	—
China	—	—	—	—	55	48	25	12	8	—
India	37	46	49	61	54	87	31	22	27	—
Indonesia	—	—	18	22	31	21	24	28	27	—
Korea, Rep. of	45	43	69	86	130	176	211	194	228	—
Malaysia	14	12	10	31	57	95	71	31	34	—

Pakistan	44	71	75	37	39	46	31	24	29	—
Philippines	18	36	30	21	33	46	32	51	42	—
Sri Lanka	32	28	29	37	26	29	39	35	30	—
Taiwan, China	30	46	52	35	43	85	124	155	190	—
Thailand	—	—	30	24	22	18	16	19	12	—
Vietnam	—	—	—	—	—	22	30	24	37	—
Latin America	**37**	**26**	**36**	**35**	**42**	**37**	**39**	**18**	**22**	**—**
Argentina	32	30	28	27	24	19	10	8	17	—
Brazil	—	16	43	36	42	39	34	8	7	—
Chile	53	27	28	28	16	34	23	18	13	—
Colombia	28	23	22	26	40	25	25	35	58	—
Dominican Republic	78	42	44	46	50	55	89	48	59	—
Ecuador	—	37	48	59	71	44	20	24	32	—
Mexico	—	—	—	43	48	42	54	30	33	—
Nicaragua	—	—	—	—	—	—	29	31	26	—
All developing countries	**41**	**43**	**44**	**43**	**48**	**51**	**36**	**23**	**22**	**—**
European transition economies	**—**	**—**	**—**	**—**	**—**	**—**	**47**	**40**	**40**	**45**
Bulgaria	—	—	—	—	—	—	28	26	22	29
Czech Republic	—	—	—	—	—	—	39	30	39	33
Estonia	—	—	—	—	—	—	28	27	29	31
Hungary	—	—	—	—	—	—	35	34	51	31
Latvia	—	—	—	—	—	—	54	47	66	31
Lithuania	—	—	—	—	—	—	54	52	67	31
Poland	—	—	—	—	—	—	27	27	36	33
Romania	—	—	—	—	—	—	36	44	65	51
Russia	—	—	—	—	—	—	46	34	33	—
Slovak Republic	—	—	—	—	—	—	31	30	37	32
Slovenia	—	—	—	—	—	—	60	72	69	45
Turkey	21	36	35	41	38	38	50	58	50	59
Ukraine	—	—	—	—	—	—	39	33	25	—

(*Table continues on the following page.*)

Table 11.7. WRIs, by Country and Region[a], All Covered Tradable Farm Products, 1960–2007 (*continued*)
(percent)

	1960–64	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–04	2005–07
High-income countries	**55**	**66**	**54**	**73**	**77**	**95**	**77**	**60**	**58**	**33**
Australia	20	31	28	18	13	21	21	9	4	2
Austria	92	93	39	43	39	82	106	60	56	33
Canada	16	15	15	50	81	90	59	37	42	35
Denmark	82	84	93	157	139	121	71	55	50	26
Finland	129	138	108	129	69	204	204	65	58	31
France	93	118	94	118	124	115	74	55	51	32
Germany	142	146	109	133	134	117	73	58	52	28
Iceland	—	—	—	188	193	365	299	201	180	194
Ireland	66	99	97	187	179	169	93	74	69	44
Italy	89	90	73	88	99	93	63	49	47	23
Japan	74	94	106	155	150	248	240	210	213	163
Netherlands	137	159	129	170	164	132	76	64	56	33
New Zealand	11	12	14	20	24	28	13	10	9	7
Norway	—	—	—	292	198	256	229	174	164	117
Portugal	22	29	31	57	30	70	56	43	42	30
Spain	35	53	29	38	40	80	59	44	41	27
Sweden	149	184	137	204	163	139	122	64	61	35
Switzerland	—	—	—	219	190	347	284	195	172	108
United Kingdom	147	142	115	140	135	128	81	62	58	37
United States	13	20	12	12	26	35	22	19	25	16

Source: Authors' calculations based on product NRAs and CTEs in Anderson and Valenzuela (2008).

Note: — = not available.

a. Regional aggregates are weighted using the average of the value of production and the value of consumption at undistorted prices.

Table 11.8. TRIs, by Country and Region[a], All Covered Tradable Farm Products, 1960–2007
(percent)

	1960–64	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–04	2005–07
Africa	**21**	**22**	**21**	**26**	**18**	**50**	**18**	**14**	**14**	—
Cameroon	27	34	38	49	35	9	8	8	3	—
Côte d'Ivoire	17	16	37	50	28	31	27	27	39	—
Egypt, Arab Rep. of	−5	2	−2	15	8	95	12	17	6	—
Ethiopia	—	—	—	—	41	54	56	49	36	—
Ghana	3	13	18	42	59	66	32	11	25	—
Kenya	−27	−21	−6	−3	−7	25	−9	10	12	—
Madagascar	21	17	−15	7	−1	29	10	6	11	—
Mozambique	—	—	—	31	−6	−16	3	19	44	—
Nigeria	112	102	94	64	50	78	25	17	−7	—
Senegal	19	13	38	45	35	36	36	8	16	—
South Africa	1	4	9	2	4	−14	−9	−1	−2	—
Sudan	29	28	29	29	23	56	40	18	31	—
Tanzania	—	—	—	24	22	42	41	22	30	—
Uganda	8	14	38	85	59	61	10	7	6	—
Zambia	21	1	1	36	−12	−46	−28	−7	29	—
Zimbabwe	35	39	43	51	29	37	19	10	12	—
Asia	**7**	**29**	**27**	**28**	**35**	**41**	**23**	**12**	**11**	—
Bangladesh	—	—	−13	9	−1	24	1	−8	6	—
China	—	—	—	—	44	44	19	4	1	—
India	21	36	42	47	38	70	26	18	22	—
Indonesia	—	—	1	9	14	5	2	−1	19	—
Korea, Rep. of	5	16	44	69	119	158	189	164	184	—
Malaysia	12	4	8	19	18	21	14	5	5	—
Pakistan	7	42	19	3	4	12	−3	−2	4	—
Philippines	−4	2	1	0	3	16	18	39	27	—
Sri Lanka	26	17	20	20	13	5	23	17	4	—

(*Table continues on the following page.*)

Table 11.8. TRIs, by Country and Region[a], All Covered Tradable Farm Products, 1960–2007 (*continued*)
(percent)

	1960–64	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–04	2005–07
Taiwan, China	−6	−3	−16	−8	−19	−25	37	67	96	—
Thailand	—	—	25	19	13	11	9	6	1	—
Vietnam	—	—	—	—	—	12	28	6	−11	—
Latin America	**24**	**14**	**21**	**18**	**19**	**14**	**17**	**5**	**8**	—
Argentina	30	27	28	25	23	18	7	3	13	—
Brazil	—	12	28	19	20	13	11	0	0	—
Chile	9	−7	−15	4	8	24	17	14	8	—
Colombia	14	5	8	8	18	11	5	12	−13	—
Dominican Republic	60	25	21	27	37	34	57	30	37	—
Ecuador	—	12	15	34	45	26	3	7	16	—
Mexico	—	—	—	12	16	13	26	8	17	—
Nicaragua	—	—	—	—	—	—	11	22	18	—
All developing countries	**17**	**26**	**24**	**26**	**31**	**38**	**22**	**11**	**11**	—
European transition economies	—	—	—	—	—	—	**8**	**14**	**14**	**6**
Bulgaria	—	—	—	—	—	—	11	10	6	12
Czech Republic	—	—	—	—	—	—	−20	1	10	1
Estonia	—	—	—	—	—	—	2	16	4	6
Hungary	—	—	—	—	—	—	−6	−12	−20	−12
Latvia	—	—	—	—	—	—	32	22	21	11
Lithuania	—	—	—	—	—	—	36	14	−6	−3
Poland	—	—	—	—	—	—	15	7	−9	−17
Romania	—	—	—	—	—	—	8	20	41	31
Russia	—	—	—	—	—	—	−31	16	22	—
Slovak Republic	—	—	—	—	—	—	−2	7	5	0
Slovenia	—	—	—	—	—	—	−8	−17	−24	−12
Turkey	4	3	10	22	9	13	16	23	17	8
Ukraine	—	—	—	—	—	—	20	11	14	—

High-income countries	**30**	**33**	**23**	**32**	**40**	**45**	**39**	**33**	**29**	**15**
Australia	−7	−11	−6	−3	−4	−7	−7	−3	−1	0
Austria	69	66	19	24	23	−22	−11	41	38	17
Canada	8	6	6	15	22	25	22	13	14	14
Denmark	−35	−35	−3	61	70	75	51	37	32	12
Finland	39	17	−7	−10	18	−106	−153	50	41	16
France	58	73	44	47	69	72	51	32	29	13
Germany	98	112	66	64	81	73	52	39	33	14
Iceland	—	—	—	130	151	−33	10	35	38	45
Ireland	−4	−12	7	96	117	128	81	63	55	26
Italy	45	48	33	34	52	49	31	25	23	8
Japan	64	73	73	102	105	144	134	132	127	106
Netherlands	89	120	86	96	110	84	55	48	40	17
New Zealand	2	2	2	−8	−11	−1	2	2	1	0
Norway	—	—	—	31	−32	152	195	155	140	88
Portugal	10	15	13	32	20	33	24	21	21	12
Spain	21	18	−1	−2	3	42	30	23	21	11
Sweden	46	41	42	51	49	−71	−59	47	42	18
Switzerland	—	—	—	197	168	81	44	17	14	37
United Kingdom	70	49	36	64	82	89	65	44	39	22
United States	4	2	1	4	7	7	6	2	4	1

Source: Authors' calculations based on product NRAs and CTEs in Anderson and Valenzuela (2008).

Note: — = not available.

a. Regional aggregates are weighted using the average of the value of production and consumption at undistorted prices.

country TRIs and WRIs are shown. That figure reveals the extremely high indexes for the most agricultural-protecting countries in the world, namely the three European Free Trade Area (EFTA) members (Iceland, Norway, and Switzerland) and the three advanced economies of Northeast Asia (Japan, Republic of Korea, and Taiwan, China). Notice also from figure 11.7 that while the WRI is always positive, the TRI can be negative—in fact, the TRI is slightly negative for a few countries, because of export or import subsidies.

A useful way of summarizing the regional estimates is provided in figure 11.8, which shows their movement since the late 1980s, when most of the indexes peaked. The indexes suggest that agricultural policies were not reducing either the trade or welfare of a region if the region was located at the zero point of both axes—that is, in the bottom left corner of the diagram (the "sweet spot"). While almost no region is near that point, virtually all regions have moved toward it since 1985–89, and substantially so for the outliers, most notably Africa, but also considerably for Asia, the largest developing country region, and for the European Union.

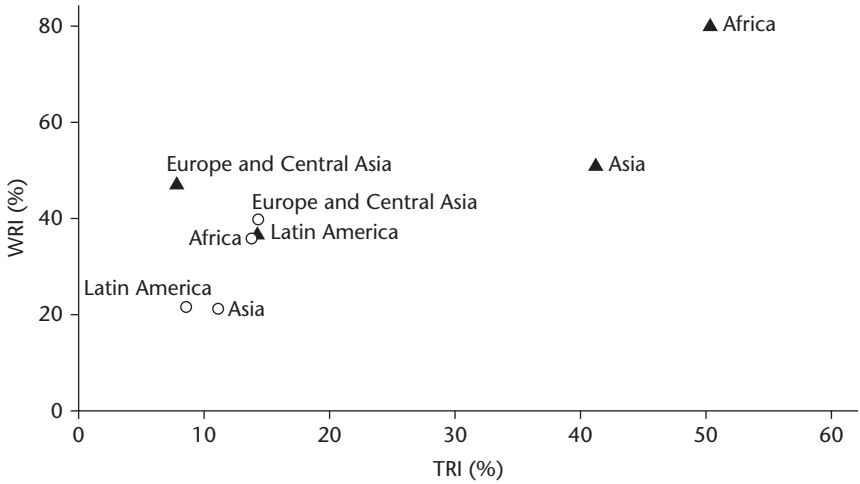
The biggest contributors to the global reduction in trade from farm policies are (in order) Japan, Korea, India, France, and Germany, while the biggest contributors to the global reduction in welfare from farm policies are (again in order) Japan, the United States, Korea, China, and France (figure 11.9).

Over the entire period between 1961 and 2004, the WRI has tended to be higher the higher is a country's real GDP per capita (figure 11.10). There has also been a negative correlation between the TRI and a trade specialization index defined as the ratio of net exports to the total value of exports plus imports of agriculture and food—and an even stronger negative correlation between the WRI and that trade specialization index. That is, agricultural-exporting countries tend to have lower measures of both the TRI and the WRI, while import-competing countries tend to have more welfare- and trade-reducing policies in place.

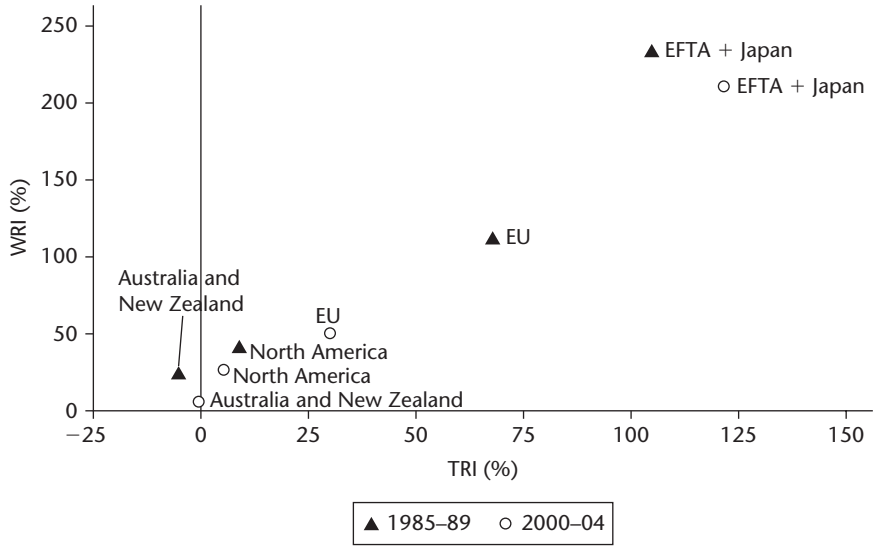
What can be said about agricultural distortions in the world as a whole? The fact that NRAs for high-income and developing countries diverged in opposite ways away from zero in the first half of the period under study, and then converged toward zero in the most recent quarter-century, means that their weighted average NRA traced out a fairly flat trend. By contrast, figure 11.11 shows the WRI and TRI for the world as a whole each tracing out a hill-shaped path and thus providing less misleading indicators of the evolving disarray in world agricultural markets. Figure 11.11 also suggests that the global welfare cost of distortions was much higher than the NRA indicates, though more so in earlier decades than in the current one. The same is true also of the trade restrictiveness of farm policies globally, although much less at the beginning and end of the period studied than in the 1970s and 1980s.

Figure 11.8. TRIs and WRIs for Covered Tradable Farm Products, by Region, 1985–89 and 2000–04

a. Developing and transition economies



b. High-income countries

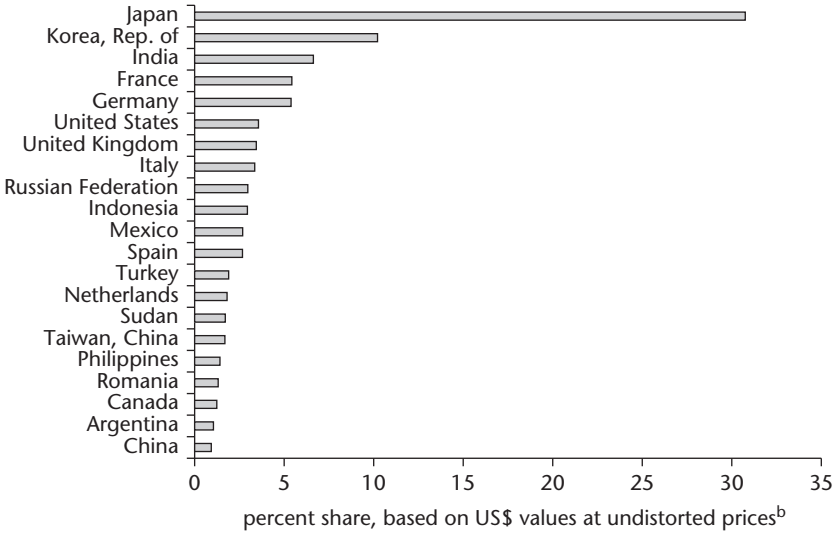


Source: Derived by the authors using data from Anderson and Croser (2009).

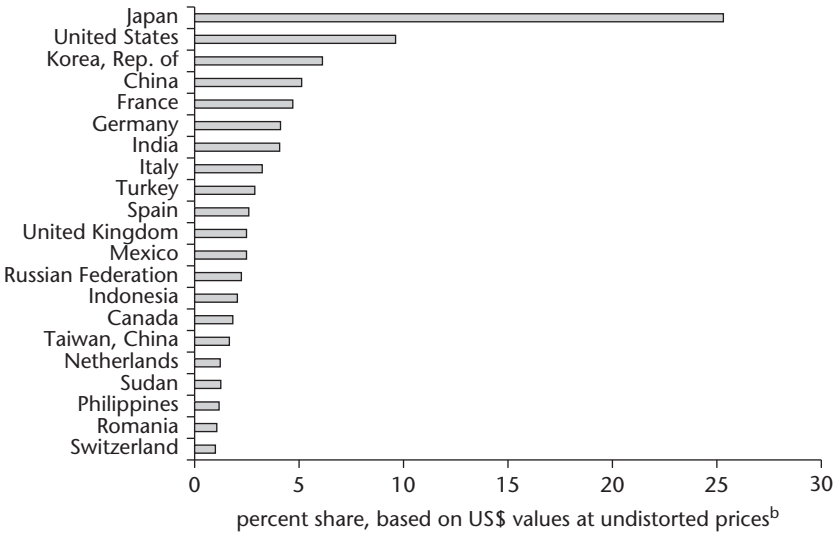
Note: For Europe and Central Asia in the top panel, data for 1985–89 is actually for 1992–94.

Figure 11.9. Country Contributions to the Global TRI and WRI, 2000–04

a. TRI[a]



b. WRI[c]



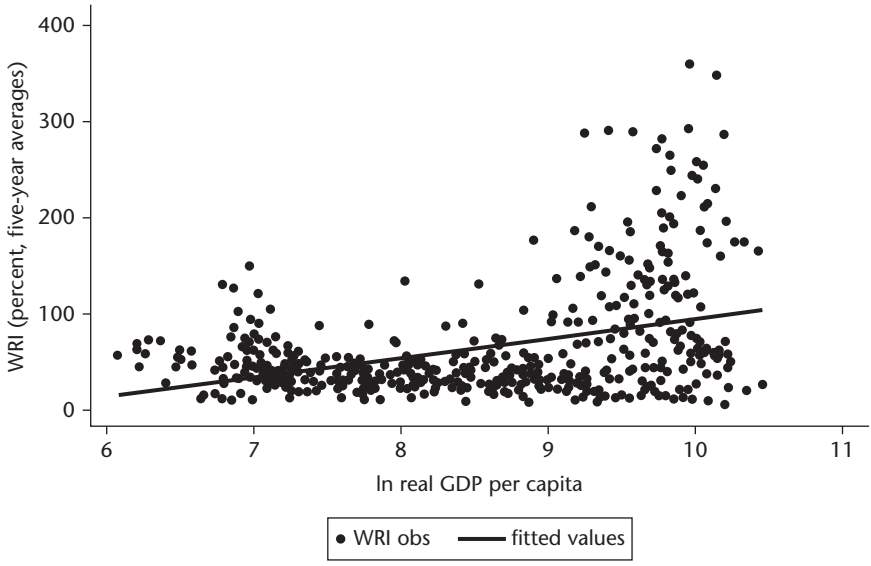
Source: Derived from data in Anderson and Croser (2009).

a. The global TRI in current U.S. dollars is obtained by multiplying the global TRI by the average of the value of global production and consumption at undistorted prices. Each country contribution is computed as the country-level TRI multiplied by the country-level average value of production and consumption at undistorted prices, as a share of the global aggregate TRI multiplied by the global average value of production and consumption at undistorted prices.

b. The sum of all country contributions (which are necessarily all positive for the WRI) is 100. Country contributions of less than 1 percent are omitted from the figures.

c. The global WRI in current U.S. dollars is obtained by multiplying the global WRI by the average of the value of global production and consumption at undistorted prices. Each country contribution is computed as the country-level WRI multiplied by the country-level average of the value of production and consumption at undistorted prices, as a share of the global aggregate WRI multiplied by the global average value of production and consumption at undistorted prices.

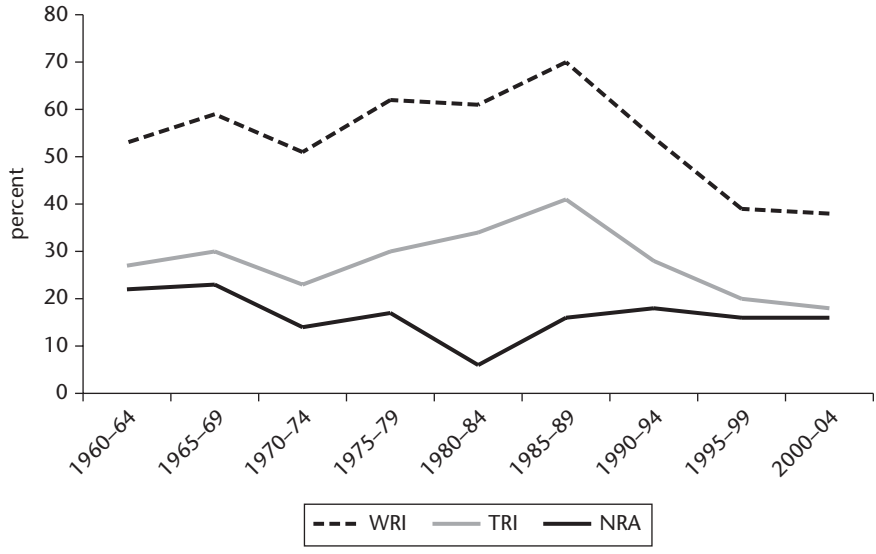
Figure 11.10. WRI and Real Per Capita GDP, All 75 Countries, 1961–2004[a]



Source: Derived by the authors using data from Anderson and Croser (2009).

a. The fitted regression line is WRI = −105 + 19.8 lnGDPPC, Adj R^2 = 0.14, n = 498
(−5.6) (9.1)

Figure 11.11. NRA, TRI, and WRI for Covered Tradable Farm Products, World, 1960–2004



Source: Anderson and Croser (2009), based on NRAs and CTEs in Anderson and Valenzuela (2008).

Finally, how do these estimates of partial equilibrium indicators of trade and welfare reduction compare with those generated by a global general equilibrium model? Even though there are numerous reasons for not expecting them to be the same, such a comparison can be a check on the orders of magnitude at least. The final chapter of this volume provides one such set of modeling results. It uses the economy-wide Linkage Model and the present project's NRAs and CTEs to examine what the trade, welfare, and other effects would be of removing all distortions to goods markets globally as of 2004. According to that model, global trade in all primary and lightly processed agricultural products would be US$154 billion higher, and global welfare would be US$168 billion higher, or US$101 billion if just agricultural and food policies were liberalized (Valenzuela, van der Mensbrugghe, and Anderson 2009, tables 13.14 and 13.16). This compares with the global TRI and WRI of US$138 billion and US$282 billion, respectively, for 2000–04 for just the 75 focus countries examined here and for just farm products (calculated as shown in the notes to figure 11.9). The welfare result from the Linkage Model is smaller than the WRI number, despite the model's broader coverage of products and countries, because it takes into account the general equilibrium effects of other (including nonagricultural) distortions at home and also distortions abroad insofar as they affect international prices, whereas the global WRI is obtained simply by summing the WRIs of each country. A better comparison would have been with a set of model scenarios where only farm policies were liberalized in only one of the 75 countries at a time, but that would require 75 simulations; it remains an area for further research.

Conclusion

This chapter provides a panel set of index estimates that is well grounded in trade theory and that takes into account various forms of agricultural price and trade taxes and subsidies. The panel set covers 75 countries over the past half century. It provides a very useful supplement to the various indicators of the mean and variance of aggregate NRAs and CTEs and the TBI used in previous chapters in this volume, especially from the viewpoint of the likely economic welfare or trade impacts of a country's structure of assistance to and taxation of agricultural industries and food consumers. The indexes presented here can thus serve as inputs into cross-county studies of the impact over time of agricultural distortions on growth, poverty, unemployment, and so forth. They also are important supplements to the NRA and CTE in improving understanding of the long-term history of food and agricultural price and trade policies. That is especially true in seeking an index of global distortions when developing and high-income countries' NRAs or CTEs tend to offset each other. The new indexes suggest the world was not very

much less distorted by 2004 than it was in the 1960 (although it certainly was compared with the latter 1980s), and that the level of distortion is far higher than that suggested by the global average NRA or CTE.

There would be high returns to further research in this area. The above estimates are based on the assumption that domestic price elasticities of supply (demand) are equal across commodities within a country. The estimates could thus be refined by relaxing the assumption that the price elasticities of demand (or supply) across goods are equal. This would entail a move to "marginal welfare weights," instead of production and consumption share weights when estimating the PDI and CDI, respectively. Kee, Nicita, and Olarreaga (2009) provide a methodology for estimating elasticities that could be adapted to the Distortions to Agricultural Incentives database.

Finally, the above equations could also be developed so that estimates of the distortions of consumer and producer prices for a particular commodity in individual countries are aggregated across countries in order to obtain partial equilibrium indexes of the reduction in world trade and economic welfare for any chosen global commodity market. The first attempt to do that is presented in the next chapter of this volume (Anderson et al. 2009).

Notes

1. The NRA and CTE measures are related to the well-known producer and consumer subsidy equivalent (PSE and CSE) measures estimated by the OECD (2008). Their main conceptual difference is that the NRA and CTE are expressed as a percentage of the undistorted price, whereas the PSE and CSE are expressed as a percentage of the distorted price. The NRA and CTE values are identical if the only government interventions are at a country's border (such as a tariff on imports). In the case of agriculture, however, there are typically domestic production or consumption taxes or subsidies also in place, so the NRAs and CTEs differ.

2. See Anderson and Valenzuela (2008). Within each region, the shares of agricultural value added that the studied countries represented in 1990–2004 at distorted prices are 90 percent for high-income countries, 92 percent for European transition economies (including Turkey and Central Asia), and 86 percent for developing countries (76 percent in Africa, 94 percent in Asia, 81 percent in Latin America and the Caribbean, and 0 percent in the Middle East), and hence 88 percent globally.

3. Throughout this chapter, indirect effects of sectoral and trade policy measures directed at nonagricultural sectors are ignored. Standard assumptions in basic trade theory are adopted, notably that there are no divergences between private and social marginal costs and that benefits that might arise from externalities, market failures, and any other behind-the-border policies not represented in the analysis here, including such things as underinvestment in public goods.

4. For a set of CGE estimates of the welfare, trade, and various other economic effects of the policies captured in the Agricultural Distortions database, see Valenzuela, van der Mensbrugghe, and Anderson (2009).

5. In addition, indexes can be defined as the ad valorem trade tax rate, which, if applied uniformly across countries for a particular product, would generate the same global reduction in trade in that product (or global economic welfare loss) as the actual cross-country structure of NRAs and CTEs for that tradable commodity. See chapter 12 of this volume for such an analysis.

6. This chapter builds on chapter 12 of Anderson and Neary (2005), which is devoted to a consideration of how to deal with domestic price distortions.

7. MacLaren and Lloyd (2008) analyse the production side of the Australian agricultural sector with a production distortion index (although they use the word "assistance" rather than "distortion"). This is the uniform production subsidy that gives the same deadweight production loss as the actual differentiated structure of assistance, and so is exactly equal to the production component derived above. Here, a similar uniform consumption tax component (call it a consumption distortion index) is added, and seeks a TRI that gives the same trade-reducing effect as the sum of the actual trade effects on the two sides of the market. Likewise, a WRI is generated that gives the same deadweight welfare loss as the sum of the actual welfare losses on both sides of the market.

8. This insight is usually attributed to Harberger (1959). In fact, it was discovered by Dupuit (1844), more than 100 years before Harberger, while analysing the welfare loss resulting from commodity taxation. In his words, "the loss of utility increases as the square of the tax" (Dupuit 1844, p. 281). Dupuit's contribution to consumer surplus and welfare analysis is considered in Humphrey (1992).

9. Expressions for measures of trade restriction and welfare reduction in Anderson and Neary (2005) use the same weights.

10. Estimates of the NRA for total agricultural production in studied countries are obtained by making guesstimates of the rates of assistance for the remaining 30 percent of agricultural production. Those guesstimates are not used in the present study, but their impact can be seen by comparing the third and fourth sets of rows of NRAs in Table 11.1.

11. National WRIs and TRIs are aggregated across countries using as weights an average of the value of consumption and production at undistorted prices. National and regional WRIs and TRIs for the five-year periods are unweighted averages of the annual indexes.

References

Allen, M. 2005. "Review of the IMF's Trade Restrictiveness Index." Policy Development and Review Department, International Monetary Fund, Washington, DC.

Anderson, J. E., G. J. Bannister, and J. P. Neary. 1995. "Domestic Distortions and International Trade." *International Economic Review* 36 (1): 139–57.

Anderson, J. E., and J. P. Neary. 2005. *Measuring the Restrictiveness of International Trade Policy*. Cambridge, MA: MIT Press.

Anderson, K., and J. Croser. 2009. *National and Global Agricultural Trade and Welfare Reduction Indexes, 1955 to 2007*. Supplementary database at http://www.worldbank.org/agdistortions.

Anderson, K., J. Croser, S. Nelgen, and E. Valenzuela. 2009. "Global Distortions to Key Commodity Markets." Chapter 12 in this volume.

Anderson, K., M. Kurzweil, W. Martin, D. Sandri, and E. Valenzuela. 2008a. "Methodology for Measuring Distortions to Agricultural Incentives." Agricultural Distortions Working Paper 02, World Bank, Washington, DC (and appendix A of this volume).

_____. 2008b. "Measuring Distortions to Agricultural Incentives, Revisited." *World Trade Review* 7 (4): 1–30.

Anderson, K., and E. Valenzuela. 2008. "Estimates of Global Distortions to Agricultural Incentives, 1955 to 2007." Core database at http://www.worldbank.org/agdistortions.

Dupuit, J. 1844. "On the Measurement of Utility of Public Works." *Annals des Ponts et Chaussees*, 2nd series, Volume 8.

Feenstra, R. C. 1995. "Estimating the Effects of Trade Policy." In *Handbook of International Economics*, ed. G. N. Grossman and K. Rogoff. Amsterdam: Elsevier.

Harberger, A. C. 1959. "Using the Resources at Hand More Effectively." *American Economic Review* 49 (2): 134–46.

Humphrey, T. M. 1992. "Marshallian Cross Diagrams and Their Uses before Alfred Marshall: The Origins of Demand and Supply Geometry." *Economic Review* (March/April): 3–23.

Irwin, D. A. Forthcoming. *The Battle over Protection: A History of US Trade Policy*.

Kee, H. L., A. Nicita, and M. Olearraga. 2008. "Import Demand Elasticities and Trade Distortions." *Review of Economics and Statistics* 90 (4): 666–82.

_____. 2009. "Estimating Trade Restrictiveness Indexes." *Economic Journal* 119 (534): 172–99.

Lloyd, P. J. 1974. "A More General Theory of Price Distortions in an Open Economy." *Journal of International Economics* 4 (4): 365–86.

Lloyd, P. J., J. L. Croser, and K. Anderson. 2009a. "Welfare- and Trade-based Indicators of National Distortions." Agricultural Distortions Working Paper 72, World Bank, Washington, DC.

_____. 2009b. "Global Distortions to Agricultural Markets: New Indicators of Trade and Welfare Impacts, 1960 to 2007." Policy Research Working Paper 4865, World Bank, Washington, DC.

MacLaren, D., and Lloyd, P. J. 2008. "Measuring Assistance to the Agricultural Industry in Australia Using a Production Assistance Index." Paper presented at the 52nd Annual Conference of the Australian Agricultural and Resource Economics Society, Canberra, 5–8 February.

OECD. 2008. OECD PSE-CSE Database (Producer and Consumer Support Estimates, OECD Database 1986–2007). Organisation for Economic Co-operation and Development. http://www.oecd.org/document/55/0,3343,en_2649_33727_36956855_1_1_1_1,00.html.

Valenzuela, E., D. van der Mensbrugghe, and K. Anderson. 2009. "General Equilibrium Effects of Price Distortions on Global Markets, Farm Incomes, and Welfare." Chapter 13 in this volume.

12

GLOBAL DISTORTIONS TO KEY COMMODITY MARKETS

*Kym Anderson, Johanna L. Croser, Signe Nelgen, and Ernesto Valenzuela**

The regional books that preceded and provided the developing country details for the present one,[1] like the regional summary chapters in Parts II and III of this book, are all country focused. While they include commodity details for their particular country or region, they are not able to provide an overview for developing countries or high-income countries as a group, or for the world as a whole. Nor is there space in the opening chapter of this book to provide a detailed commodity-focused summary. This chapter seeks to fill that gap.

The chapter begins by describing the overall project's coverage of 30 major commodities and their importance in regional and global agricultural production and trade (more details are in appendix B of this volume). It then summarizes the nominal rates of assistance (NRAs) and consumer tax equivalents (CTEs) for 12 key covered products, together with their gross subsidy and tax equivalents in constant dollars.

The policies generating positive or negative NRAs and CTEs are often an attempt by a government not only to raise or lower the trend level of domestic producer or consumer prices relative to those in international markets, but also to reduce price and quantity volatility in the domestic market for key farm products. Given that this issue became headline news again when international food prices spiked in 2007 and 2008, the issue of whether domestic prices of key products

*The authors are grateful for the estimates of distortions provided by the authors of country studies compiled by Anderson and Valenzuela (2008) and Anderson and Croser (2009), and for help with data compilation and manipulation by Esteban Jara and Marianne Kurzweil.

have in fact been more stable than prices in international markets over the past 50 years is examined. There is space to discuss this issue only briefly here; however, the Agricultural Distortions Project database provides much more scope for in-depth study of the role of policies in influencing market volatility.

This chapter also examines seven largely nontraded food staples that are nonetheless important food items for poor people in low-income countries. Even though these commodities are only a small share of global production and exports of farm products, they can be crucial to the food security of large segments of developing-country populations. The Agricultural Distortions Project database lends itself to placing the policies affecting (or ignoring) those products in a broader perspective.

Finally, this chapter provides another new perspective on the project's database. It seeks to shed light on how relatively distorted various commodity markets are from the viewpoint of global trade or welfare restrictiveness. This analysis draws on the theory outlined in the previous chapter, but switches the focus from countries to products. True, a global model of each commodity market (or a global economy-wide computable general equilibrium [CGE] model) calibrated for a particular year of interest could provide such insights for that year: the NRA and CTE estimates for that product could be inserted into such a model to generate partial (or general) equilibrium estimates of the global trade and welfare effects of those distortionary policies. However, global models do not exist for many commodities, and global CGE models such as the one used by Valenzuela, van der Mensbrugghe, and Anderson (2009) in the next chapter typically must aggregate many of the smaller commodities into groups to keep the model tractable. Moreover, such models are calibrated to a particular year and so are incapable of providing a long time series of estimates of the global trade and welfare effects of distortionary policies affecting particular commodity markets. The global trade reduction indexes (TRIs) and welfare reduction indexes (WRIs) used here are calculated for each of 12 key agricultural commodities for each year over the past half century, based on NRA and CTE estimates for the project's sample of 75 countries. These two new indexes provide for each product the ad valorem trade tax rate at which, if applied uniformly to that commodity in every country, would generate the same partial equilibrium reduction in trade or economic welfare as the actual structure across countries of NRAs and CTEs for that tradable commodity.

NRA and CTE Coverage of Key Farm Products

The Agricultural Distortions Project involves the estimation of annual NRAs and CTEs over the past five decades for 75 focus countries. In aggregate, the coverage

represents around 70 percent of the gross value of agricultural production in those focus countries and just under two-thirds of global farm production valued at undistorted prices over the period covered. The study has generated about 30,000 NRA and CTE estimates covering more than 70 different products, with an average of 11 products per country. Not all countries had data for the entire 1955–2007 period; the average number of years covered is 41 per country (see table 12.A.1 in the annex.).

The NRAs estimated by the project cover more than three-quarters of global output of the 30 most valuable agricultural products in terms of their share of global farm production, and as much as five-sixths for grains and tubers. This chapter focuses on the 12 main commodities: three meats plus milk (worth 55 percent of global output of these 12 products), three grains plus soybeans (37 percent of this group's output), and three tropical products plus sugar (just 8 percent of global output of these 12 products, but of the most significance to agriculture in developing countries). All but one-seventh of global production of these 12 products is covered by the project's NRAs and CTEs (table 12.1). That

Table 12.1. Coverage of Gross Value of Agricultural Production at Undistorted Prices for 12 Key Covered Products, 2000–04

(*percent*)

	NRA coverage (%) of product's global value of production	Product's share of global production value of 12 key products
Grains and oilseeds	**93**	**37**
Rice	92	13
Wheat	89	10
Maize	94	9
Soybeans	96	5
Tropical crops	**80**	**8**
Sugar	87	3
Cotton	82	3
Coconuts	60	1
Coffee	75	1
Livestock products	**82**	**55**
Milk	83	15
Beef	69	14
Pig meat	91	16
Poultry	81	10
All above products	**86**	**100**

Source: Authors' calculations based on the Anderson and Valenzuela (2008) database and FAO commodity balance and production data.

coverage is spread relatively equally across the five regions examined, as shown in table 12.2. Though each region's share of the 12 key products varies considerably, as a group, NRA coverage of those 12 products ranges from one-third of agricultural production in the focus countries of Africa to one-half in Latin America and high-income countries (table 12.3). Taken together, these coverage statistics suggest the NRAs can be considered very representative of the regional and global agricultural economies.

GSEs and NRAs, by Product

The gross subsidy equivalents (GSEs) of the NRAs for the 12 key products are summarized in figure 12.1 for developing and high-income countries separately, as well as for all of the study's focus countries. These estimates are obtained by multiplying the NRA by the value of production of each product at undistorted prices for each country, and summing across countries. The products attracting the largest subsidies in 2000–04 were the rice pudding ingredients of rice, milk, and sugar, plus beef, with milk dominating by far (and even more so two decades earlier). For some countries, the GSE for a particular product is negative, which offsets positive assistance in other countries. Rice is a case in point: it received positive assistance in both developing and high-income countries in 2000–04, but in 1980–84 developing countries in aggregate taxed rice production more than high-income countries subsidized it. Figure 12.1 also shows that assistance fell for the majority of those 12 products in high-income countries over the past quarter century, becoming less positive, whereas in developing countries it rose, becoming less negative. Hence, for all focus countries as a group, the picture is mixed: sugar was more assisted in 2000–04 than in 1980–84; wheat, beef, and especially milk became less assisted over those years; and rice, maize, and pig meat have moved from being taxed in aggregate to being subsidized. Coffee, coconuts, and cotton are all less taxed now than in the early 1980s.

The complete time series of the GSEs is summarized in table 12.4, from 1965 to 2004. Throughout that period, livestock assistance dominated crop assistance globally, and by a huge margin before the mid-1980s, when crop assistance was negative in many years. Typically, developing countries have not taxed milk so that, unlike for meat in earlier years, milk is not an offset to the positive assistance in high-income countries. Developing countries switched from negative to positive assistance during the 1980s for wheat and sugar, and during the 1990s for rice, maize, and meat, while assistance for the three tropical crops of coconuts, coffee, and cotton remained slightly negative into the 2000s.

Table 12.2. Share of Global Gross Value of Agricultural Production for Key Covered Products, by Region,[a] 2000–04
(*percent*)

	Africa	Asia	Latin America	Eastern Europe and CIS countries	High-income countries	All focus countries	Residual	World
Grains and oilseeds	**11**	**39**	**5**	**6**	**23**	**84**	**16**	**100**
Rice	3	81	2	0	5	92	8	100
Wheat	6	32	4	14	33	89	11	100
Maize	11	26	13	5	40	94	6	100
Soybeans	0	15	37	0	43	96	4	100
Tropical crops	**10**	**36**	**12**	**5**	**11**	**74**	**26**	**100**
Sugar	5	43	17	6	16	87	13	100
Cotton	11	30	5	14	22	82	18	100
Coconuts	0	60	0	0	0	60	40	100
Coffee	11	12	52	0	0	75	25	100
Livestock products	**3**	**21**	**6**	**7**	**36**	**72**	**28**	**100**
Milk	3	21	4	12	43	83	17	100
Beef	6	1	16	5	41	69	31	100
Pig meat	0	49	3	6	34	91	9	100
Poultry	2	27	9	5	38	81	19	100

Source: Authors' calculations based on the Anderson and Valenzuela (2008) database and FAO commodity balance and production data.

a. The group averages refer to 30 key products, and in total there are more than 70 products covered by the project, even though only 12 are shown separately here.

Table 12.3. Share of Regional Gross Value of Agricultural Production for Major Covered Products,[a] by Region, 2000–04

(*percent*)

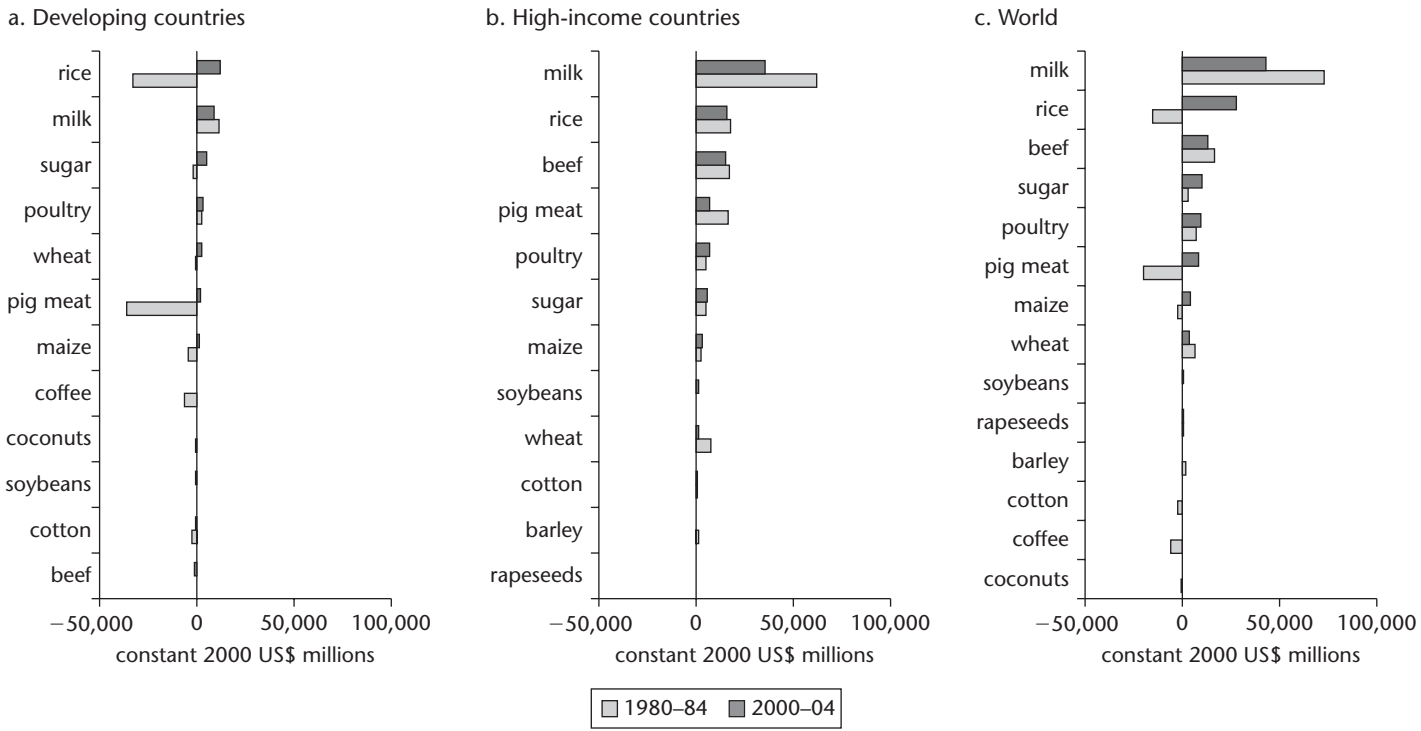
	Africa	Asia	Latin America	Eastern Europe and CIS countries	High-income countries
Grains and oilseeds	**16**	**23**	**13**	**12**	**16**
Rice	2.8	13.6	1.9	0.1	1.0
Wheat	4.7	4.6	3.0	10.2	5.6
Maize	8.4	3.3	8.3	2.7	6.2
Soybeans	0.0	1.1	13.3	0.0	3.6
Tropical crops	**4.3**	**3.8**	**8.0**	**3.3**	**1.6**
Sugar	1.2	1.9	3.8	1.3	0.8
Cotton	2.3	1.0	0.9	2.1	0.9
Coconuts	—	0.8	—	—	—
Coffee	0.8	0.1	3.3	—	—
Livestock products	**12**	**19**	**28**	**24**	**33**
Milk	3.5	4.5	4.4	11.8	11.1
Beef	6.8	0.2	14.7	4.6	9.1
Pig meat	—	10.6	3.0	6.6	8.9
Poultry	1.6	3.6	5.9	2.9	6.2
Total of above 12 products	**32**	**45**	**49**	**39**	**51**
All covered products	**68**	**66**	**70**	**61**	**72**
Noncovered products	**32**	**34**	**30**	**39**	**28**
All agricultural products	**100**	**100**	**100**	**100**	**100**

Source: Authors' calculations based on the Anderson and Valenzuela (2008) database and FAO commodity balance and production data.

Note: — = not available.

a. The product group averages refer to 30 key products, and in total there are more than 70 products covered by the project, even though only 12 are shown separately here.

Figure 12.1. GSEs of Assistance to Farmers Globally, by Product, 1980–84 and 2000–04



Source: Anderson and Valenzuela (2008), based on estimates reported in the project's national country studies.

Table 12.4. GSEs of Assistance to Farm Industries, by Focus Country Group,[a] 1965–2007

a. All focus countries (*constant 2000 US$ per year*)

	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–04
Grains and oilseeds	**12,911**	**−2,700**	**11,442**	**−10.561**	**44.083**	**38.345**	**37.908**	**36,655**
Rice	2,009	−3,700	9,851	−15.006	23.352	23.491	24.633	28,189
Wheat	8,365	−881	974	7.010	16.094	12.663	7.993	3,489
Maize	2,477	1,995	1,300	−2.259	5.507	1.770	3.347	4,124
Soybeans	61	−114	−682	−307	−869	422	1.935	853
Tropical crops	**7,053**	**−7,289**	**−6,757**	**−6.521**	**2.092**	**3.468**	**5.716**	**10,683**
Sugar	8,287	−6,247	547	3.134	7.816	7.211	8.958	10,750
Cotton	−94	927	−2,008	−2.230	−1.422	−2.151	−1.297	228
Coconuts	−110	−543	−256	−841	−841	−1.117	−1.017	−273
Coffee	−1,030	−1,425	−5,040	−6,584	−3.462	−476	−928	−21
Livestock products	**61,368**	**66,214**	**105,824**	**77,798**	**97.486**	**94.166**	**86.491**	**76,757**
Milk	35,581	39,518	72,029	73,126	73.973	59.982	46.208	43,974
Beef	7,350	7,364	10,554	17,018	27.272	21.052	19.998	13,986
Pig meat	15,792	15,132	17,550	−19,655	−9.729	3.382	9.874	8.927
Poultry	2,644	4,201	5,691	7,309	5.969	9.750	10.411	9,869
Total of above 12 products	**81,332**	**56,225**	**110,509**	**60,716**	**143.661**	**135.979**	**130.116**	**124.095**

b. Developing countries (*constant 2000 US$ per year*)

	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–04
Grains and oilseeds	**−6,971**	**−15,204**	**−14,214**	**−38,079**	**−3,883**	**−7,934**	**9,494**	**15,235**
Rice	−9,278	−14,804	−11,835	−32,706	−5,435	−7,230	2,513	12,245
Wheat	1,574	108	−115	−453	3,191	1,361	4,720	2,297
Maize	673	−396	−1,579	−4,611	−28	−2,092	1,106	1,222
Soybeans	61	−112	−685	−308	−1,611	27	1,155	−529
Tropical crops	**331**	**−8,680**	**−12,538**	**−12,092**	**−5,003**	**−3,181**	**−503**	**4,222**
Sugar	2,980	−6,249	−4,819	−1,982	889	440	2,273	5,103
Cotton	−1,509	−462	−2,424	−2,684	−1,590	−2,028	−832	−586
Coconuts	−110	−543	−256	−841	−841	−1,117	−1,017	−273
Coffee	−1,030	−1,425	−5,040	−6,584	−3,462	−476	−928	−21
Livestock products	**−755**	**−1,814**	**11,494**	**−22,745**	**−2,035**	**7,066**	**14,248**	**12,930**
Milk	263	55	9,639	11,242	13,198	6,443	5,610	8,684
Beef	−1,914	−2,793	−307	−298	1,583	−608	1,926	−965
Pig meat	671	883	1,352	−36,180	−16,910	−1,207	3,323	2,125
Poultry	225	41	810	2,491	94	2,438	3,388	3,085
Total of above 12 products	**−7,396**	**−25,699**	**−15,258**	**−72,916**	**−10,921**	**−4,049**	**23,238**	**32,387**

(*Table continues on the following page.*)

Table 12.4. GSEs of Assistance to Farm Industries, by Focus Country Group,[a] 1965–2007 (*continued*)

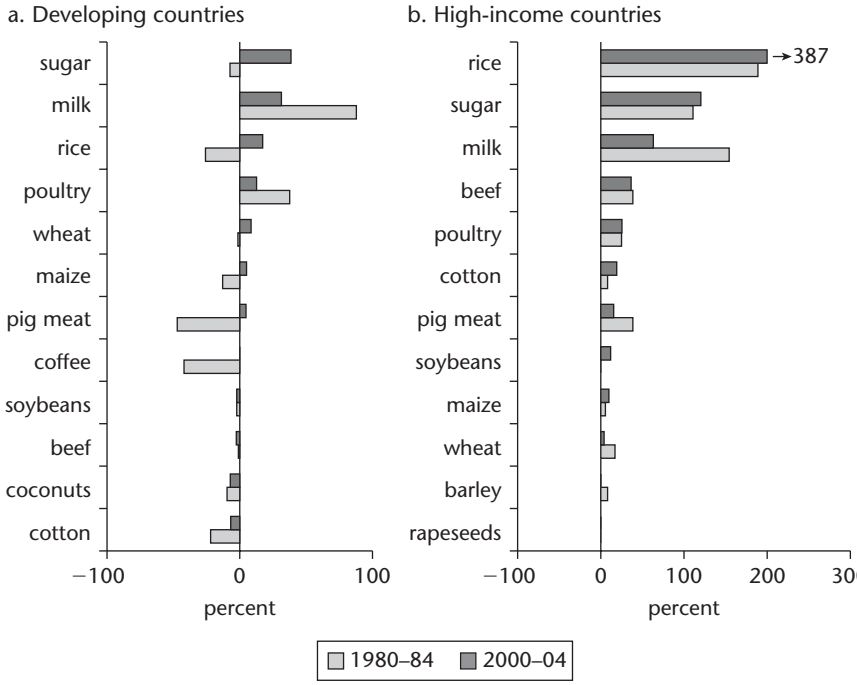
c. High-income countries (*constant 2000 US$ per year*)

	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–04	2005–07
Grains and oilseeds	**19,889**	**12,523**	**25,672**	**27,495**	**47,967**	**46,277**	**28,416**	**21,431**	**15,359**
Rice	11,291	11,128	21,696	17,685	28,791	30,717	22,126	15,955	11,431
Wheat	6,795	−991	1,095	7,459	12,894	11,300	3,272	1,192	1,351
Maize	1,804	2,387	2,879	2,349	5,542	3,862	2,243	2,905	2,408
Soybeans	0	−2	2	1	739	397	776	1,379	169
Tropical crops	**10,304**	**3,555**	**11,135**	**6,948**	**15,900**	**14,940**	**8,037**	**6,595**	**5,120**
Sugar	5,301	1	5,373	5,117	6,914	6,775	6,682	5,645	2,819
Cotton	1,414	1,390	416	455	168	−119	−467	816	1,992
Barley	3,563	2,135	5,324	1,359	7,154	7,175	1,858	129	307
Rapeseeds	26	29	22	17	1,664	1,110	−36	6	2
Livestock products	**62,126**	**68,044**	**94,370**	**100,534**	**99,476**	**87,122**	**72,259**	**63,791**	**34,486**
Milk	35,312	39,462	62,441	61,852	60,757	53,568	40,626	35,260	13,117
Beef	9,277	10,171	10,854	17,324	25,661	21,648	18,062	14,953	8,519
Pig meat	15,121	14,249	16,196	16,534	7,176	4,590	6,543	6,802	7,206
Poultry	2,416	4,162	4,879	4,824	5,882	7,316	7,027	6,777	5,643
Total of above 12 products	**92,319**	**84,122**	**131,176**	**134,976**	**163,343**	**148,339**	**108,712**	**91,817**	**54,964**

Source: Anderson and Valenzuela (2008), based on estimates reported in the project's national country studies.

a. Does not include NPS or decoupled assistance, nor assistance provided by nonfocus countries.

Figure 12.2. NRAs, Key Covered Products, High-Income and Developing Countries[a], 1980–84 and 2000–04



Source: Anderson and Valenzuela (2008), based on estimates reported in the project's national country studies.

a. Product NRAs are averages of country NRAs weighted by the value of production at undistorted prices.

These GSE values are the combined effect of output values reflected in tables 12.1 to 12.3 and NRAs shown in figure 12.2. Figure 12.2 confirms that the three rice pudding ingredients share the dubious honor of being the most assisted products in percentage terms in both developing and high-income countries. The time series since 1965 is shown in table 12.5 for all focus countries, where it is evident that it is not just the value of the livestock sector but also its high NRAs that contribute to its dominance in GSE terms, with milk the stand-out assisted product. The distribution across countries of NRAs for these individual products is considered below, beginning with the most assisted.

Rice, milk, and sugar

The first thing that is striking about figure 12.3 is that virtually all countries for which NRAs have been estimated for rice, milk, and sugar assisted these three

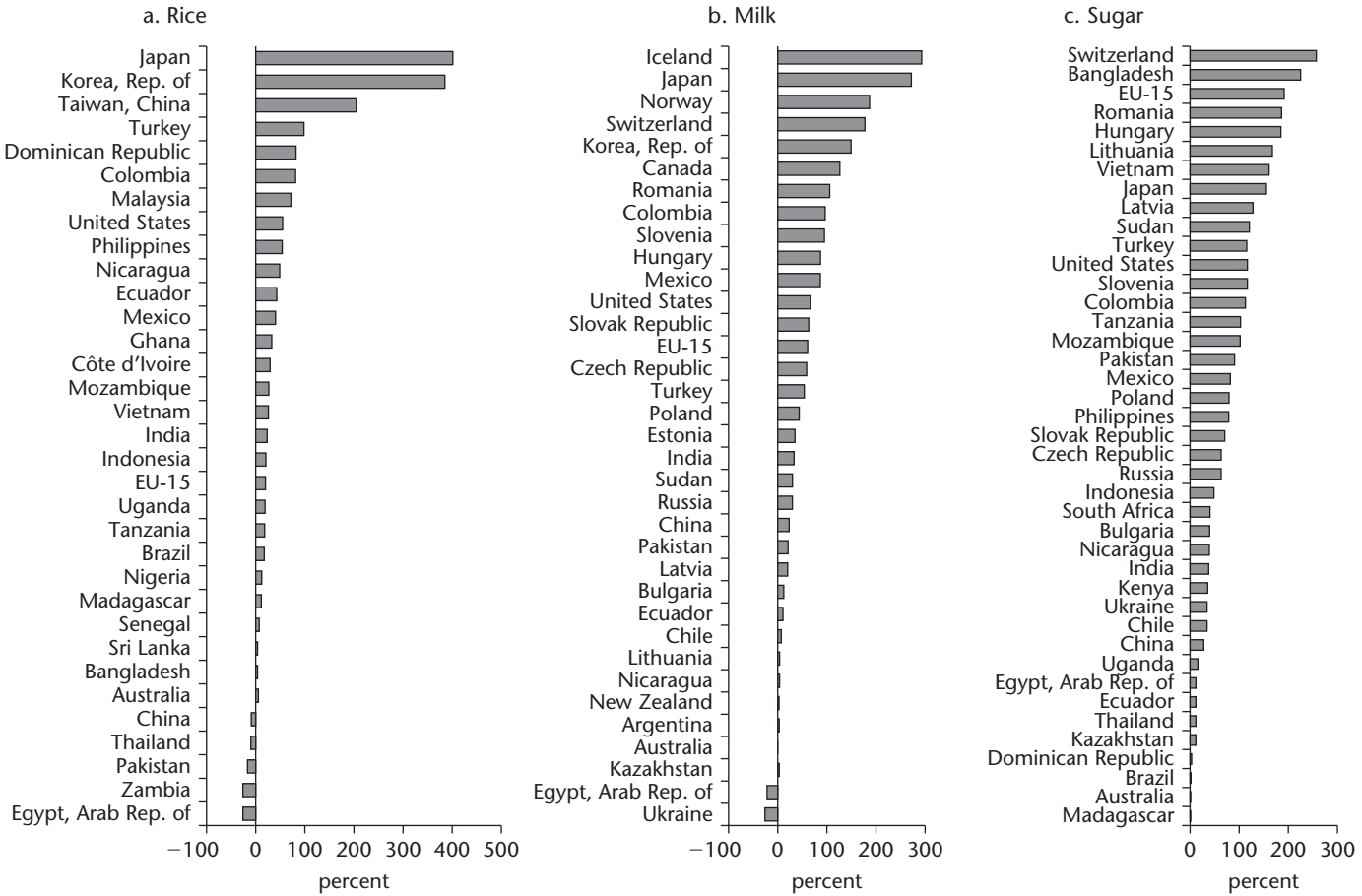
Table 12.5. NRAs, 12 Key Covered Farm Products,[a] All Focus Countries, 1965–2004
(*percent*)

	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–04
Grains and oilseeds[b]	**11**	**6**	**5**	**−3**	**21**	**16**	**14**	**17**
Rice	6	11	12	−10	26	25	23	39
Wheat	22	7	2	9	32	23	12	6
Maize	8	5	2	−3	12	3	6	7
Soybeans	1	0	−2	−1	−2	1	7	4
Tropical crops[b]	**34**	**−5**	**−9**	**−8**	**4**	**7**	**11**	**27**
Sugar	157	−4	9	15	39	28	39	60
Cotton	0	9	−9	−12	−8	−10	−6	3
Coconuts	−24	−8	−3	−11	−19	−34	−22	−8
Coffee	−31	−33	−43	−43	−31	−8	−10	0
Livestock products[b]	**46**	**39**	**50**	**30**	**42**	**35**	**30**	**27**
Milk	97	91	140	138	151	85	62	53
Beef	14	12	13	25	43	29	31	23
Pig meat	47	36	31	−16	−11	4	10	10
Poultry	20	26	26	29	21	26	20	19
Total of above 12 products	29	18	21	10	28	24	21	23
All covered products[b]	**24**	**15**	**18**	**6**	**16**	**18**	**16**	**16**

Source: Anderson and Valenzuela (2008), based on estimates reported in the project's national country studies.

a. The group averages refer to 30 key products, and in total there are more than 70 products covered by the project, even though only 12 are shown separately here
b. Weighted averages using value of production at undistorted prices.

Figure 12.3. NRAs, Rice, Milk, and Sugar, by Country, 2000–04



Source: Anderson and Valenzuela (2008), based on estimates reported in the project's national country studies.

industries in 2000–04. The only exceptions are Ukraine and the Arab Republic of Egypt for milk and, for rice, Egypt, Zambia, Pakistan, and (very slightly) Thailand and China. Second, in virtually no country in the project's sample does the government not intervene in the market for these three products. The third striking feature of figure 12.3 is the huge rates of assistance for these products in some countries, with the peak rate for each product exceeding 200 percent in 2000–04. This is far higher than the peak NRAs for the other products in the sample of 12, with the exception of poultry (and beef in Norway). These three features, especially the third one, suggest there are characteristics these industries have in common that influence the political economy of support for them. One thing milk and sugar share with poultry is the need for immediate processing of the raw farm product before it is saleable to consumers, but that is also true of other products such as cotton. The definitive political economy paper on these products has yet to be written, but perhaps the availability of the project's NRA database will catalyze such an analysis.

With high protection for the 12 products examined here in virtually all markets, their international price has been depressed perhaps more than that for most other farm products. This has been very harmful for the main unsubsidized exporters of these products, notably Thailand for rice, New Zealand for milk products, and Brazil and Australia for sugar.

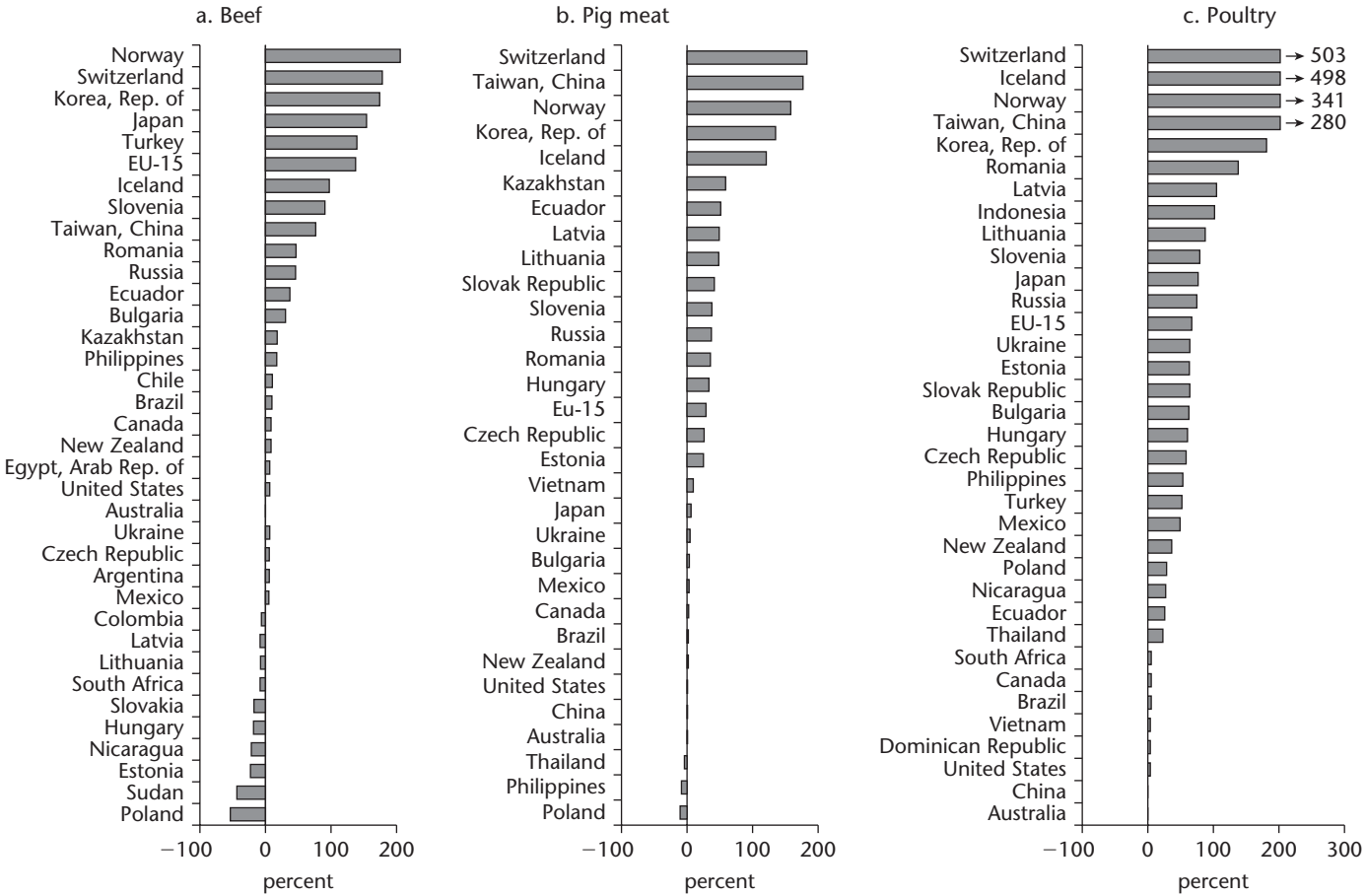
Beef, pig meat, and poultry

Meat industries too tend to be mostly assisted, except for beef, where there are several countries still taxing its production (often implicitly, for example via export taxes or restrictions). The highest NRAs by far for these meats are in Norway, Switzerland, and Northeast Asia. Since there are almost no pig and poultry industries with negative assistance, and since high-income countries dominate the upper part of figure 12.4, this suggests that those countries are overproducing these protein-rich foods. And since all but low-income countries produce these products using intensive feeding of grains and oilseed meals, those policies are also putting upward pressure on the prices of those crop products—except perhaps in countries where assistance to intensive livestock industries is just to compensate for the protection-induced high domestic price for feed grains and oilseeds.

Wheat, maize, and soybeans

These three temperate crop products are grown more in high-income countries than in any of the other four regions examined in the Agricultural Distortions Project (table 12.2). But where they are grown in developing countries (predominantly

Figure 12.4. NRAs, Beef, Pig Meat, and Poultry, by Country, 2000–04



Source: Anderson and Valenzuela (2008), based on estimates reported in the project's national country studies.

in the Southern Hemisphere), the NRAs tend to be negative. There are also lots of countries where these products' NRAs are close to zero, and the peak NRAs are in countries that grow very little of them (again, mostly Norway, Switzerland, and Northeast Asia—see figure 12.5). Thus, the contribution of wheat, maize, and soybean subsidies to global farm subsidies is quite modest even though these products account for a large share of the world's farm production (one-quarter of the 12 key products examined here, according to table 12.1).

Coconut, cocoa, coffee, and cotton

Coconut NRAs are not shown in figure 12.6 because there are only three countries in the sample for which they were estimated. In each case, the NRA by 2000 was slightly positive: 10 percent in Indonesia, 14 percent in the Philippines, and 17 percent in Sri Lanka for 2000–04. But in the last few decades of the 20th century, this tree crop's exports were taxed heavily.

Cocoa NRAs are available for six countries, all on the equator. In all cases, production is still discouraged (negative NRAs), most heavily so in the major producing country of Côte d'Ivoire.

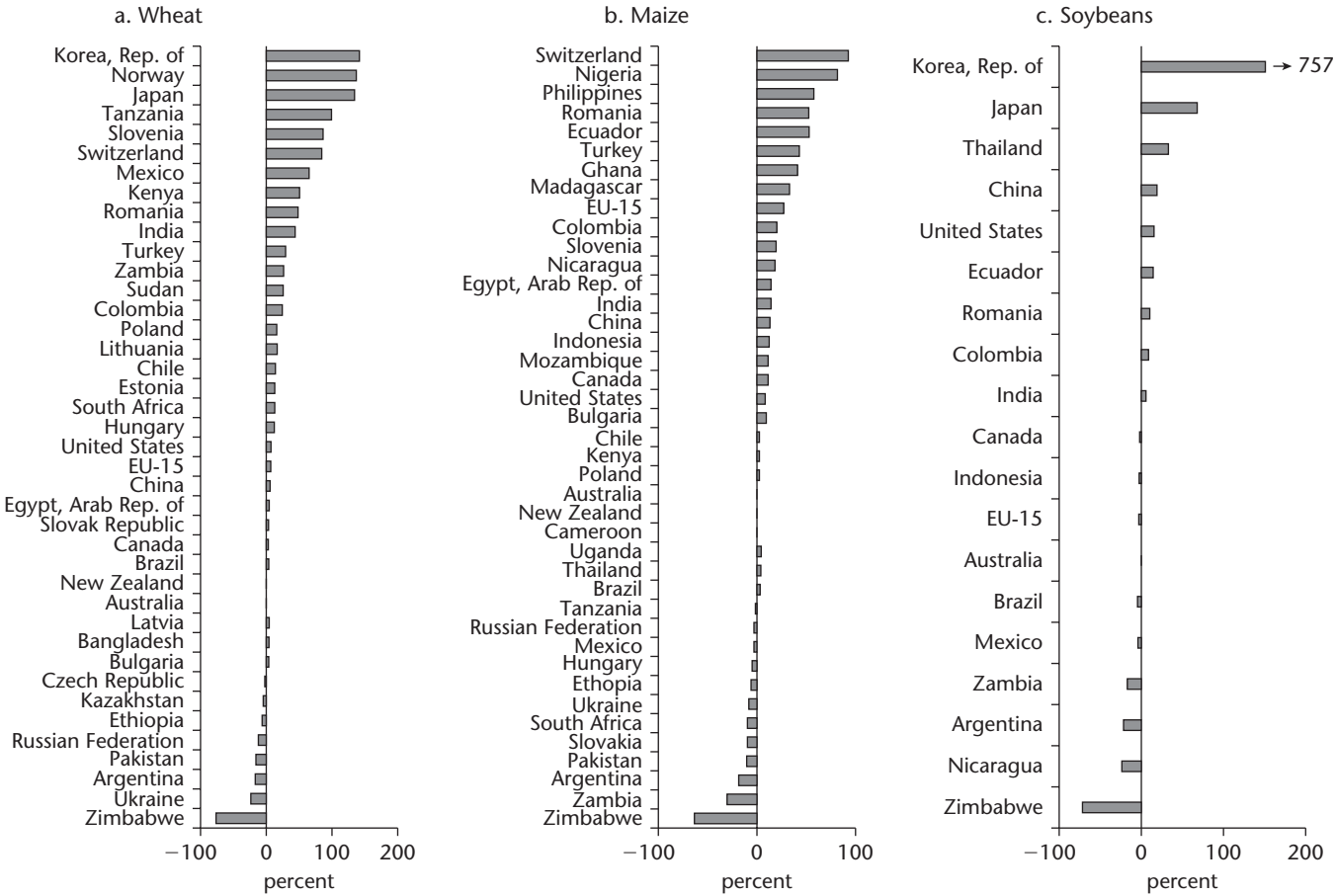
Coffee is now produced in many countries, and the extent of government intervention in this product varies from heavy taxation (again in Côte d'Ivoire, and almost as much as for cocoa) to slight assistance in the case of Brazil and Colombia in 2000–04.

More than any of the key products examined here—and in sharp contrast to rice, milk, and sugar—cotton is simultaneously taxed heavily in developing countries and subsidized heavily in high-income countries. The United States had an NRA of 70 percent for cotton in 2000–04,[2] while several African countries have NRAs of around −70 percent—and several more were equally taxing of this industry in earlier decades (Baffes 2009). It also seems that some Central Asian countries still tax cotton producers substantially, although the data are not sufficiently robust to be able to estimate NRAs with confidence (Pomfret 2008). This wide diversity of NRAs means that freeing of cotton markets globally would lead to a big relocation of production from supporting countries, most notably the United States, to many poor countries, especially those in Africa and Central Asia that are currently underpricing raw cotton to growers. A recent study using an economy-wide model of the global economy (Anderson and Valenzuela 2007) strongly supports that inference.

CTEs, by Product

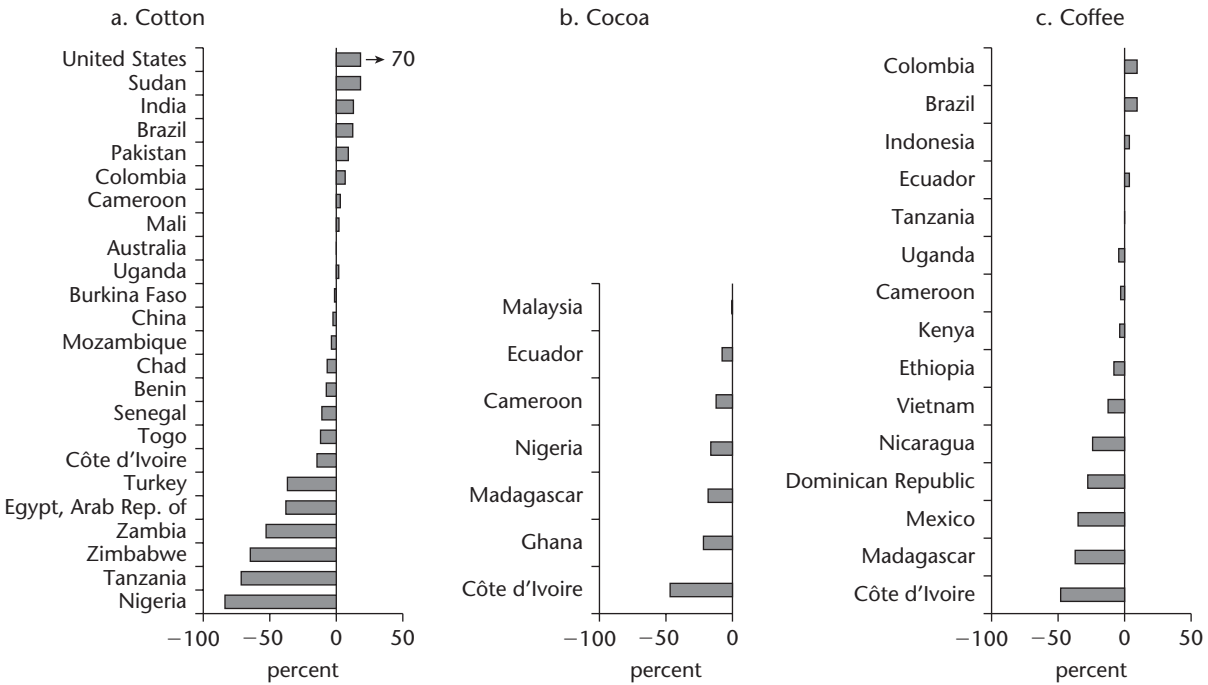
The CTEs of government intervention in nine of the key products examined here are fairly similar to the NRAs in percentage terms (compare tables 12.5 and

Figure 12.5. NRAs, Wheat, Maize, and Soybeans, by Country, 2000–04



Source: Anderson and Valenzuela (2008), based on estimates reported in the project's national country studies.

Figure 12.6. NRAs, Cotton, Cocoa, and Coffee, by Country, 2000–04



Source: Anderson and Valenzuela (2008), based on estimates reported in the project's national country studies.

12.6a), because intervention is mostly at the border and such measures affect producer and consumer prices equally. (The three tropical cash crops are not shown in table 12.6 because they are grown almost exclusively for export once they are lightly processed.) In cases where only border measures are used, the sign of the dollar equivalent of those taxes is the same as that of the GSE. However, the magnitude differs because these are heavily traded products and so countries differ in the extent to which they are net importers or exporters of each one.

Table 12.6b shows that of the meats, only pig meat consumption has been subsidized on a global basis. That global trend can be mostly attributed to China, and was phased out by the mid-1990s. Among the grain crops, rice consumption was taxed in aggregate in the focus countries only up to the mid-1980s, soybeans were taxed on net only in the 1970s, and maize consumption was taxed in aggregate only from the early 1990s.

The Effects of Intervention on Price Variability

Many governments intervene in commodity markets not only to alter the trend level of prices using long-term subsidies or taxes on farmers or food consumers, but also to attempt to reduce price and quantity volatility in the domestic market for key farm products. The justification sometimes given for such intervention in poor countries is that credit markets are underdeveloped or inefficient because of local monopoly lenders, so low-income consumers and producers have difficulty smoothing their consumption over time as prices fluctuate. There and in higher-income countries, the motive for intervention may be partly viewed also as a form of income insurance (Thompson et al. 2004), although it needs to be kept in mind that stabilizing prices is not the same as stabilizing incomes of the target households. It is also true that to achieve price stability through altering trade barriers is extraordinarily difficult. Indeed, more than 60 years ago, Hayek (1945) warned that such intervention is likely to lead to government failure that could reduce welfare more than the cost of the market failure it seeks to overcome, given the high cost of the information needed to do it well.

There is a huge analytical literature on the economics of price stabilization. Its innate connection with trade policy was highlighted by Johnson (1975) following the upward spike in world food prices in 1973–74. His analysis of grain prices suggested that if free trade in grain was in place in 1975, prices would be so much less variable—because trade could mitigate local supply variability—that only negligible quantities of carryover or storage would be profitable. A subsequent study of global food trade provided complementary results: using a stochastic model of world markets for grains, livestock products, and sugar, Tyers and Anderson (1992) found that instability of international food prices in the early

Table 12.6. CTEs of Policies Assisting Producers of Covered Farm Products, All Focus Countries, 1965–2007

a. Percent

	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–04	2005–07[a]
Crops[b]	**10**	**−3**	**4**	**5**	**19**	**17**	**13**	**16**	**22**
Rice	−14	−11	4	1	24	25	22	38	137
Wheat	19	2	3	12	27	16	6	2	5
Maize	11	7	8	2	5	−3	−2	−2	3
Soybeans	1	−3	−1	3	1	0	7	4	8
Sugar	175	1	13	19	40	42	44	63	79
Livestock products[b]	**46**	**39**	**50**	**32**	**41**	**29**	**27**	**25**	**19**
Milk	98	89	137	130	140	69	54	46	23
Beef	16	14	16	25	47	30	36	31	21
Pig meat	47	35	30	−12	−10	0	7	8	19
Poultry	23	28	27	28	18	21	18	19	16
Total of above 12 products[b]	**28**	**16**	**25**	**17**	**30**	**23**	**20**	**21**	**21**

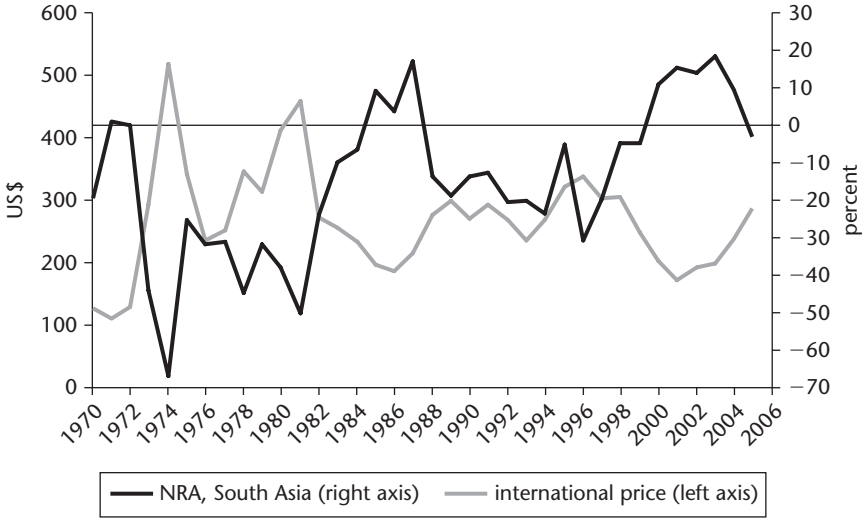
b. Aggregate value (*constant 2000 US$ per year*)

	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–04	2005–07[a]
Crops	**13,090**	**−20,549**	**10,751**	**12,591**	**46,803**	**49,139**	**38,465**	**40,780**	**34,167**
Rice	−7,405	−15,615	4,303	−511	21,994	23,714	22,973	27,390	15,748
Wheat	7,020	−2,812	1,113	7,545	14,412	9,339	3,720	1,420	2,418
Maize	3,399	2,396	3,992	1,218	2,249	−1,755	−1,487	−998	1,465
Soybeans	60	−452	−323	703	−11	123	2,557	1,518	2,280
Sugar	10,016	−4,065	1,667	3,636	8,159	17,718	10,702	11,450	12,255
Livestock products	**62,252**	**66,748**	**106,150**	**80,323**	**96,353**	**83,687**	**82,670**	**76,759**	**41,500**
Milk	34,929	38,158	70,180	69,282	69,593	52,186	41,196	40,069	13,019
Beef	8,622	8,945	12,604	17,432	30,110	23,143	24,990	18,906	12,589
Pig meat	15,702	15,119	17,544	−13,400	−8,648	−82	6,971	7,487	9,676
Poultry	2,998	4,526	5,822	7,009	5,297	8,440	9,513	10,298	6,217
Total of above 12 products	**75,342**	**46,200**	**116,901**	**92,914**	**143,156**	**132,826**	**121,135**	**117,539**	**75,667**

Source: Anderson and Valenzuela (2008), based on estimates reported in the project's national country studies.

a. The estimates for the period 2005–07 refer to only high-income-country policies.
b. Weighted averages based on the value of consumption at undistorted prices.

Figure 12.7. Rice NRA and International Rice Price, South Asia, 1970–2005



Source: Authors' compilation based on data in Anderson and Valenzuela (2008).

Note: Correlation coefficient is −0.75.

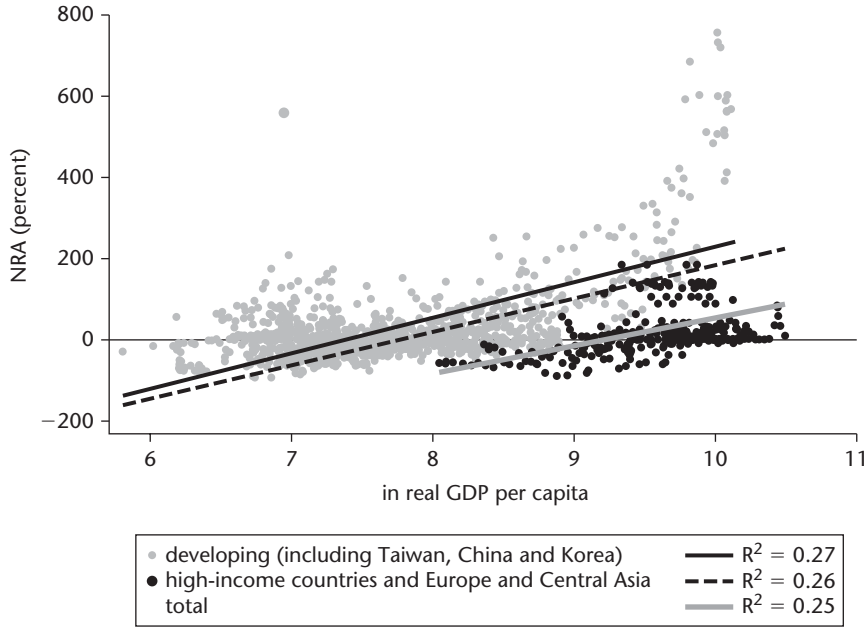
1980s was three times greater than it would have been under free trade in those products.

Many countries vary their trade taxes and hence NRAs inversely with international prices, particularly for staple foods. Rice is perhaps the most obvious example. Anderson and Martin illustrate for Southeast Asia in chapter 9 in this volume, and figure 12.7 illustrates for South Asia, where the domestic rice NRA moves in the opposite direction to the world rice price with a high correlation coefficient of −0.75 (which compares with −0.59 for Southeast Asia for the same period). This desire to stabilize does not seem to be diminishing, even though the trend rate of NRA for rice is rising as incomes grow (see figure 12.8).

One consequence of such domestic market-stabilizing activities by governments is that the international market for food staples is "thinned." As shown in table 12.7, food staples are traded much less than tropical products by developing countries—and the numbers in the high-income countries column of that table would be much lower too had intra-European Union (EU) trade been excluded from the data. For example, only 6.9 percent of global rice production was traded internationally in 2000–03, compared with 14 and 24 percent for maize and wheat, and prior to the 1990s the global share of rice traded was less than 4.5 percent.

If this market "thinning" matters most in low-income countries where consumption smoothing through time is most unaffordable for poor households, the

Figure 12.8. NRAs for Rice and Per capita Income, 1955–2007



Source: Anderson and Valenzuela (2008), based on estimates reported in the project's national country studies.

question arises as to how successful governments in that group of countries have been in keeping domestic price volatility below volatility in international markets. A recent attempt to test that, using the prices that generated the NRAs from this project, found that government intervention in low-income countries, on average, had destabilized prices relative to the international marketplace (Masters and Garcia 2009), apparently vindicating Hayek's concern cited above, and contrary to the general conclusion reached by Schiff and Valdés (1992) using data up to the mid-1980s. That is, policies continue to seek to reduce fluctuations in domestic food prices and in the quantities available for consumption via fluctuations in barriers to trade. This beggar-thy-neighbor dimension of each national economy's food policy reduces the international public good role that trade between nations can play in bringing stability to the world's food markets. The more some countries insulate their domestic markets, the more other countries perceive a need to do likewise, exacerbating the effect on world prices so that even larger changes in NRAs are desired—a classic collective action problem, and one that was illustrated yet again in 2007–08, when the imposition of export restrictions in key exporting countries in late 2007 and early 2008 contributed to the sharp increases

Table 12.7. Shares of Production Exported (X/Q) and of Consumption Imported (M/C) for Major Covered Products,[a] by Region, 2000–03

(*percent*)

		Africa	Asia	Latin America and the Caribbean	Eastern Europe and Central Asia	High-income coutnries
Grains	**X/Q**	**2**	**7**	**11**	**13**	**29**
	M/C	**17**	**9**	**22**	**11**	**27**
Rice	X/Q	6	6	1	2	32
	M/C	28	1	12	59	15
Wheat	X/Q	4	3	46	13	49
	M/C	44	4	51	6	27
Maize	X/Q	4	8	15	10	20
	M/C	14	5	14	9	5
Tropical crops	**X/Q**	**52**	**38**	**45**	**32**	**47**
	M/C	**13**	**18**	**12**	**42**	**42**
Sugar	X/Q	27	12	40	20	31
	M/C	20	9	4	46	25
Cotton[b]	X/Q	29	1	5	2	31
	M/C	2	4	9	21	3
Coconuts	X/Q	—	9	—	—	—
	M/C	—	—	—	—	—
Coffee	X/Q	77	78	73	—	—
	M/C	2	3	5	—	—
Livestock	**X/Q**	**1**	**4**	**10**	**7**	**20**
	M/C	**8**	**6**	**5**	**9**	**14**
Pig meat	X/Q	—	1	12	6	21
	M/C	—	2	8	12	20
Milk	X/Q	0	0	5	2	7
	M/C	1	1	5	1	3
Beef	X/Q	1	2	10	6	23
	M/C	9	48	5	14	20
Poultry	X/Q	1	10	16	7	19
	M/C	9	11	5	28	10
Total of above 12 products	**X/Q**	**16**	**22**	**19**	**11**	**24**
	M/C	**13**	**14**	**12**	**11**	**19**

Source: Authors' calculations based on Anderson and Valenzuela (2008) and FAO commodity balance and production data.

a. The group averages refer to 30 key products, and in total there are more than 70 products covered by the project, even though only 12 are shown separately here. These data include intra-EU trade, which, if excluded, would have lowered substantially the numbers in the last column.

b. Excluding data for the five cotton-exporting countries of Benin, Burkina Faso, Chad, Mali, and Togo.

in world prices in the first half of 2008. This is an area requiring considerably more analysis of past government behavior, and for which the current project's Agricultural Distortions Project database is well suited, but space and time limitations preclude it from being included in this volume.

What about Nontraded Food Staples of Low-Income Countries?

The NRA coverage of the 12 key traded products discussed above represents only one-third of agricultural production in Africa, compared with one-half of farm output in Latin America and high-income countries (table 12.3). Part of the reason for the difference is that in low-income countries where rural infrastructure is weak, trade costs are relatively high and so a larger proportion of food production focuses on products that tend to be mostly not traded internationally. They include root crops such as cassava, potatoes, sweet potatoes, and yams; grains such as millet; and fruits such as bananas and plantains. Apart from potatoes, these crops are almost exclusively grown in developing countries with hot climates, yet with different degrees of specialization across regions (table 12.8). Apart from bananas, these products are traded very little across borders, even with neighboring countries (table 12.9). Yet in terms of calories and protein, bananas and plantains account for two-thirds of the fruit intake in Sub-Saharan Africa, and they, along with the four tubers and millet, account for one-quarter of all Sub-Saharan African food intake, according to Food and Agriculture Organization (FAO) food balance sheets in recent years.

How much difference would it make if these products had been more fully included in the Agricultural Distortions Project database? Despite their importance as a source of calories and protein, their share of the global value of production is quite low, because of their low prices. In aggregate, those seven products account for just 5 percent of the global value of farm output valued at domestic producer prices. In Africa, though, they account for a bit more than one-fifth of the regional value of agricultural production. For that reason, authors of the project's African studies typically include them in their sample of covered products. This can be seen from table 12.10, where the fourth row shows that these products accounted in 1995–2004 for one-third (22 percentage points) of the 67 percent coverage ratio for the African sample. The second set of rows in table 12.10 shows that had all developing countries included all seven of these products in their covered sample, it would have raised their coverage by no more than 6 percentage points. Those rows also show that their inclusion in the African studies was nearly complete.

Table 12.8. Share of Global Production of Seven Mostly Nontraded Staple Crops, by Region, 1995–2004
(*percent*)

	Africa	Asia	Latin America	All developing countries	High-income countries and Eastern Europe and CIS countries	All focus countries	Residual	World
Cassava	37	28	14	79	0	79	19	100
Potato	2	29	4	35	52	87	13	100
Sweet potato	5	89	1	95	1	96	4	100
Yams	88	0	1	89	0	89	11	100
Millet	31	45	0	76	5	81	19	100
Banana	6	48	26	80	1	81	19	100
Plantain	56	2	13	70	0	70	30	100
Total of above seven crops	**23**	**41**	**11**	**75**	**11**	**86**	**14**	**100**

Source: Authors' calculations based on FAO (2008) volume of production data.

Table 12.9. Average of Focus Developing Countries' Self-Sufficiency Ratios for Seven Mostly Nontraded Staple Crops, by Region, 1961–2005
(*regional production divided by regional production plus net imports*)

	1961–69	1970–79	1980–89	1990–99	2000–05
Africa					
Cassava	1.00	1.00	1.00	1.00	1.00
Potatoes	1.02	1.03	1.02	1.03	1.02
Sweet potatoes	1.00	1.00	1.00	1.00	1.00
Yams	1.00	1.00	1.00	1.00	1.00
Millet	1.00	0.99	1.00	1.00	1.00
Bananas	1.23	1.13	1.05	1.09	1.13
Plantains	1.00	1.00	1.00	1.00	1.00
Asia					
Cassava	1.04	1.10	1.18	1.13	1.04
Potatoes	1.00	1.00	1.00	1.00	1.00
Sweet potatoes	1.00	1.00	1.00	1.00	1.00
Yams	1.00	1.00	1.00	0.98	0.87
Millet	1.00	1.00	1.00	1.00	1.00
Bananas	1.04	1.08	1.06	1.04	1.04
Plantains	1.00	1.00	1.00	1.00	1.00
Latin America					
Cassava	1.00	1.00	1.00	1.00	1.00
Potatoes	1.00	0.99	1.00	0.99	0.99
Sweet potatoes	1.00	1.00	1.01	1.01	1.01
Yams	1.00	1.02	1.04	1.02	1.01
Millet	4.21	2.21	2.15	1.97	1.03
Bananas	1.23	1.21	1.25	1.48	1.52
Plantains	1.00	1.00	1.00	1.03	1.06

Source: Authors' calculations based on FAO (2008) volume of production and trade data.

Together, those two facts suggest that the fuller inclusion of those seven staples in the covered product set would not have altered the developing countries' average NRA for covered products very much. To test that assertion more formally, the NRA for covered products, shown in the third set of rows in table 12.10, was recalculated to include any of the seven staples that were missing, assuming the NRAs for those missing staples were zero (since the nature of the market for these products is such that they attract very little government intervention). The final set of rows in table 12.10 show that such inclusion would bring the NRA average for covered products only very slightly closer to zero (for example, from 5.3 to 4.9 percent for developing countries as a group in 1995–2004). Moreover, their partial

Table 12.10. Additional Contribution of Seven Noncovered Staples[a] to Values of Agricultural Production (VOP) and to Aggregate NRAs in Focus Developing Countries, by Region, 1966–2004

(*percent, at undistorted prices*)

	Africa	Asia	Latin America	All developing countries
Covered products' share of regional VOP (with seven staples' share in brackets)				
1966–74	71 (16.5)	63 (1.3)	58 (1.2)	64 (2.7)
1975–84	69 (18.2)	71 (1.1)	69 (0.4)	71 (3.5)
1985–94	67 (18.6)	76 (1.3)	66 (0.5)	73 (4.0)
1995–2004	67 (22.1)	69 (2.6)	69 (0.9)	69 (5.8)
Noncovered seven staples' share of regional VOP				
1966–74	1.7	4.6	7.2	4.5
1975–84	2.4	5.9	8.3	5.8
1985–94	2.4	5.4	10.1	5.8
1995–2004	2.7	5.7	10.3	6.0
Covered products' weighted average NRA				
1966–74	−20.1	−0.2	−19.8	−8.1
1975–84	−16.2	−10.7	−17.1	−13.8
1985–94	−5.8	−9.9	−6.7	−9.1
1995–2004	−7.7	8.3	1.8	5.3
Covered plus seven noncovered weighted average NRA[b]				
1966–74	−19.6	−0.2	−17.6	−7.6
1975–84	−15.7	−9.9	−15.3	−12.8
1985–94	−5.6	−9.2	−5.8	−8.4
1995–2004	−7.4	7.7	1.6	4.9

Source: Authors' calculations based on FAO (2008) volume of production data and on NRAs from the project's national country studies as summarized in Anderson and Valenzuela (2008).

a. The staples considered here are bananas, cassava, millet, plantains, potatoes, sweet potatoes, and yams. The undistorted prices for these products are assumed to be the domestic producer prices.
b. Assumes the NRA and CTE for each of the seven noncovered staples is zero.

omission from the covered set makes no difference to the NRA average for all agriculture (including noncovered products), since in most cases the guesstimated NRA for noncovered, nontradable farm products in developing countries was zero anyway.

Global Commodity TRIs and WRIs[3]

Certainly, global models can estimate the trade and welfare effects of commodity policies, but such models typically are calibrated to a particular year and so are incapable of providing a long time series of estimates of the global effects of distortionary policies affecting particular commodity markets. Drawing on the theory outlined in the previous chapter, but with a focus on products rather than countries, the analysis presented in this final section of the chapter provides time series estimates for a pair of partial equilibrium indexes that give more insights than just NRAs or CTEs can provide into the likely impact of policies in restricting global trade in particular products and in reducing the contribution each product's market can make to global economic welfare.

These two new indexes can provide for each product the ad valorem trade tax rate, which, if applied uniformly to that commodity in every country, would generate the same partial equilibrium reduction in trade or economic welfare as the actual structure across countries of NRAs and CTEs for that tradable commodity. If one is willing to assume that the domestic price elasticities of supply are equal across countries for a particular commodity, and likewise for the domestic price elasticities of demand for that commodity (as indeed many global commodity models do, for lack of country-specific econometric estimates), then there is no need to know the size of those elasticities in order to estimate the two new indexes.

As in the previous chapter, these indicators are called the TRI and the WRI. One feature of both the WRI and the TRI is that they use a country's share of world production and consumption to determine the global welfare and trade effects of price-distorting policies. And an important feature of the WRI is that it takes into account the fact that the welfare effect of a policy such as an import tariff is related to the square of the tariff rate, which is particularly important in global commodity markets with a wide dispersion of NRAs across countries.

The theoretical literature that identifies ways to measure the welfare- and trade-reducing effects of international trade policy in scalar index numbers stems from the theoretical advances by Anderson and Neary (summarized in and extended beyond their 2005 book) and the partial equilibrium simplifications by Feenstra (1995). Notwithstanding these advances, to the knowledge of the authors of this chapter, no long time series of indexes had been estimated across countries for individual commodities until Lloyd, Croser, and Anderson (2009) showed that the required theory is a straightforward variation of that summarized for countries in chapter 11 of this volume. They have applied the theory to estimate the indexes for 28 of the commodity markets included in the Agricultural Distortions Project database, summing across countries for each product, in contrast to

chapter 11, where the summation is across products for each country. Here, results are summarized for just the 12 key global commodities that are the focus of this chapter, for each year since 1965, based on NRA and CTE estimates for the project's sample of 75 countries.

Table 12.11 reports the time series of estimated global TRIs for each of the 12 agricultural commodities and for the three groups of commodities (grains and oilseeds, tropical crops, and livestock products). Generally, those TRIs are somewhat above the NRAs reported in table 12.5, especially for tropical products for which the trade-reducing effects of import taxes of some high-income countries are reinforced by the export taxes of some lower-income countries. By contrast, for a few products, the global average TRI is less than the NRA, reflecting the fact that export subsidies have been in place for some higher-income countries or import subsidies for some lower-income countries.

As indicated in the country studies presented in earlier chapters, the most trade-distorted products are sugar, milk, and rice. Among the grains, it is rice trade that has been taxed most since the 1970s, while among the oilseeds and tropical crops it is sesame and sugar trade that are taxed most. Maize and soybean trade has been taxed least among those crops shown, and at very low rates compared with livestock products, especially milk. Note, however, that the extent of distortions to trade has diminished more for livestock products than for crops since the 1980s, when agricultural price and trade reforms began to be implemented in numerous countries.

Table 12.12 similarly reports the global WRI estimates. These are substantially above the NRAs, with five-year averages across the 12 commodities between 1965 and 2004 in the range of 55–85 percent, compared with the 6–24 percent range for the comparable NRA averages. This greater size is partly because the welfare cost is proportional to the square of the NRA, and partly because some NRAs are negative and so offset positive NRAs in the process of averaging them whereas the welfare cost of those negative and positive NRAs are additive. Figure 12.9 shows that the most distorted among the 12 commodities in 2000–04 in terms of both global welfare cost and trade restrictiveness are rice, sugar, milk, and beef.

A useful way of summarizing the WRI and TRI estimates for particular products is provided in figure 12.10, which shows their movement since many of the indexes peaked in the late 1980s. The indexes would suggest policies for a particular commodity market were not reducing either trade or welfare if the product were located at the zero point of both axes, that is, in the bottom left corner of the diagram (the "sweet spot"). Nearly all of the farm commodities shown have moved toward that spot since 1985–89, and very substantially so for the outliers—namely milk and coffee—but also considerably so for wheat and maize.

Table 12.11. Global TRIs, by Commodity, 1965–2004
(*percent*)

	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–04
Grains and oilseeds	**18**	**15**	**15**	**20**	**19**	**18**	**15**	**9**
Rice	50	58	42	41	58	53	32	43
Wheat	15	1	1	9	28	20	11	4
Maize	8	4	9	−3	9	10	2	3
Soybeans	1	0	6	8	11	8	6	6
Tropical Crops	**34**	**26**	**36**	**42**	**32**	**31**	**19**	**9**
Sugar	143	27	40	47	56	44	41	55
Cotton	2	13	14	1	13	4	9	−4
Coconuts	24	8	3	12	21	35	23	9
Coffee	30	31	37	46	33	13	12	2
Livestock products	**53**	**37**	**48**	**53**	**49**	**37**	**23**	**25**
Milk	83	79	133	131	125	63	53	45
Beef	20	17	18	32	47	32	33	32
Pig meat	37	28	25	47	25	11	9	8
Poultry	22	29	26	24	27	27	18	18
All of above	**29**	**21**	**23**	**30**	**30**	**29**	**19**	**15**

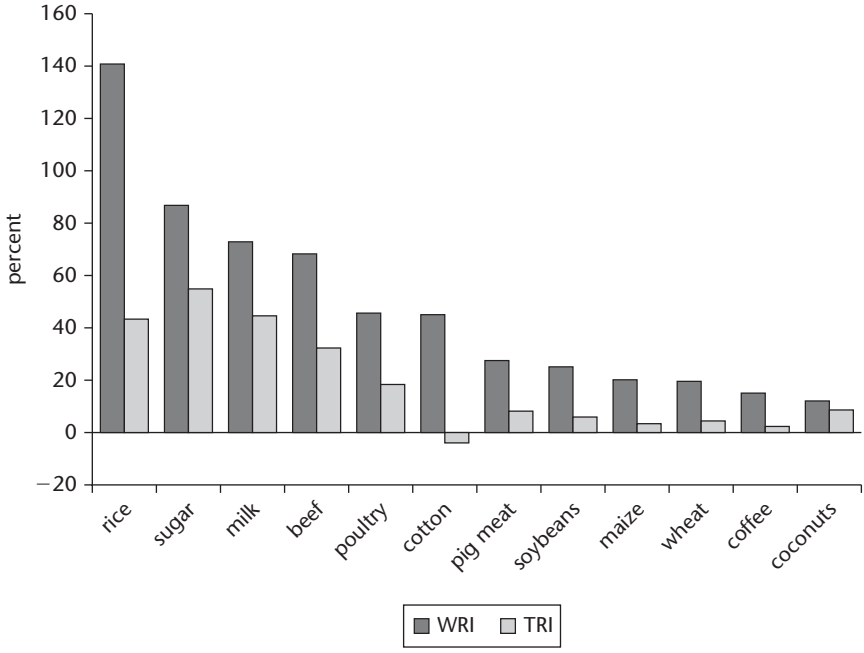
Source: Derived from estimates in Anderson and Croser (2009), based on NRA and CTE estimates in Anderson and Valenzuela (2008).

Table 12.12. Global WRIs, by Commodity, 1965–2004
(*percent*)

	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–04
Grains and oilseeds	**44**	**42**	**47**	**49**	**89**	**82**	**61**	**58**
Rice	65	86	75	75	150	152	116	141
Wheat	45	36	30	30	59	47	29	20
Maize	29	23	29	30	48	29	21	20
Soybeans	6	10	16	28	31	27	24	25
Tropical Crops	**97**	**48**	**47**	**49**	**63**	**58**	**52**	**59**
Sugar	224	58	68	72	99	76	77	87
Cotton	46	47	32	29	39	38	34	45
Coconuts	24	12	14	19	24	38	27	12
Coffee	32	35	44	50	38	31	22	15
Livestock products	**83**	**76**	**91**	**89**	**88**	**68**	**54**	**52**
Milk	161	149	218	182	191	111	83	73
Beef	43	42	47	66	93	76	72	68
Pig meat	79	66	59	70	42	33	27	28
Poultry	43	54	48	50	48	54	46	45
All of above	**67**	**58**	**65**	**66**	**86**	**73**	**57**	**55**

Source: Derived from estimates in Anderson and Croser (2009), based on NRA and CTE estimates in Anderson and Valenzuela (2008).

Figure 12.9. TRI and WRI for 12 Key Covered Products, 2000–04



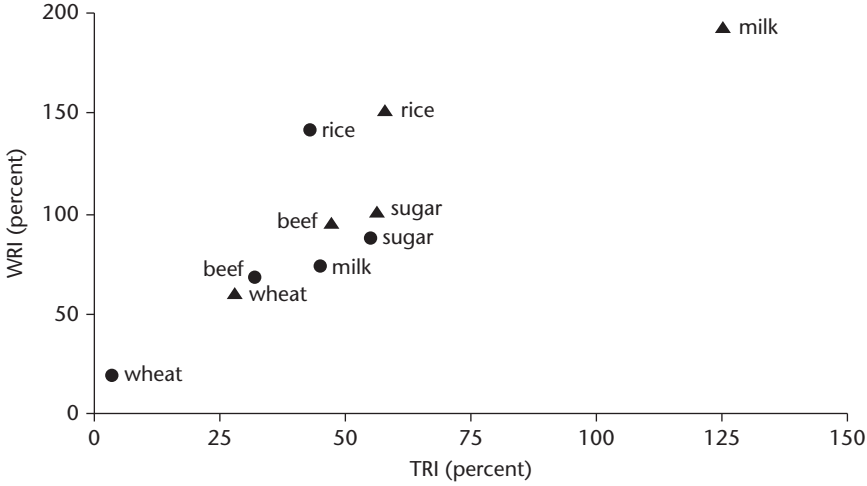
Source: Derived from estimates in Anderson and Croser (2009), based on NRA and CTE estimates in Anderson and Valenzuela (2008).

The countries that contribute most to the global TRI are shown in figure 12.11 for the five most distorted products. These shares are related not only to the size of the index but also to the contribution of the country to global trade in that product. In the case of sugar, milk, and beef, many countries are highly protective of their domestic producers and so the contributions are relatively evenly spread across the countries. By contrast, rice trade restrictions are due mostly to a few Asian countries, notably, India, Japan, and Taiwan, China. Cotton trade distortions are even more concentrated, with subsidies in the United States the main contributor.

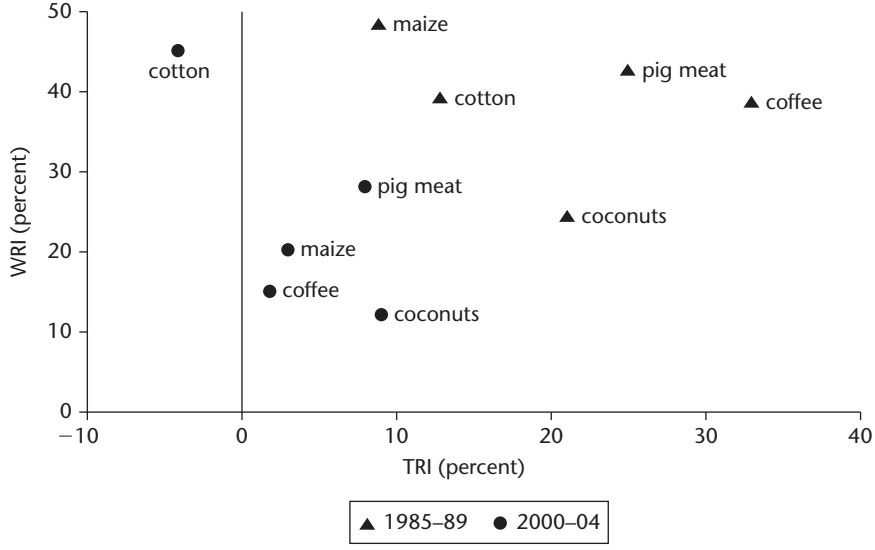
Similar summary information for the country contributions to the global commodity WRIs are presented in figure 12.12. In this case, Japan is prominent in reducing world welfare in the markets of not just rice but also milk and beef. For cotton, distortionary policies not only in the United States but also in Turkey and several other large developing countries are dominant contributors, where it is the size of the country in global cotton production/consumption

Figure 12.10. Global TRI and WRI for Covered Tradable Farm Products, by Commodity, 1985–89 and 2000–04

a. Beef, milk, rice, sugar, and wheat

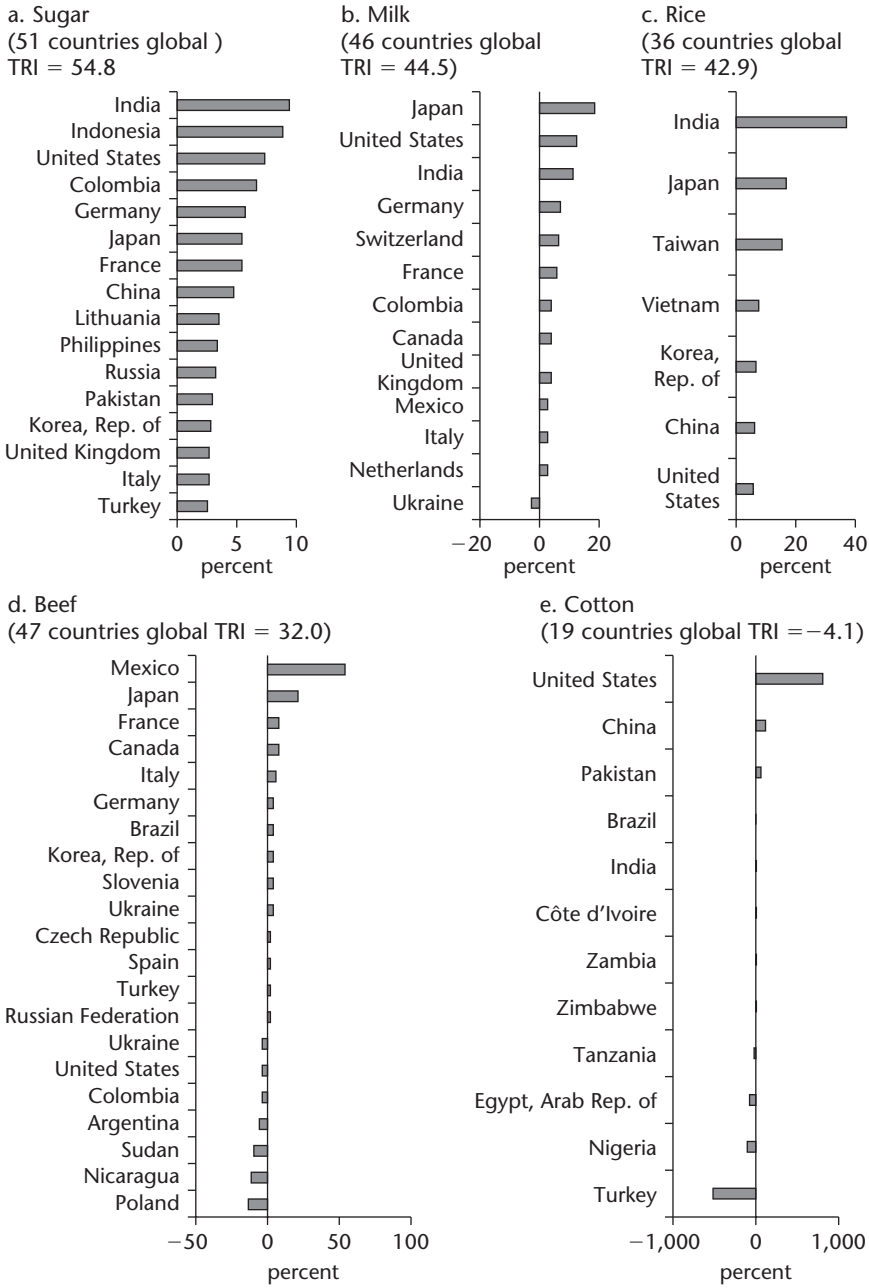


b. Coconut, coffee, cotton, maize, and pig meat



Source: Derived from estimates in Anderson and Croser (2009), based on NRA and CTE estimates in Anderson and Valenzuela (2008).

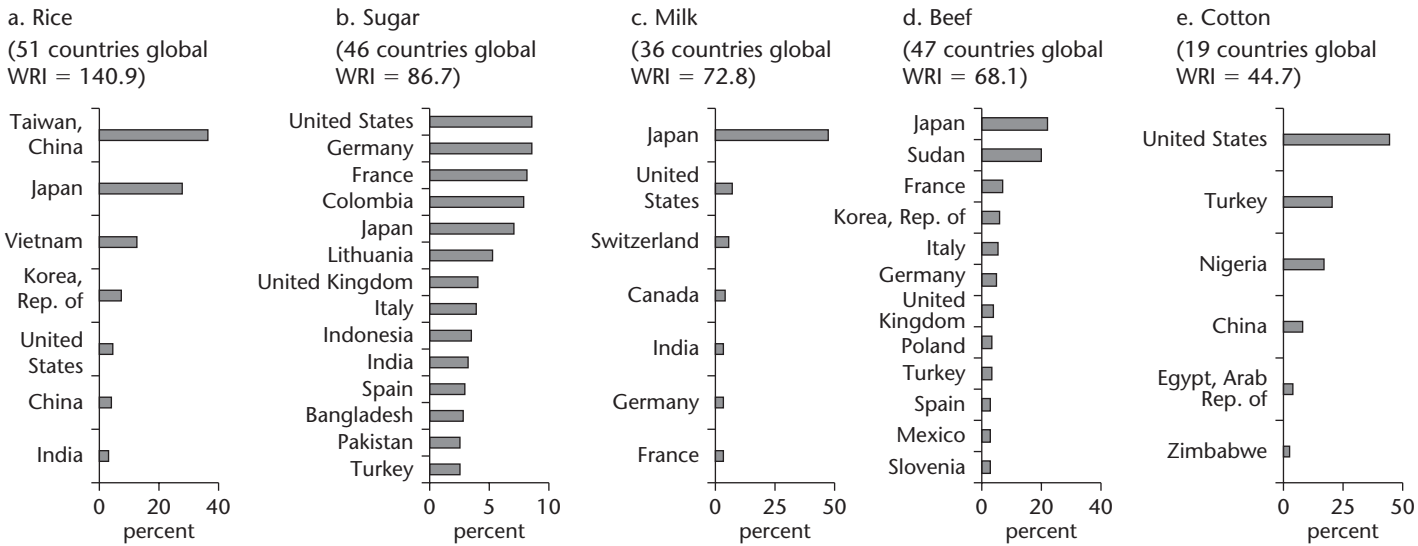
Figure 12.11. Country Share of the Global Commodity-Specific TRI for Rice, Sugar, Beef, Cotton, and Milk, 2000–04



Source: Derived from estimates in Anderson and Croser (2009), based on NRA and CTE estimates in Anderson and Valenzuela (2008).

Note: The decomposition over the five-year period can be greater than or less than 100, even though the decomposition sums to 100 in any one year. Here, the five-year averages are scaled so that the decompositions sum to 100. Focus countries have been omitted where the decomposition share has an absolute value of less than 2.

Figure 12.12. Country Share of the Global Commodity-Specific WRI for Rice, Sugar, Milk, Beef, and Cotton, 2000–04



Source: Derived from estimates in Anderson and Croser (2009), based on NRA and CTE estimates in Anderson and Valenzuela (2008).

Note: The decomposition over the five-year period can be greater than or less than 100, even though the decomposition sums to 100 in any one year. Here, the five-year averages are scaled so that the decompositions sum to 100. Focus countries have been omitted where the decomposition share has a value of less than 2.

that interacts with the percentage WRI to determine the aggregate contribution of each nation. In short, this application of these two additions to the family of so-called trade restrictiveness indexes provides very different indicators of distortions to global agricultural markets than the NRAs and CTEs (and even more so than the OECD's producer and consumer support estimates, which are expressed as a percentage of distorted rather than undistorted prices and so are smaller than their NRA and CTE counterparts). More specifically, the TRI offers a much truer indication of the world trade effects of government interventions in the markets for traded products, by properly accommodating trade subsidies alongside trade taxes, while the WRI offers a much truer indication of the global welfare effects of government interventions in the markets for traded products by also properly taking into account the fact that the welfare cost of a price distortion is proportional to the square of the tax or subsidy rate.

These two indexes have been calculated with the help of a number of simplifying assumptions, most notably that each country is small and that its price elasticity of supply (demand) for a particular product is the same as that for every other country, that cross-price elasticities are zero, and that at the aggregate level the slopes of the demand and supply curve are equal. However, this is what trade negotiators typically assume when they attempt to calculate the trade effects of market access concessions they are considering exchanging. It is also what commonly would be assumed when calculating, for the arbitrator of a trade dispute settlement case, the magnitude of the trade damage from a violation of commitments under a trade agreement. Models of the global market for particular farm products often have to make such assumptions too, for want of reliable or agreed econometric estimates of those elasticities for each country. Moreover, these indexes have the advantage over formal supply and demand models in that they can be expressed in time series form, thereby revealing trends and fluctuations over long periods, rather than just providing a snapshot at a point in time.

Annex

Table 12.A.1 Summary of NRA Estimates by Major Product, Africa, Asia, and Latin America, 2000–04

a. Africa

Product	Number of countries	Weighted average NRA, %	Gross value of production[a]	Countries
Apples[b]	1	0.3	0.15	South Africa
Bananas	1	1.1	0.08	Cameroon
Beans	3	−25.1	0.49	Mozambique, Tanzania, Uganda
Beef	3	−26.0	5.89	Egypt, South Africa, Sudan
Camel meat	1	87.7	0.10	Sudan
Cashews	2	−9.9	0.06	Mozambique, Tanzania
Cassava	13	−2.6	8.45	Benin, Burkina Faso, Cameroon, Chad, Côte d'Ivoire, Ghana, Madagascar, Mali, Mozambique, Nigeria, Tanzania, Togo, Uganda
Chat	1	−39.5	0.07	Ethiopia
Cloves	1	−18.7	0.05	Madagascar
Cocoa	5	−35.8	2.59	Cameroon, Côte d'Ivoire, Ghana, Madagascar, Nigeria
Coffee	7	−12.0	0.70	Cameroon, Côte d'Ivoire, Ethiopia, Kenya, Madagascar, Tanzania, Uganda
Cotton	16	−46.1	1.94	Benin, Burkina Faso, Cameroon, Côte d'Ivoire, Chad, Egypt, Mali, Mozambique, Nigeria, Senegal, Sudan, Tanzania, Togo, Uganda, Zambia, Zimbabwe
Fruits and vegetables[b]	1	0.0	0.14	Kenya
Grapes[b]	1	7.4	0.21	South Africa

Product	Number of countries	Weighted average NRA, %	Gross value of production[a]	Countries
Groundnuts	8	−40.3	1.72	Ghana, Mozambique, Nigeria, Senegal, Sudan, Uganda, Zambia, Zimbabwe
Gum arabic	1	−67.1	0.02	Sudan
Hides and skins	1	−48.4	0.03	Ethiopia
Maize	13	−5.4	7.24	Cameroon, Egypt, Ethiopia, Ghana, Kenya, Madagascar, Mozambique, Nigeria, South Africa, Tanzania, Uganda, Zambia, Zimbabwe
Milk	2	14.6	2.99	Egypt, Sudan
Millet	13	−2.3	1.79	Benin, Burkina Faso, Cameroon, Chad, Mali, Mozambique, Nigeria, Senegal, Sudan, Tanzania, Togo, Uganda, Zambia
Oilseeds	1	−39.4	0.08	Ethiopia
Oranges[b]	1	8.4	0.23	South Africa
Roots and tubers	1	0.0	0.38	Cameroon
Palm oil	1	−12.6	0.73	Nigeria
Peppers	1	−10.2	0.00	Madagascar
Plantains	5	−0.1	1.93	Cameroon, Côte d'Ivoire, Ghana, Tanzania, Uganda
Potatoes	2	0.0	0.07	Mozambique, Tanzania
Poultry	1	2.7	1.36	South Africa
Pulses	1	−20.4	0.16	Ethiopia
Pyrethrum	1	−47.7	0.00	Tanzania
Rice	10	−5.5	2.45	Côte d'Ivoire, Egypt, Ghana, Madagascar, Mozambique, Nigeria, Sudan, Tanzania, Uganda, Zambia

(*Table continues on the following page.*)

Table 12.A.1 Summary of NRA Estimates by Major Product, Africa, Asia, and Latin America, 2000–04 (*continued*)

a. Africa

Product	Number of countries	Weighted average NRA, %	Gross value of production[a]	Countries
Sesame	1	−38.1	0.20	Sudan
Sheep meat	2	−21.4	1.57	South Africa, Sudan
Sisal	1	0.0	0.01	Tanzania
Sorghum	13	20.7	2.13	Benin, Burkina Faso, Cameroon, Chad, Mali, Mozambique, Nigeria, Sudan, Tanzania, Togo, Uganda, Zambia, Zimbabwe
Soybeans	2	−54.2	0.04	Zambia, Zimbabwe
Sugar	8	43.7	1.03	Egypt, Kenya, Madagascar, Mozambique, South Africa, Sudan, Tanzania, Uganda
Sunflower	3	−3.5	0.15	South Africa, Zambia, Zimbabwe
Sweet potatoes	4	−0.2	0.34	Madagascar, Mozambique, Tanzania, Uganda
Tea	3	−16.4	0.58	Kenya, Tanzania, Uganda
Teff	1	−7.1	0.37	Ethiopia
Tobacco	4	−63.0	0.51	Mozambique, Tanzania, Zambia, Zimbabwe
Vanilla	1	−12.8	0.06	Madagascar
Wheat	8	−1.1	4.03	Egypt, Ethiopia, Kenya, South Africa, Sudan, Tanzania, Zambia, Zimbabwe
Yams	12	−3.3	5.73	Benin, Burkina Faso, Chad, Côte d'Ivoire, Ghana, Mali, Nigeria, Togo
All covered products	**21**	**−8.9**	**58.8**	

b. Asia

Product	Number of countries	Weighted average NRA, %	Gross value of production[a]	Countries
Bananas	1	0.0	0.47	Philippines
Barley	1	562.8	0.04	Rep. of Korea
Beef	3	85.2	1.00	Rep. of Korea, Philippines, and Taiwan, China
Cabbages	1	27.6	0.39	Rep. of Korea
Cassava	1	−10.0	0.42	Thailand
Chickpeas	1	18.7	1.43	India
Chilies	1	67.2	0.03	Sri Lanka
Cocoa	1	0.0	0.02	Malaysia
Coconuts	3	−7.9	3.80	Indonesia, Malaysia, Philippines, Sri Lanka
Coffee	2	−1.7	0.68	Indonesia, Vietnam
Cotton	3	5.1	4.79	China, India, Pakistan
Eggs	2	51.3	0.64	Rep. of Korea and Taiwan, China
Fruits and vegetables	1	−8.9	23.10	India
Fruits	1	0.0	9.23	China
Garlic	1	122.6	0.26	Rep. of Korea
Groundnuts	1	12.9	1.79	India
Jute	1	−38.7	0.18	Bangladesh
Maize	6	12.6	16.30	China, India, Indonesia, Pakistan, Philippines, Thailand
Milk	4	31.6	22.00	China, India, Rep. or Korea, Pakistan, and Taiwan, China
Onions	1	53.4	0.02	Sri Lanka
Palm oil	3	−2.6	6.66	Indonesia, Malaysia, Thailand
Peppers	1	197.0	0.28	Rep. of Korea

(*Table continues on the following page.*)

Table 12.A.1 Summary of NRA Estimates by Major Product, Africa, Asia, and Latin America, 2000–04 (*continued*)

b. Asia

Product	Number of countries	Weighted average NRA, %	Gross value of production[a]	Countries
Pig meat	6	4.2	52.10	China, Rep. of Korea, Philippines, Taiwan in China, Vietnam
Potatoes	2	6.2	0.44	Brunei Darussalam, Sri Lanka
Poultry	7	12.2	17.50	China, Rep. of Korea, Philippines, Taiwan in China, Vietnam
Rapeseeds	1	64.8	1.09	India
Rice	12	18.5	67.00	Brunei Darussalam, China, India, Indonesia, Rep. of Korea, Malaysia, Pakistan, Philippines, Sri Lanka, Taiwan in China, Thailand, Vietnam
Rubber	5	3.9	4.47	Indonesia, Malaysia, Sri Lanka, Thailand, Vietnam
Sorghum	1	15.7	0.83	Indonesia
Soybeans	5	16.9	5.22	China, India, Indonesia, Rep. of Korea, Thailand
Sugar	8	43.1	9.18	China, India, Indonesia, Pakistan, Philippines, Thailand, Vietnam
Sunflower	1	14.6	0.26	India
Tea	3	−7.5	0.56	Brunei Darussalam, Indonesia, Sri Lanka
Vegetables	1	0.0	49.90	China
Wheat	6	10.7	22.50	Brunei Darussalam, China, India, Rep. of Korea, Pakistan, and Taiwan, China
All covered products	**12**	**10.4**	**324.6**	

c. Latin America

Product	Number of countries	Weighted average NRA, %	Gross value of production[a]	Countries
Apples	1	−0.2	0.15	Chile
Bananas	2	−24.3	0.69	Dominican Republic, Ecuador
Barley	1	−6.8	0.18	Mexico
Beans	3	−3.3	0.88	Dominican Republic, Mexico, Nicaragua
Beef	7	−1.3	14.30	Argentina, Brazil, Chile, Colombia, Ecuador, Mexico, Nicaragua
Cassava	1	0.0	0.02	Dominican Republic
Cocoa	1	−6.7	0.08	Ecuador
Coffee	6	3.3	3.20	Brazil, Colombia, Dominican Republic, Ecuador, Mexico, Nicaragua
Cotton	2	10.7	0.86	Brazil, Colombia
Eggs	1	−15.7	1.84	Mexico
Garlic	1	361.9	0.00	Dominican Republic
Grapes	1	−0.4	0.20	Chile
Groundnuts	1	−34.5	0.04	Nicaragua
Maize	7	−3.1	8.07	Argentina, Brazil, Chile, Colombia, Ecuador, Mexico, Nicaragua
Milk	6	45.3	4.26	Argentina, Chile, Colombia,Ecuador, Mexico, Nicaragua
Onions	1	74.0	0.01	Dominican Republic
Palm oil	1	47.4	0.14	Colombia
Pig meat	3	4.5	2.93	Brazil, Ecuador, Mexico
Poultry	5	18.8	5.78	Brazil, Dominican Republic, Ecuador, Mexico, Nicaragua

(*Table continues on the following page.*)

Table 12.A.1 Summary of NRA Estimates by Major Product, Africa, Asia, and Latin America, 2000–04 (*continued*)

c. Latin America

Product	Number of countries	Weighted average NRA, %	Gross value of production[a]	Countries
Rice	6	33.7	1.87	Brazil, Colombia, Dominican Republic, Ecuador, Mexico, Nicaragua
Sesame	1	−40.5	0.01	Nicaragua
Sorghum	3	−10.3	0.87	Colombia, Mexico, Nicaragua
Soybeans	6	−9.9	13.00	Argentina, Brazil, Colombia, Ecuador, Mexico, Nicaragua
Sugar	7	26.5	3.71	Brazil, Chile, Colombia, Dominican Republic, Ecuador, Mexico, Nicaragua
Sunflower	1	−31.9	0.91	Argentina
Tomato	2	−37.0	1.68	Dominican Republic, Mexico
Wheat	5	2.0	2.91	Argentina, Brazil, Chile, Colombia, Mexico
All covered products	**8**	**2.7**	**68.6**	

Source: Drawn from estimates in Anderson and Valenzuela (2008).

a. Annual average gross value of covered production at undistorted prices (US$ billions).
b. Even though apples, fruit and vegetables, grapes, and oranges are covered only by one country, the weighted and simple averages differ because traded and nontraded products are treated separately.

Notes

1. Those regional books cover Africa (Anderson and Masters 2009), Asia (Anderson and Martin 2009), Latin America (Anderson and Valdés (2008), and European transition economies (Anderson and Swinnen 2008).

2. Unfortunately, the European Union does not appear in figure 12.5 because a time series of its cotton NRA was not measured (cotton is a relatively small crop produced only in southern Europe). Nor has the OECD measured a producer support estimate (PSE) for cotton. However, independent estimates for recent years indicate that EU growers receive an even higher NRA than the 70 percent received by U.S. growers in 2000–04 (see Anderson and Valenzuela 2007).

3. This section draws heavily on Lloyd, Croser, and Anderson (2009), who develop the theory summarized here and provide index estimates for a much larger sample of products than reported below.

References

Anderson, J. E., and J. P. Neary. 2005. *Measuring the Restrictiveness of International Trade Policy*. Cambridge, MA: MIT Press.

Anderson, K., and J. Croser. 2009. *National and Global Agricultural Trade and Welfare Reduction Indexes, 1955 to 2007.* Supplementary database at http://www.worldbank.org/agdistortions.

Anderson, K., and W. Martin, eds. 2009. *Distortions to Agricultural Incentives in Asia*. Washington, DC: World Bank.

Anderson, K., and W. Masters, eds. 2009. *Distortions to Agricultural Incentives in Africa*. Washington, DC: World Bank.

Anderson, K. and J. Swinnen, eds. 2008. *Distortions to Agricultural Incentives in Europe's Transition Economics*. Washington, DC: World Bank.

Anderson, K., and A. Valdés, eds. 2008. *Distortions to Agricultural Incentives in Latin America*. Washington, DC: World Bank.

Anderson, K. and E. Valenzuela. 2007. "The World Trade Organization's Doha Cotton Initiative: A Tale of Two Issues." *The World Economy* 30 (8): 1281–1304.

_____. 2008. "Estimates of Global Distortions to Agricultural Incentives, 1955 to 2007." World Bank, Washington DC. Core database at http://www.worldbank.org/agdistortions.

Baffes, J. 2009. "Benin, Burkina Faso, Chad, Mali, and Togo." In *Distortions to Agricultural Incentives in Africa*, ed. K. Anderson and W. Masters. Washington, DC: World Bank.

FAO. 2008. FAOSTAT data, accessed from http://www.fao.org in October.

Feenstra, R. C. 1995. "Estimating the Effects of Trade Policy." In *Handbook of International Economics*, Volume 3, ed. G. N. Grossman and K. Rogoff. Amsterdam: Elsevier.

Hayek, F. A. 1945. "On the Use of Information in Society." *American Economic Review* 35 (4): 519–30.

Johnson, D. G. 1975. "World Agriculture, Commodity Policy, and Price Variability." *American Journal of Agricultural Economics* 57 (5): 823–28.

Lloyd, P. J., J. L. Croser, and K. Anderson. 2009. "How Do Agricultural Policy Restrictions to Global Trade and Welfare Differ Across Commodities?" Policy Research Working Paper 4864, World Bank, Washington, DC.

Masters, W. A., and A. F. Garcia. 2009. "Agricultural Price Distortion and Stabilization." Agricultural Distortions Working Paper 86, World Bank, Washington, DC.

Pomfret, R. 2008. "Tajikistan, Turkmenistan, and Uzbekistan." In *Distortions to Agricultural Incentives in Europe's Transition Economics*, ed. K. Anderson and J. Swinnen. Washington, DC: World Bank.

Schiff, M., and A. Valdés. 1992. *The Political Economy of Agricultural Pricing Policy, Volume 4: A Synthesis of the Economics in Developing Countries*. Baltimore: Johns Hopkins University Press for the World Bank.

Thompson, S. R., P. M. Schmitz, N. Iwai, and B. K. Goodwin. 2004. "The Real Rate of Protection: The Income Insurance Effects of Agricultural Policy." *Applied Economics* 36: 1–8.

Tyers, R., and K. Anderson. 1992. *Disarray in World Food Markets: A Quantitative Assessment*. Cambridge and New York: Cambridge University Press.

Valenzuela, E., D. van der Mensbrugghe, and K. Anderson. 2009. "General Equilibrium Effects of Price Distortions on Global Markets, Farm Incomes, and Welfare." Chapter 13 in this volume.

13

GENERAL EQUILIBRIUM EFFECTS OF PRICE DISTORTIONS ON GLOBAL MARKETS, FARM INCOMES, AND WELFARE

*Ernesto Valenzuela, Dominique van der Mensbrugghe, and Kym Anderson**

There has been a great deal of change over the past quarter century in policy distortions to agricultural incentives throughout the world: the antiagricultural and antitrade biases of policies of many developing countries have been reduced, export subsidies of high-income countries have been cut, and some reinstrumentation toward less inefficient and less trade-distorting forms of support, particularly in Western Europe, has begun. However, applied rates of protection from agricultural import competition have continued to increase in both rich and poor countries, notwithstanding the Uruguay Round Agreement on Agriculture, which aimed to bind and reduce farm tariffs.

This chapter analyzes the net economic effects of agricultural price and trade policy changes around the world since the early 1980s, and compares those estimates with projections of how global markets, farm incomes and economic welfare as of 2004 would change if remaining policy distortions were removed. That is, this combined retrospective and prospective analysis seeks to assess how

*The authors are grateful for the distortions estimates provided by authors of the focus country case studies, and for assistance with spreadsheets by Johanna Croser, Marianne Kurzweil, and Signe Nelgen. The working paper version of this chapter (Valenzuela, van der Mensbrugghe, and Anderson 2008) contains additional appendix tables.

far the world has come, and how far it still has to go, in removing the disarray in world agriculture that was so vividly portrayed in D. Gale Johnson's seminal 1973 study of the issue—and which seemed to have worsened by the time he revised that book in the late 1980s (Johnson 1991).

To quantify the impacts of both past reforms and current policies, the distortions in the prerelease of version 7 of the GTAP (Global Trade Analysis Project) global protection database are amended here by replacing applied tariffs with distortion rates that reproduce those estimated in the database, using domestic-to-border price comparisons, by authors of the developing-country case studies in the World Bank Agricultural Distortions Project. Likewise, a set of distortions for the period 1980–84 is generated, again aiming to reproduce trend distortion rates in the country case studies.[1] Those two sets of distortion estimates suggest that while average distortions to incentives facing developing-country farmers generally were much less in 2004 than in the early 1980s, nonetheless there remains a considerable range of rates across commodities and countries, including a strong antitrade bias in agricultural policies for many countries. Furthermore, nonagricultural protectionism is still rife in some developing countries, and agricultural price supports in some high-income countries remain high.

Among other things, the present analysis is able to address questions such as: To what extent have government trade and domestic agricultural policies reduced distortionary effects on agricultural markets and farm incomes since the early 1980s? Are policies as of 2004 still reducing farmer rewards in developing countries and thereby prolonging inequality across countries in farm household incomes? Are they depressing value added in primary agriculture more than in other sectors in developing countries, and earnings of unskilled workers more than of owners of other factors of production, thereby potentially contributing to inequality and poverty within those developing countries? With farm incomes well below nonfarm incomes in most developing countries, and with agriculture in those countries intensive in the use of unskilled labor, past or prospective rises in agricultural relative to nonagricultural value added and in wages for the unskilled relative to skilled wages and capital earnings indicate a likely reduction in inequality and poverty.

To provide answers to these and related questions, the amended GTAP distortion database is used in a global computable general equilibrium (CGE) model—the Linkage model—to assess how agricultural markets, factor prices, and value added in agriculture versus nonfarm sectors would differ if (a) 1980–84 distortion rates were still in place, and (b) all price and trade policies that distort markets for farm and nonfarm goods as of 2004 were removed. It is important to include nonagricultural trade policies in the reform experiment because, as shown in the seminal study by Krueger, Schiff, and Valdés (1988), they were at least as harmful to developing-country farmers as were those countries' agricultural policies.

The text below first presents results for the key countries and regions of the world and for the world as a whole, beginning with national economic welfare. Results for numerous individual countries are also presented.[2] While no one anticipates a move to completely free markets globally in the near future, comparison with the 1980–84 results provides a sense of perspective on what is still to come relative to what has already happened in terms of policy changes over the past quarter century. The prospective analysis also serves as a benchmark to suggest what is at stake in terms of further reforms either unilaterally or via World Trade Organization (WTO) rounds of multilateral trade negotiations. At the same time, by showing how different the trade patterns of various countries would be without distortions, it also provides a better indication of agricultural comparative advantages in different parts of the world than is available by looking at actual trade and self-sufficiency indicators in the current distortion-ridden situation.

The chapter begins with an examination of the extent of price distortions in 2004 and 1980–84 as calibrated in Valenzuela and Anderson (2008), with an emphasis mainly on import tariffs in the case of nonfarm products and, in the case of agriculture, on production and export taxes and subsidies. This is followed by a description of the Linkage model of the global economy to be used to analyze the consequences of removing those distortions. The key results of the two sets of simulations are then presented, beginning with the retrospective experiment. The bottom-line results for net farm incomes from both experiments are presented for global liberalization of all merchandise, as well as for reform of just agricultural policies. After comparing these results with earlier ones generated using the version 6 of the GTAP protection database,[3] the paper concludes by highlighting the main messages.

Key Distortions in Global Markets

Border measures traditionally have been the main means by which governments distort prices in their domestic markets for products, with the relative prices of the various tradables affected by trade taxes-cum-subsidies. Product-specific domestic output and farm input subsidies have played a more limited role, in part because of their much greater overt cost to the treasury. In principle, services trade and foreign investment distortions also could distort incentives in the agricultural and industrial sectors, but they are ignored here because much controversy still surrounds their measurement and how they should be modeled.[4]

To quantify the impacts of both past reforms and current policies, the Altertax procedure (Malcolm 1998) is used to amend the distortions in the prerelease of version 7 of the GTAP global protection database.[5] The amendments are mainly for developing countries. Following Anderson and Valenzuela (2007b), cotton distortions in the United States are also altered to better reflect policies

there. To simplify the discussion below, European transition economies (in which Turkey is included) are treated as one of the world's developing country regions, along with Africa, Asia, and Latin America.[6]

The latest prerelease of version 7 of the GTAP database includes estimates of bilateral tariffs and export subsidies and of domestic supports as of 2004 for more than 100 countries and country groups spanning the world. As with version 6 of the GTAP dataset (which relates to 2001), the protection data come from a joint CEPII (Centre d'Etudes Prospectives et d'Informations Internationales)/ ITC (International Trade Centre) project known as MAcMaps. MAcMaps is a detailed database on bilateral import protection at the Harmonized System 6 tariff line level that integrates trade preferences, specific and compound tariffs, and a partial evaluation of nontariff barriers such as tariff rate quotas.[7] Version 7 of the GTAP database for 2004 has lower tariffs than the previous database for 2001 because of major reforms such as completing the implementation of the Uruguay Round Agreement on Agriculture and unilateral reforms including those resulting from WTO accession negotiations by China and other recently acceding countries.

As mentioned above, in the case of agriculture in developing countries, the distortion levels in that database have been replaced with an alternative set for numerous developing countries, based on nominal rate of assistance (NRA) estimates for 2004 that have come from the present World Bank project (Anderson and Valenzuela 2008; Valenzuela and Anderson 2008). The sectoral averages of these amended values are shown in table 13.1 for 2004, and also for 1980–84. In the case of amendments to the import tariffs on individual farm products for any particular developing country, the bilateral tariff structure in version 7 of the GTAP database is preserved by simply lowering or raising the bilateral tariffs by the same proportion the average tariff on each product for 2004 is amended.[8]

According to this amended dataset, the weighted average applied tariff for agriculture and lightly processed food in 2004 was 21.8 percent for developing countries and 22.3 percent for high-income countries, while for nonfarm goods it was 7.5 percent for developing countries and just 1.2 percent for high-income countries. Though export subsidies for farm products for a few high-income regions and export taxes in a few developing countries were still in place in 2004, these measures are generally small in their impact compared with tariffs, as are production subsidies and taxes.[9] In 1980–84, however, developing countries had an average agricultural export tax of 11 percent, while high-income countries had an average farm export subsidy of 21 percent. The average agricultural import tariff was lower for developing countries (16 percent) in 1980–84 than for high-income countries (26 percent), as opposed to the situation in 2004, when the two groups

Table 13.1. Structure of Price Distortions in Global Goods Markets,[a] 1980–84 and 2004
(*percent*)

	1980–84				2004			
	Primary agriculture	Agriculture and lightly processed food		Other goods	Primary agriculture	Agriculture and lightly processed food		Other goods
	Domestic support	Export subsidy	Tariff	Tariff	Domestic support	Export subsidy	Tariff	Tariff
Africa	**−0.3**	**−2.5**	**17.0**	**12.6**	**−0.8**	**0.1**	**20.4**	**11.2**
Egypt, Arab Rep. of	0.4	−6.6	5.8	22.5	0.0	0.0	5.0	13.5
Madagascar	0.0	−4.4	3.4	13.9	0.0	−4.4	3.4	2.7
Mozambique	0.2	−53.8	5.5	29.7	0.2	0.0	14.5	10.9
Nigeria	2.6	22.5	22.2	0.1	0.1	0.0	76.1	17.2
Senegal	0.0	−6.7	5.7	8.7	0.0	−1.1	6.2	8.9
South Africa	0.0	5.6	18.1	5.8	0.0	0.0	10.2	6.5
Tanzania	5.5	−29.4	7.9	97.5	−0.3	0.0	11.8	13.7
Uganda	−0.9	−14.1	16.1	50.1	0.0	−2.6	9.2	5.5
Zambia	−0.8	−21.4	6.0	26.0	−0.8	0.0	7.0	9.0
Zimbabwe	−4.1	−31.0	7.0	49.0	−3.2	0.0	8.9	15.4
Rest of Africa	−1.2	−4.2	19.0	13.4	−1.2	0.3	19.0	13.4
East and South Asia	**−2.4**	**−16.7**	**19.5**	**34.6**	**2.4**	**0.6**	**29.6**	**8.1**
China	−8.5	−38.7	6.9	46.1	0.0	0.2	6.5	7.1
Korea, Rep. of	2.8	0.0	106.7	7.6	0.0	0.0	319.4	5.9
Taiwan, China	−0.4	21.7	98.0	5.7	−0.4	0.0	84.2	3.9
Indonesia	0.2	−3.1	27.9	28.0	0.0	−1.6	7.3	4.9
Malaysia	4.8	−0.2	3.1	5.2	0.0	−0.2	5.0	5.9
Philippines	−4.7	−0.1	18.3	14.0	−4.7	0.0	7.1	3.4
Thailand	−0.2	−0.7	29.8	19.1	−0.2	0.0	26.2	12.9

(*Table continues on the following pages.*)

Table 13.1. Structure of Price Distortions in Global Goods Markets,[a] 1980–84 and 2004 (*continued*)
(*percent*)

	1980–84				2004			
	Primary agriculture	Agriculture and lightly processed food		Other goods	Primary agriculture	Agriculture and lightly processed food		Other goods
	Domestic support	Export subsidy	Tariff	Tariff	Domestic support	Export subsidy	Tariff	Tariff
Vietnam	−3.6	−0.5	21.5	18.5	−3.6	−0.5	21.5	18.5
Bangladesh	−1.0	−2.2	10.6	26.7	−1.0	0.0	9.9	22.5
India	4.9	−8.8	8.9	86.2	10.1	2.5	2.9	20.8
Pakistan	0.7	−2.7	15.0	53.3	0.0	−0.2	19.4	18.5
Sri Lanka	1.1	−14.1	22.1	53.1	0.6	−0.3	23.8	5.8
Rest of East and South Asia	−0.7	0.0	4.3	2.7	−0.7	0.0	4.3	2.7
Latin America	**3.8**	**−9.6**	**9.8**	**15.7**	**−0.2**	**−1.4**	**7.2**	**6.7**
Argentina	0.0	−20.9	0.0	15.8	0.0	−14.8	0.0	5.8
Brazil	5.0	−17.1	3.2	33.4	0.0	0.0	4.8	8.9
Chile	−3.0	0.0	4.8	6.2	0.0	0.0	2.4	1.8
Colombia	−0.6	1.0	21.7	22.8	0.0	0.0	21.6	9.8
Ecuador	0.0	−13.7	28.6	10.3	0.0	0.0	13.4	10.4
Mexico	14.3	−9.6	19.1	6.8	1.2	0.0	6.2	3.4
Nicaragua	0.0	−2.8	10.9	3.9	0.0	−2.8	9.6	3.9
Rest of Latin America	−1.7	0.3	9.9	9.9	−1.7	0.3	9.9	9.9
Eastern Europe and Central Asia	**0.8**	**−2.6**	**13.8**	**9.6**	**0.8**	**−0.3**	**15.9**	**4.8**
Baltic states	3.4	0.0	8.2	0.9	3.4	0.0	8.2	0.9
Bulgaria	0.6	0.0	14.8	11.5	0.6	0.0	14.8	11.5
Czech Republic	0.6	0.0	3.0	0.5	0.6	0.0	3.0	0.5
Hungary	3.1	0.0	6.2	0.5	3.1	0.0	6.2	0.5

Poland	0.4	0.0	6.2	0.8	0.4	0.0	6.2	0.8
Romania	1.3	0.0	18.0	9.8	1.3	0.0	18.0	9.8
Slovak Republic	0.0	0.0	5.2	0.4	0.0	0.0	5.2	0.4
Slovenia	0.0	0.0	7.8	0.4	0.0	0.0	7.8	0.4
Russian Federation	1.7	−0.9	18.9	7.4	1.7	−0.9	18.9	7.4
Kazakhstan	−0.9	0.0	3.4	2.7	−0.9	0.0	3.4	2.7
Turkey	0.8	−14.3	20.4	43.9	0.8	0.0	33.3	3.1
Rest of Eastern Europe and Central Asia	−1.1	−0.9	9.7	5.7	−1.1	−0.9	9.7	5.7
High-income countries	**6.6**	**20.9**	**24.0**	**2.4**	**2.6**	**7.2**	**22.3**	**1.2**
Australia	0.5	7.0	6.7	8.9	0.0	0.0	0.5	3.3
Canada	3.0	7.0	42.6	5.1	1.6	3.6	18.9	1.4
EU-15	1.2	28.6	13.3	2.0	1.2	12.8	6.9	0.7
Japan	13.1	0.0	120.9	0.9	2.0	0.0	151.7	1.7
New Zealand	−5.3	15.4	1.7	18.0	0.0	−0.2	0.7	3.3
Rest of Western Europe	101.7	54.0	59.5	4.0	2.6	13.4	53.9	2.2
United States	3.3	14.1	6.5	2.9	5.2	0.6	6.1	1.3
Developing countries	**−0.6**	**−11.0**	**16.4**	**25.6**	**1.4**	**0.0**	**21.8**	**7.5**
Africa	−0.3	−2.5	17.0	12.6	−0.8	0.1	20.4	11.2
East Asia	−5.6	−21.5	24.3	29.6	−0.3	0.0	41.6	6.7
South Asia	3.5	−7.1	10.7	72.6	7.2	1.7	6.9	20.2
Latin America	3.8	−9.6	9.8	15.7	−0.2	−1.4	7.2	6.7
Middle East	−12.4	0.0	7.5	5.7	−12.4	0.0	7.5	5.7
Eastern Europe and Central Asia	0.8	−2.6	13.8	9.6	0.8	−0.3	15.9	4.8
World total	**2.3**	**4.7**	**20.1**	**10.1**	**1.9**	**3.5**	**22.1**	**3.3**

Source: Authors' calculations based on Anderson and Valenzuela (2008).

a. Using value of production at undistorted prices as weights.

of countries had equivalent average tariffs of 22 percent. In addition, tariffs on nonagricultural imports were more than three times higher in 1980–84 than in 2004 for developing countries (table 13.1).

The averages obscure large variations across countries and commodities. Of particular note are the agricultural tariffs. The rise in the average of those tariffs for developing countries since 1980–84 is representative for Africa and Europe's transition economies, but it fell in Latin America and in much of Asia—although the rise in the Republic of Korea was so dramatic as to cause the Asian average to increase by one-third (table 13.1).

On their own, the averages are not necessarily good indicators of overall distortions to farmers' incentives, although it certainly helps to see relative rates of assistance (RRAs) to agriculture versus nonagricultural goods (which is why RRAs are emphasized in the preceding chapters in this volume). Also of importance is the composition of each country's trade. Three examples serve to illustrate the point. First, if high-income countries' tariffs on temperate farm products are at a near-prohibitive level but are zero on tropical products such as coffee beans, those countries' import-weighted average agricultural tariff could be quite low even though agricultural value added in those rich countries had been enhanced substantially. A second illustration is the case of a developing country with a strong agricultural comparative advantage in all but one small farming industry, and with high tariffs to stave off import competition for that industry and for all manufacturing industries. Overall, agricultural value added would be depressed by that structure of protection, yet the import-weighted average tariff protection for agriculture would be high and possibly above that for manufactures. A third example is where the nonagricultural primary sector receives a similar level of import protection as the farm sector and less than the manufacturing sector but is much more export-focused than agriculture. In the latter case, trade reform may cause that other primary sector to expand at the expense not only of manufacturing but also of farming. Despite the use of production rather than trade weights to obtain sectoral averages rates of distortion in table 13.1, and even though the ratio of agricultural to other goods' tariffs for 2004 in that table is well above unity for many of the regions shown, it is not possible to say from those distortion rates alone whether developing-country policies have overshot in terms of moving away from an antiagricultural bias. Equally, it is not possible to know how the benefits of removal of agricultural tariffs in the protective countries would be distributed among the various agricultural-exporting countries. What is needed to address such issues is a global general equilibrium model to estimate the net effects of all sectors' distortions in all countries on the various nations' agricultural markets and net farm incomes, to which the analysis below now turns.

The Linkage Model of the Global Economy

The model used for this analysis is the World Bank's global CGE model, known as Linkage (van der Mensbrugghe 2005). For most of this decade, it has formed the basis for the World Bank's standard long-term projections of the world economy and for much of its trade (and more recently migration) policy analysis (for example, World Bank 2002, 2004, 2005, 2006). It is a relatively straightforward CGE model but with some characteristics that distinguish it from other comparative static models such as the GTAP model (described in Hertel 1997). Factor stocks are fixed in Linkage, which means in the case of labor that the extent of unemployment (if any) in the baseline remains unchanged. Producers minimize costs subject to constant returns to scale in production technology, consumers maximize utility, and all markets—including for labor—are cleared with flexible prices. There are three types of production structures. Crop sectors reflect the substitution possibilities between extensive and intensive farming; livestock sectors reflect the substitution possibilities between pasture and intensive feeding; and all other sectors reflect standard capital and labor substitution. There are two types of labor, skilled and unskilled, and the total employment of each is assumed to be fixed (meaning no change in their unemployment levels). There is a single representative household per modeled region, allocating income to consumption using the extended linear expenditure system. Trade is modeled using a nested Armington structure in which aggregate import demand is the outcome of allocating domestic absorption between domestic goods and aggregate imports, and then aggregate import demand is allocated across source countries to determine the bilateral trade flows.[10]

Government fiscal balances are fixed in U.S. dollar terms in Linkage, with the fiscal objective being met by changing the level of lump sum taxes on households. This implies that losses of tariff revenues are replaced by higher direct taxes on households. The current account balance also is fixed. Given that other external financial flows are fixed, this implies that ex ante changes to the trade balance are reflected in ex post changes to the real exchange rate. For example, if import tariffs are reduced, the propensity to import increases and additional imports are financed by increasing export revenues. The latter typically is achieved by a depreciation of the real exchange rate. Finally, investment is driven by savings. With fixed public and foreign saving, investment comes from changes in the savings behavior of households and from changes in the unit cost of investment. The model solves only for relative prices, with the numeraire, or price anchor, being the export price index of manufactured exports from high-income countries. This price is fixed at unity in the base year.

A virtue of beginning with the latest GTAP database (prerelease 5 of version 7) is that it includes bilateral tariffs that capture not only reciprocal but also

nonreciprocal preferential trade agreements, the latter of which provide low-income exporters duty-free access to protected high-income country markets. This allows the fact that future reform may cause a decline in the international terms of trade for developing countries that enjoy preferential access to agricultural and other markets of high-income countries (in addition to those that are net food importers because their comparative advantage is in other sectors, such as labor-intensive manufacturing.

The version of the Linkage model used for this study is based on an aggregation involving 24 sectors and 52 regions spanning the world (see table 13.A.1 in the annex). There is an emphasis on agriculture and food, which together comprise half of those 24 sectors. Consistent with the rest of the present project, and with WTO practice, Korea and Taiwan, China are included in the "developing country" category.[11]

Because the results below are comparative static results, they do not include the (often much larger) dynamic gains that result from an acceleration in investment due to the reduction in tariffs on industrial goods lowering the cost of investment. Nor do they account for the structural changes that lead to different comparative advantages over time (which could have a notable impact on the terms-of-trade effect, but it is not possible to say in what direction). And because this version of the Linkage model assumes perfect competition and constant returns to scale, it captures none of the benefits of freeing markets that came from accelerated productivity growth, scale economies, and the creation of new markets (extensification versus intensification). There is also a dampening effect on estimates of welfare gains because of product and regional aggregation, which hides many of the differences across products in NRAs and consumer tax equivalents. The results therefore should be treated as providing much lower-bound estimates of the net economic welfare benefits from policy reform.[12]

Retrospective Analysis: How Different Would 2004 Have Been if the Agricultural and Merchandise Trade Policy Changes Globally since 1980–84 Had Not Happened?

To simultaneously examine the effects of high-income country liberalization of agricultural policies and the reduction in the antiagricultural and antifarm trade policy biases in developing countries with and without liberalization of nonagricultural trade policies (to sense the relative contribution of the latter to the overall result for net farm incomes), a set of scenarios is created below in which 1980–84 distortion rates replace those for 2004. Global and national economic welfare effects are examined first, followed by changes in the terms of trade, adjustments

to quantities produced and traded, effects on factor rewards, and percentage changes to agricultural value added (net farm income) relative to value added in the rest of the economy.

Global and national economic welfare

The Linkage model and the distortions database presented here provide a baseline projection of the world economy in 2004. This is first compared with a simulation in which all agricultural domestic and border subsidies and taxes plus import tariffs on other merchandise are replaced with the distortion structures of 1980–84, as summarized in table 13.1. The model presented here suggests that the reforms over the intervening two decades have improved global welfare by US$233 billion per year. (Keep in mind that a negative sign in this experiment has the same meaning as a positive sign in the next experiment, since both sets of simulations use 2004 policies as their baseline.) The distribution across regions of that change in economic welfare (or equivalent variation in income), reported in table 13.2, suggests two-thirds of those dollars accrued to high-income countries. However, as a share of national income, developing countries gained more, with an average increase of 1.0 percent compared with 0.7 percent for high-income countries. The results vary across developing countries, ranging from slight losses in a few cases to large proportional increases in cases such as China, Mozambique, and Nigeria.

The second column of numbers and those in parentheses in table 13.2 show the amount of welfare gain due to changes in the international terms of trade for each country. For developing countries as a group, the terms of trade effect is adverse, while the opposite is the case for high-income countries. Nonetheless, even though that terms of trade change reduced their gains from improved efficiency of domestic resource use, developing country economies have benefited proportionately more than high-income economies from the policy reforms of the past quarter century.

Decomposing the contribution to welfare of changes in national terms of trade

To understand the contribution to welfare of the changes in international terms of trade shown in table 13.2, it is necessary to first examine the changes in import and export prices for farm and other products. For developing countries as a group, their terms of trade have worsened because of these reforms for two sets of reasons: for nonagricultural goods, export prices have been lowered by 0.4 percent while import prices have hardly been affected; and for farm products, reduced export prices (0.6 percent) have been compounded by 16 percent higher prices for their agricultural and food imports. The net effect is a deterioration of

Table 13.2. Economic Welfare Impact of Going Back to 1980–84 Policies, by Country/Region

	Total real income gain per year (US$ billions)	Change in income due just to change in terms of trade (US$ billions)	Total real income gain relative to 2004 benchmark (%)[a]	
North and Sub-Saharan Africa	**−2.8**	**1.8**	**−0.5**	**(0.3)**
Egypt, Arab Rep. of	−0.1	0.1	−0.2	(0.1)
Madagascar	0.0	0.1	1.1	(2.0)
Mozambique	−0.2	0.4	−3.7	(7.2)
Nigeria	−0.2	−0.9	−0.5	(−2.0)
Senegal	0.0	0.0	−1.2	(−1.2)
South Africa	−2.6	−1.4	−1.8	(−0.9)
Tanzania	−0.1	0.8	−1.1	(8.6)
Uganda	−0.1	0.4	−2.3	(6.3)
Zambia	0.0	0.1	−0.8	(2.8)
Zimbabwe	−0.2	0.3	−8.7	(12.3)
Rest of Africa	0.7	1.9	0.3	(0.7)
East and South Asia	**−72.3**	**26.4**	**−2.1**	**(0.8)**
China	−46.4	29.1	−3.5	(2.2)
Korea, Rep. of	−6.9	−6.9	−1.4	(−1.4)
Taiwan, China	−2.9	−3.1	−1.2	(−1.2)
Indonesia	−3.5	1.3	−1.6	(0.6)
Malaysia	0.5	−0.5	0.6	(−0.6)
Philippines	0.1	1.4	0.2	(2.1)
Thailand	−1.5	−0.5	−0.6	(−0.2)
Vietnam	−0.3	−0.2	−0.8	(−0.5)
Bangladesh	0.0	0.0	0.1	(0.0)
India	−8.7	5.6	−1.7	(1.1)
Pakistan	−1.2	0.6	−1.6	(0.7)
Sri Lanka	−0.9	0.4	−5.8	(2.2)
Rest of East and South Asia	−0.7	−0.9	−0.5	(−0.6)
Latin America	**−7.1**	**13.7**	**−0.4**	**(0.8)**
Argentina	−1.7	0.1	−1.4	(0.1)
Brazil	−5.3	6.8	−1.2	(1.6)
Chile	0.1	0.7	0.1	(1.0)
Colombia	2.5	2.5	3.5	(3.5)
Ecuador	−0.6	0.3	−2.5	(1.2)
Mexico	−2.6	3.6	−0.5	(0.7)
Nicaragua	0.0	0.0	0.6	(0.0)
Rest of Latin America	0.5	−0.2	0.1	(−0.1)

Table 13.2. Economic Welfare Impact of Going Back to 1980–84 Policies, by Country/Region (*continued*)

	Total real income gain per year (US$ billions)	Change in income due just to change in terms of trade (US$ billions)	Total real income gain relative to 2004 benchmark (%)[a]	
Eastern Europe and Central Asia	**6.5**	**7.1**	**0.5**	**(0.6)**
Baltic states	0.3	0.2	1.1	(0.7)
Bulgaria	0.4	0.3	3.4	(2.6)
Czech Republic	0.4	0.3	0.6	(0.4)
Hungary	0.3	0.3	0.4	(0.4)
Poland	0.4	0.3	0.3	(0.2)
Romania	0.8	0.5	2.2	(1.4)
Slovak Republic	0.1	0.1	0.5	(0.5)
Slovenia	0.0	0.0	0.1	(0.0)
Russian Federation	3.7	1.5	0.8	(0.3)
Kazakhstan	0.0	0.0	0.0	(0.0)
Turkey	−4.4	1.6	−2.0	(0.7)
Rest of Eastern Europe and Central Asia	4.4	2.1	4.2	(2.0)
High-income countries	**−159.9**	**−50.8**	**−0.7**	**(−0.2)**
Australia	−2.4	−0.2	−0.5	(0.0)
Canada	−4.6	1.6	−0.7	(0.2)
EU-15	−63.0	−10.3	−0.8	(−0.1)
Japan	−14.6	−20.3	−0.5	(−0.6)
New Zealand	−2.5	−0.6	−3.6	(−0.8)
Rest of Western Europe	−59.7	−15.9	−12.1	(−3.2)
United States	−10.8	−2.6	−0.1	(0.0)
Hong Kong, China and Singapore	−2.2	−2.6	−1.8	(−2.1)
Developing countries	**−73.1**	**49.3**	**−1.0**	**(0.7)**
North Africa	0.6	0.1	0.3	(0.0)
Sub-Saharan Africa	−3.4	1.7	−1.0	(0.5)
East Asia	−61.5	19.9	−2.2	(0.7)
South Asia	−10.8	6.5	−1.7	(1.0)
Latin America	−7.1	13.7	−0.4	(0.8)
Middle East	2.6	0.4	0.5	(0.1)
Eastern Europe and Central Asia	6.5	7.1	0.5	(0.6)
High-income countries	**−159.9**	**−50.8**	**−0.7**	**(−0.2)**
World total	**−233.0**	**−1.5**	**−0.8**	**(0.0)**

Source: Authors' World Bank Linkage model simulations.

a. Numbers in parentheses refer to that due to terms of trade effects.

1.7 percent in their terms of trade. By contrast, high-income countries enjoyed an improvement of 0.8 percent in their terms of trade as a result of the policy changes, partly from nonfarm products but mostly from farm products, where the improvement in their export prices more than offset the higher prices of their imports (table 13.3).

The contributions of those four elements to national economic welfare can be seen in table 13.4. Overall, the terms of trade effect for developing countries diminishes the welfare gains from reform by US$49 billion, bringing it down to US$73 billion per year. Of that, two-fifths is from the decline in agricultural export prices (in part because of less taxation and hence larger volumes of those exports now), another two-fifths from the decline in prices of nonfarm exports, and one-fifth from the rise in prices of their food imports (partly because of reduced assistance to farmers in high-income countries). For high-income countries, however, the reduction in agricultural tariffs and subsidies and the consequent rise in international food prices helps farm exporters more than it hurts import-competing farmers in this group, and the improvement in welfare from lower prices of nonfarm imports more than offsets the loss due to lower prices for their nonfarm exports.

Quantities produced and traded

The retrospective results suggest that, as a result of the reforms of the past two decades, developing countries' aggregate shares of global output and exports of textiles and apparel have grown by about 3 percentage points while the shares for other nonfarm products have changed by no more than one percentage point. Their shares in agricultural and food markets, however, have changed more: their share of the world's primary agricultural exports has risen from 43 to 55 percent and the output share from 58 to 62 percent, and even their shares of processed foods have risen by one percentage point. The increases have occurred in nearly all agricultural industries—the exceptions being rice and sugar, where the growth in protectionism in high-income countries has been greatest.

The share of global production of farm products that is exported (excluding intra-European Union [EU] trade) is slightly smaller as a result of the reforms, in contrast to the 5 percentage-point rise for textiles and clothing and the 3-point rise for other manufactures. Agriculture's 8 percent share in 2004 remains in stark contrast to the 31 percent share for other primary products and around 25 percent for all other goods, and this "thinness" is an important contributor to the volatility of international prices for these weather-dependent farm products (first columns of table 13.5). The fact that the past two decades of reform have not made agricultural products more traded globally is illuminating. The findings

Table 13.3. Impact of Going Back to 1980–84 Policies on Indexes of Real[a] Export and Import Prices, by Region
(*percent*)

	Percent change in export prices			Percent change in import prices			Percent change in terms of trade		
	Agriculture and light processing	Manufacturing and services	Total	Agriculture and light processing	Manufacturing and services	Total	Agriculture and light processing	Manufacturing and services	Total
Developing countries	**0.6**	**0.4**	**0.4**	**−15.7**	**0.0**	**−1.3**	**16.3**	**0.4**	**1.7**
North Africa	1.6	0.5	0.6	−9.2	0.5	−0.9	10.7	0.1	1.5
Sub-Saharan Africa	−12.8	−0.5	−2.1	−18.7	0.3	−1.8	5.9	−0.8	−0.3
East Asia	−1.8	0.2	0.2	−7.1	−0.6	−1.1	5.4	0.8	1.3
South Asia	6.6	5.5	5.6	−6.8	0.1	−0.8	13.4	5.5	6.4
Latin America	5.4	0.5	1.1	−12.1	0.4	−0.5	17.5	0.2	1.6
Middle East	−2.2	−0.6	−0.7	−25.6	0.3	−2.6	23.4	−0.9	1.9
Eastern Europe and Central Asia	3.9	0.4	0.6	−28.6	0.5	−1.8	32.5	−0.1	2.4
High-income countries	**−24.0**	**0.2**	**−1.7**	**−17.9**	**0.4**	**−0.8**	**−6.2**	**−0.2**	**−0.8**
World total	**−17.6**	**0.3**	**−1.0**	**−17.0**	**0.3**	**−1.0**	**−0.6**	**0.0**	**0.0**

Source: Authors' World Bank Linkage model simulations.

a. Relative to the numeraire which in this version of the Linkage model is the price of high-income countries' exports of manufactures.

Table 13.4. Terms-of-Trade Contribution to Real Income Changes from Going Back to 1980–84 Policies, by Region
(*2004 US$ billions*)

	Exports		Imports[a]		Total impact	
	Agriculture and light processing	Manufacturing and services	Agriculture and light processing	Manufacturing and services	Net terms of trade impact	Net real income gain
Developing countries	**20,567**	**20,323**	**11,907**	**−3,458**	**49,340**	**−73,150**
North Africa	157	390	−10	−452	85	598
Sub-Saharan Africa	2,359	−504	560	−696	1,719	−3,399
East Asia and Pacific	5,395	7,948	877	5,684	19,905	−61,550
South Asia	1,441	6,218	−818	−365	6,476	−10,761
Latin America	9,562	5,296	1,681	−2,867	13,671	−7,125
Middle East	−256	−1,560	3,545	−1,352	376	2,584
Eastern Europe and Central Asia	1,909	2,536	6,072	−3,409	7,108	6,504
High-income countries	**−65,099**	**12,403**	**32,558**	**−30,710**	**−50,847**	**−159,880**
World total	**−44,532**	**32,726**	**44,465**	**−34,167**	**−1,508**	**−233,030**

Source: Authors' World Bank Linkage model simulations.

Table 13.5. Impact of Going Back to 1980–84 Policies on Shares of Global Output Exported, and Developing-Country Shares of Global Output and Exports,[a] by Product

(*percent*)

	Share of global output exported[a]		Developing countries' share of global output		Developing countries' share of global exports[a]	
	2004 benchmark	1980–84	2004 benchmark	1980–84	2004 benchmark	1980–84
Paddy rice	1	2	81	85	56	21
Wheat	16	19	67	56	25	10
Other grains	11	14	55	45	35	17
Oilseeds	21	23	69	60	54	34
Plant-based fibers	25	44	74	72	50	72
Vegetables and fruits	9	8	72	69	69	56
Other crops	14	12	49	45	75	62
Cattle, sheep, goats	2	2	43	41	56	53
Other livestock	4	6	65	57	43	41
Wool	13	14	82	80	16	14
Beef and sheep meat	7	6	27	26	31	24
Other meat products	7	10	32	21	42	2
Vegetable oils and fats	20	19	52	49	80	73
Dairy products	5	8	29	31	28	54
Processed rice	5	6	76	79	85	60
Refined sugar	8	22	52	69	78	95
Other food, beverages, and tobacco	9	7	35	35	50	54
Other primary products	31	30	64	65	76	78
Textile and wearing apparel	28	23	53	50	74	71
Other manufacturing	24	21	32	33	43	42
Services	3	3	20	20	31	31
Agriculture and food	8	9	46	44	54	48
Primary agriculture	8	9	62	58	55	43
Processed foods	8	9	37	36	52	51

Source: Authors' World Bank Linkage model simulations.

a. Excluding intra-EU trade.

summarized elsewhere in this volume show that the reforms in developing and high-income countries over the past two decades have reduced the antitrade bias in the agricultural trade of developing countries but increased that bias in high-income countries (thanks in part to the cut in their export subsidies). According to this Linkage model result, the latter slightly more than offsets the former in terms of their aggregate impact on the global share of farm production that is traded.

The impacts on agricultural and food output and trade for various countries and regions suggest farm trade would have been two-thirds larger in real value terms had the past two decades of reform not occurred (last row of table 13.6). On the export side, that is almost entirely due to high-income countries, whose exports would have been more than twice as large had they not lowered their export subsidies and developing countries not lowered their export taxes. The global value of agricultural and food output, however, is virtually unchanged (just 3.6 percent less). This suggests that, in aggregate, the reform-induced output decline of high-income countries (11 percent) more than fully offset the reform-induced output expansion of developing countries (3 percent). Note that the big economies of China and South Asia, as well as Thailand and most of Latin America, all enjoyed increased farm output because of the past quarter century's reforms. Note also what happens to agricultural imports: in real value terms, developing countries as a group would have had to import 50 percent more farm products in 2004 had the reforms of the past two decades not taken place, while high-income countries would have had to import nearly 80 percent more (last column of table 13.6). Combined with the export effects, that means the food and agricultural self-sufficiency ratio would have been very slightly lower in developing countries and slightly higher in high-income countries (table 13.7). The extent of this reform on the tradability of different products is shown in table 13.8. Sugar, milk products, and cotton would have been exported more from developing to high-income countries had the latter group's assistance to those industries not grown over the past two decades.

The net consequences of these impacts on the share of farm production exported by regions are shown in table 13.9. For developing countries as a group, there is no change for its 9.5 percent share, while for high-income countries the share is reduced by 3 percentage points by their export subsidy cuts and other reforms, to 13 percent (including intra-EU trade).

Effects on product prices

How do different agricultural and manufacturing goods' average prices in international markets change with liberalization of distortionary agricultural policies

Table 13.6. Impact of Going Back to 1980–84 Policies on Agricultural and Food Output and Trade, by Country/Region

	2004 US$ billions			Change relative to 2004 baseline (%)		
	Output	Exports	Imports	Output	Exports	Imports
North and Sub-Saharan Africa	**5.0**	**3.9**	**8.0**	**2.6**	**18.9**	**37.0**
Egypt, Arab Rep. of	−0.4	−0.2	0.2	−2.6	−13.9	6.8
Madagascar	0.0	0.0	0.0	0.7	12.1	22.6
Mozambique	1.2	1.1	0.2	75.9	676.8	80.5
Nigeria	−0.2	0.5	0.5	−1.1	115.5	33.3
Senegal	0.2	0.2	0.1	9.6	125.0	9.8
South Africa	8.4	6.4	0.6	30.8	192.1	32.3
Tanzania	−0.3	−0.2	0.1	−5.0	−42.6	42.8
Uganda	0.0	−0.1	0.0	−1.0	−21.1	−14.9
Zambia	−0.3	−0.3	0.1	−18.6	−81.7	105.8
Zimbabwe	−0.8	−0.7	0.1	−49.0	−77.5	40.9
Rest of Africa	−2.8	−2.8	6.0	−2.5	−22.1	46.8
East and South Asia	**−42.4**	**−3.9**	**29.9**	**−4.6**	**−8.2**	**44.4**
China	−44.4	−5.8	23.6	−12.6	−57.8	96.3
Korea, Rep. of	6.3	0.6	1.1	10.4	112.5	13.1
Taiwan, China	1.8	2.1	0.5	8.7	440.3	12.8
Indonesia	0.5	−0.6	−0.4	0.8	−7.8	−9.1
Malaysia	1.8	1.7	1.1	9.8	22.0	28.3
Philippines	0.3	0.0	0.4	0.9	0.1	16.2
Thailand	−1.1	0.3	0.7	−2.0	4.5	27.4

(*Table continues on the following pages.*)

Table 13.6. Impact of Going Back to 1980–84 Policies on Agricultural and Food Output and Trade, by Country/Region (*continued*)

	2004 US$ billions			Change relative to 2004 baseline (%)		
	Output	Exports	Imports	Output	Exports	Imports
Vietnam	1.3	1.3	0.3	8.7	60.6	24.6
Bangladesh	0.4	−0.1	−0.1	1.5	−39.4	−4.8
India	−7.3	−2.6	1.3	−3.3	−38.2	22.7
Pakistan	−1.3	−0.6	0.2	−3.0	−49.7	9.5
Sri Lanka	−0.1	−0.5	0.0	−1.9	−62.4	−1.1
Rest of East and South Asia	−0.5	0.3	1.3	−2.4	13.4	25.8
Latin America and the Caribbean	**−22.5**	**−13.8**	**6.5**	**−6.9**	**−20.6**	**26.8**
Argentina	−6.4	−5.8	0.1	−19.9	−36.7	27.8
Brazil	−18.4	−12.4	0.7	−18.2	−48.5	30.7
Chile	−1.1	−0.2	0.1	−11.0	−7.8	12.7
Colombia	10.3	9.0	1.4	48.6	292.6	110.4
Ecuador	−1.4	−1.6	−0.1	−15.6	−69.6	−12.7
Mexico	−1.5	−2.9	1.2	−2.3	−54.0	12.6
Nicaragua	0.0	0.1	0.0	2.8	26.1	16.8
Rest of Latin America	−3.9	0.0	2.9	−4.6	−0.2	32.2
Eastern Europe and Central Asia	**−10.3**	**11.6**	**23.9**	**−2.6**	**53.4**	**91.6**
Baltic states	−0.8	0.2	1.0	−11.3	18.6	75.3
Bulgaria	4.3	1.9	0.4	6.8	266.2	71.2
Czech Republic	−1.1	0.0	1.0	−6.3	2.5	57.0
Hungary	−1.5	0.0	1.1	−10.9	0.3	88.8
Poland	−3.3	−0.1	1.8	−7.3	−3.9	64.0
Romania	−0.1	0.7	1.4	−0.5	101.6	101.6

Slovak Republic	−0.4	0.0	0.3	−5.1	−0.3	53.6
Slovenia	−0.1	0.1	0.2	−2.4	31.8	40.2
Russian Federation	−7.8	0.5	11.2	−8.0	28.5	126.3
Kazakhstan	0.6	0.7	0.1	5.0	75.7	33.6
Turkey	−2.6	−1.0	2.0	−4.2	−25.2	62.8
Rest of Eastern Europe and Central Asia		8.7	3.5	6.7	148.9	94.9
High-income countries[a]	**195.8**	**256.1**	**183.7**	**11.0**	**110.8**	**78.3**
Australia	−1.2	0.0	1.3	−2.0	−0.2	80.9
Canada	6.5	9.1	3.3	9.8	61.6	40.0
EU-15[a]	123.1	165.5	123.9	13.7	124.6	77.7
Japan	−6.2	1.0	8.0	−3.6	230.5	32.9
New Zealand	3.4	2.0	0.4	14.9	23.8	64.2
Rest of Western Europe	74.7	69.1	30.1	125.3	1849.8	409.0
United States	−4.4	9.4	15.9	−0.9	17.5	55.9
Hong Kong, China and Singapore	−0.1	0.0	0.8	−2.5	38.9	17.9
Developing countries	**−62.8**	**8.1**	**80.5**	**−3.2**	**4.9**	**50.3**
North Africa	−0.4	1.2	2.1	−0.7	35.2	21.4
Sub-Saharan Africa	5.5	2.7	5.9	4.3	15.5	50.0
East Asia	−34.0	−0.1	28.4	−5.4	−0.2	51.2
South Asia	−8.4	−3.8	1.4	−2.8	−41.2	12.3
Latin America	−22.5	−13.8	6.5	−6.9	−20.6	26.8
Middle East	7.3	10.3	12.2	7.1	154.2	58.6
Eastern Europe and Central Asia	−10.3	11.6	23.9	−2.6	53.4	91.6
High-income countries	**195.8**	**256.1**	**183.7**	**11.0**	**110.8**	**78.3**
World total[a]	**133.0**	**264.2**	**264.2**	**3.6**	**66.9**	**66.9**

Source: Authors' World Bank Linkage model simulations.

a. Excluding intra-EU trade.

Table 13.7. Impact of Going Back to 1980–84 Policies on Self-Sufficiency[a] in Agricultural and Other Products, by Product and Region

(*percent*)

	High-income countries		Developing countries		Africa		Latin America		East Asia		South Asia		Eastern Europe and Central Asia	
	2004 bench-mark	1980–84 policies	2004 bench-mark	1980–84 policies	2004 bench-mark	1980–84 policies	2004 bench-mark	1980–84 policies	2004 bench-mark	1980–84 policies	2004 bench-mark	1980–84 policies	2004 bench-mark	1980–84 policies
Paddy rice	101	108	100	99	97	96	93	79	100	100	101	100	95	94
Wheat	141	190	88	79	67	61	80	59	68	43	100	98	102	96
Other grains	108	124	94	88	94	97	98	100	88	76	103	103	103	95
Oilseeds	104	124	97	88	104	102	140	110	66	64	100	99	106	103
Plant-based fibers	161	168	88	83	177	141	94	78	54	11	93	91	104	243
Vegetables and fruits	90	94	105	103	108	107	153	134	102	100	99	100	99	98
Other crops	90	94	113	107	138	115	143	122	110	115	104	103	90	91
Cattle, sheep, goats	100	100	100	100	101	101	102	101	98	97	100	100	102	103
Other livestock	101	98	100	102	101	103	101	104	99	99	100	100	99	106
Wool	161	167	92	91	103	103	103	102	78	74	96	95	96	96
Beef and sheep meat	101	106	97	95	96	94	108	104	83	86	126	110	95	89
Other meat products	100	149	100	82	92	74	121	83	101	92	96	91	96	74
Vegetable oils and fats	95	100	103	100	69	86	141	115	115	116	78	73	93	92
Dairy products	103	101	94	102	76	80	97	100	78	77	99	99	102	109

Processed rice	99	104	100	99	69	72	94	89	104	104	104	100	92	94
Refined sugar	98	69	102	130	95	173	131	239	98	103	96	92	98	96
Other food, beverages, and tobacco	99	99	103	103	101	100	108	107	105	107	106	104	100	100
Other primary products	76	74	122	123	180	181	148	152	84	85	75	88	115	116
Textile and wearing apparel	81	86	123	119	98	104	104	106	144	134	144	129	101	105
Other manufacturing	101	100	98	99	77	77	96	97	106	107	90	95	95	94
Services	101	101	101	100	101	101	100	100	101	101	100	99	101	101
Agriculture and food	100	104	101	100	100	100	112	109	100	97	100	99	99	99
Agriculture	99	104	100	98	104	101	115	106	96	92	100	99	100	103
Processed foods	100	104	101	101	94	98	110	110	104	104	100	97	99	96

Source: Authors' World Bank Linkage model simulations.

a. Self-sufficiency is defined as domestic production as a percentage of domestic consumption measured in value terms at free on board (fob) prices.

Table 13.8. Impact of Going Back to 1980–84 Policies on Shares of Production Exported and of Consumption Imported by the World, High-Income and Developing Countries

(*percent*)

	Share of production exported				Share of consumption imported			
	High-income countries[a]		Developing countries		High-income countries[a]		Developing countries	
	2004 benchmark	1980–84	2004 benchmark	1980–84	2004 benchmark	1980–84	2004 benchmark	1980–84
Paddy rice	3	10	1	0	2	4	1	2
Wheat	37	40	6	3	11	10	17	22
Other grains	15	21	7	5	9	13	11	16
Oilseeds	31	37	16	13	26	22	16	21
Plant-based fibers	50	45	17	44	18	18	26	59
Vegetables and fruits	10	12	9	7	18	16	4	4
Other crops	7	8	21	16	16	13	11	10
Cattle, sheep, goats	1	1	2	2	2	2	2	2
Other livestock	6	8	3	4	6	9	3	3
Wool	60	59	2	2	35	36	10	11
Beef and sheep meat	6	6	7	5	5	4	10	11
Other meat products	6	13	9	1	6	10	8	18
Vegetable oils and fats	8	10	31	29	12	11	26	27
Dairy products	5	6	4	14	2	7	10	12
Processed rice	3	11	5	5	4	9	5	5
Refined sugar	4	4	12	30	5	33	10	13
Other food, beverages, and tobacco	7	5	12	11	8	6	9	8
Other primary products	20	18	37	36	38	39	22	20
Textile and wearing apparel	15	13	39	33	30	25	23	19
Other manufacturing	20	18	32	27	19	18	32	27
Services	3	3	5	5	2	2	5	5
Agriculture and food	7	8	9	10	8	8	8	10
Agriculture	9	12	7	7	10	10	7	8
Processed foods	6	7	12	12	7	7	10	11

Source: Authors' Linkage model simulations.

a. Excluding intra-EU trade.

Table 13.9. Impact of Going Back to 1980–84 Policies on Shares of Agricultural and Food Production Exported, by Country/Region

(*percent*)

	2004 benchmark	1980–84
Developing countries	**9.5**	**9.5**
North Africa	6.3	7.9
Sub-Saharan Africa	13.8	13.5
East Asia	8.4	7.7
South Asia	3.7	2.4
Latin America	18.1	16.3
Middle East	7.4	14.2
Eastern Europe and Central Asia	6.8	9.1
High-income countries	**13.0**	**15.9**
World total[a]	**11.4**	**13.1**
World total (excluding intra-EU trade)	**8.1**	**8.7**

Source: Authors' World Bank Linkage model simulations.

a. Including intra-EU trade.

and other protection? The answer depends not only on changes in the NRAs but also on the relative size of each subsector and the different degrees of responsiveness of inputs to changes in relative output prices, and on the method used to weigh different countries' price changes. According to the Linkage model, with its default elasticities and (Paasche) weighting methods, the average real price in international markets would have been 13 percent lower for agricultural and food products had policies not changed over the past two decades (table 13.10). International prices for farm goods are higher now despite the substantial reduction in the antiagricultural policy bias in developing countries since the early 1980s: the effect of that is evidently more than offset by the reduction in agricultural tariffs and subsidies in high-income countries.

Effects on factor rewards

The relatively small percentage changes in net national economic welfare, reported in table 13.2, hide the fact that redistribution of welfare among groups within each country following trade reform can be much larger. This is clear from the impacts on real rewards to labor, capital, and land that are reported in table 13.11, where factor rewards are expressed in real terms by deflating by the aggregate consumer price index (CPI). Those results suggest that reform has

Table 13.10. Impact of Going Back to 1980–84 Policies on Real International Product Prices
(*percentage, change relative to 2004 baseline*)

Paddy rice	−11.6
Wheat	−15.4
Other grains	−27.5
Oilseeds	−8.6
Sugar cane and beet	−0.5
Plant-based fibers	0.8
Vegetables and fruits	2.8
Other crops	2.6
Cattle, sheep, goats	0.5
Other livestock	−2.0
Raw milk	0.4
Wool	−1.9
Beef and sheep meat	−15.0
Other meat products	−45.5
Vegetable oils and fats	−1.4
Dairy products	−8.5
Processed rice	0.6
Refined sugar	−2.5
Other food, beverages, and tobacco	0.1
Textile and wearing apparel	1.4
Other manufacturing	0.3
Merchandise trade	−1.2
Agriculture and food	−12.6
Primary agriculture	−5.9
Agriculture and lightly processed food	−17.6

Source: Authors' World Bank Linkage model simulations.

Note: Model numeraire is the export price index of high-income countries' manufactured exports.

raised the food price index by half a point while lowering by one-fifth of a point the overall CPI index. Unskilled workers in developing countries, according to these results, are better off from reform than skilled workers or capital owners; if they are also agricultural landowners, they have gained from increased rewards for that factor too. For high-income countries, consistent with standard trade theory, skilled workers gained at the expense of unskilled workers and agricultural land rents have halved over what they would have been. Those European and Northeast Asian farmers renting agricultural land would have benefited from the large fall in farm rental costs, more or less offsetting the fall in prices for their output, while earnings of landowners in those countries would decline. Their loss is relative to

Table 13.11. Impact of Going Back to 1980–84 Policies on Real Factor Prices,[a] by Region
(*percent, relative to 2004 baseline*)

	Unskilled wages	Skilled wages	Capital[b] user cost	Land[b] user cost	Aggregate CPI	Food CPI
Developing countries	**−2.1**	**−1.7**	**−1.5**	**−4.1**	**1.0**	**0.4**
North Africa	0.3	0.1	−0.2	−1.1	0.3	−0.7
Sub-Saharan Africa	0.1	0.6	1.2	−1.5	−1.4	−3.1
East Asia	−4.5	−3.7	−3.4	−6.2	0.7	1.9
South Asia	−4.1	−4.7	−1.7	−6.6	5.4	4.7
Latin America	0.0	−0.1	−0.2	−8.1	2.2	0.2
Middle East	0.6	0.7	0.2	−4.3	−1.2	−3.9
Eastern Europe and Central Asia	0.2	−0.1	0.2	4.1	−0.2	−1.6
High-income countries	**0.4**	**−0.7**	**−0.4**	**102.1**	**−0.1**	**−1.2**
World total	**−0.1**	**−0.9**	**−0.7**	**21.1**	**0.2**	**−0.5**

Source: Authors' World Bank Linkage model simulations.

a. Nominal factor prices are deflated by national aggregate consumer price index (CPI) in columns 5 and 6.
b. The user cost of capital and land represents the subsidy inclusive of rental cost.

the no-reform baseline, which ignores the fact that such farm landowners have long enjoyed protection-inflated returns, in some cases for decades prior to the 1980s.

Effects on sectoral value added

Of crucial interest in terms of these policies' impact on inequality and poverty is how they have affected value added in agriculture—or, in other words, net farm income. For poverty, it matters how much that indicator changes in absolute terms in low-income countries (given that three quarters of the world's poor are farmers in developing countries), while for within-country inequality how much the indicator changes relative to value added in nonfarm sectors also matters. These results are reported in table 13.12.

The results show that for developing countries as a group, value added in agriculture is 4.9 percent higher than it would have been without reform over the past two decades, compared with just 0.4 percent for nonagriculture. A similar-sized improvement has occurred in high-income countries for nonagriculture, but there net farm incomes would have been 36 percent higher without the global

Table 13.12. Impact of Going Back to 1980–84 Policies on Sectoral Value Added, Agricultural and All-Sector Policy Changes
(*percent, relative to 2004 baseline*)

	US$ billions				Percent			
	Agricultural policies		All sectors' policies		Agricultural policies		All sectors' policies	
	Agricultural GDP	Nonagricultural GDP	Agricultural GDP	Nonagricultural GDP	Agricultural GDP	Nonagricultural GDP	Agricultural GDP	Nonagricultural GDP
North and Sub-Saharan Africa	**−0.9**	**−0.2**	**−2.3**	**−0.6**	**−0.9**	**0.0**	**−2.2**	**−0.1**
Egypt, Arab Rep. of	0.0	−0.7	−0.1	0.0	−0.1	−1.1	−0.8	0.1
Madagascar	0.0	−0.1	0.1	0.0	−3.4	−3.1	7.1	1.0
Mozambique	0.3	0.0	0.3	0.4	22.7	0.1	24.8	10.0
Nigeria	−1.2	−0.8	−0.6	−0.8	−9.3	−1.7	−4.7	−1.6
Senegal	0.0	0.0	0.1	0.0	−1.1	−0.8	9.0	−1.0
South Africa	−0.1	0.1	1.6	−1.6	−0.7	0.1	20.3	−0.8
Tanzania	0.0	−0.1	−0.1	0.3	−0.3	−1.3	−1.3	4.2
Uganda	−0.1	−0.1	−0.1	−0.1	−2.9	−1.6	−1.9	−2.1
Zambia	0.0	0.0	−0.3	0.0	0.6	0.6	−28.2	0.3
Zimbabwe	0.2	0.2	−0.3	−0.1	38.9	4.9	−62.7	−3.8
Rest of Africa	0.0	1.4	−3.1	1.2	0.1	0.5	−4.9	0.4
East and South Asia	2.0	100.7	−27.1	−65.2	0.5	2.9	−6.4	−1.9
China	9.4	37.5	−27.0	−29.7	5.7	3.0	−16.3	−2.4
Korea, Rep. of	−3.2	31.3	1.2	−24.9	−15.1	5.4	5.4	−4.3
Taiwan, China	−0.5	10.1	0.8	−12.2	−9.9	3.7	17.6	−4.4
Indonesia	0.2	2.7	0.4	−3.2	0.8	1.2	1.4	−1.5
Malaysia	−0.1	4.0	0.3	−0.4	−2.0	3.8	12.9	−0.3
Philippines	1.9	1.0	−0.6	−1.9	15.6	1.7	−4.6	−3.3
Thailand	3.0	7.3	0.0	−6.3	14.3	2.8	−0.2	−2.4
Vietnam	1.2	4.5	1.0	−1.2	18.8	15.6	15.8	−4.2
Bangladesh	−0.3	−2.1	0.3	0.9	−3.8	−4.4	3.8	1.9

India	−10.6	−1.3	−2.7	16.1	−8.3	−0.3	−2.1	3.5
Pakistan	−0.1	0.2	−0.5	−0.1	−0.5	0.2	−2.8	−0.1
Sri Lanka	0.3	1.3	−0.6	−1.0	7.1	9.6	−12.8	−7.4
Rest of East and South Asia	0.7	4.3	0.3	−1.4	11.2	2.7	5.2	−0.9
Latin America	40.7	34.6	−10.8	40.2	37.0	2.3	−9.8	2.7
Argentina	10.9	15.1	−2.7	14.3	103.5	13.8	−25.5	13.1
Brazil	13.0	21.3	−7.6	8.0	42.6	4.2	−24.9	1.6
Chile	0.2	0.7	−0.1	1.0	5.5	0.9	−1.8	1.3
Colombia	5.0	1.2	1.3	12.1	53.5	1.5	13.6	15.3
Ecuador	2.9	1.7	−0.8	−0.5	126.0	6.7	−35.4	−1.9
Mexico	0.1	−3.4	−0.9	6.3	0.3	−1.0	−4.0	1.8
Nicaragua	0.0	0.1	0.0	0.0	2.4	2.3	5.1	−0.4
Rest of Latin America	8.6	−2.1	0.0	−0.9	28.7	−0.6	0.0	−0.2
Eastern Europe and Central Asia	−6.2	4.4	1.7	−0.9	−5.2	0.3	1.5	−0.1
Baltic states	−0.1	0.2	0.0	0.3	−8.9	0.5	0.5	0.9
Bulgaria	0.4	0.1	0.4	0.6	5.6	0.3	5.6	3.4
Czech Republic	−0.7	−0.3	0.0	0.8	−20.9	−0.3	−1.1	0.8
Hungary	−0.7	−0.1	−0.3	0.8	−17.9	−0.1	−8.3	0.9
Poland	−2.5	1.7	0.3	1.0	−22.6	0.9	2.5	0.5
Romania	−0.5	0.3	0.1	1.1	−5.8	0.5	1.6	1.9
Slovak Republic	−0.1	0.1	0.0	0.3	−13.5	0.4	0.3	0.8
Slovenia	0.0	0.1	0.1	0.1	−11.1	0.4	11.8	0.4
Russian Federation	−2.3	−1.3	−0.8	−5.6	−6.6	−0.3	−2.3	−1.2
Kazakhstan	0.5	0.5	0.1	0.1	23.0	1.2	5.0	0.4
Turkey	−1.5	0.9	−3.1	0.4	−4.7	0.4	−9.5	0.2
Rest of Eastern Europe and Central Asia	1.5	2.1	5.0	−0.8	11.1	1.8	37.8	−0.7

(*Table continues on the following page.*)

Table 13.12. Impact of Going Back to 1980–84 Policies on Sectoral Value Added, Agricultural and All-Sector Policy Changes (*continued*)

(*percent, relative to 2004 baseline*)

	US$ billions				Percent			
	Agricultural policies		All sectors' policies		Agricultural policies		All sectors' policies	
	Agricultural GDP	Nonagricultural GDP	Agricultural GDP	Nonagricultural GDP	Agricultural GDP	Nonagricultural GDP	Agricultural GDP	Nonagricultural GDP
High-income countries	−58.5	28.6	144.2	−143.1	−14.7	0.1	36.2	−0.5
Australia	2.7	11.7	0.2	−0.5	13.7	2.1	1.2	−0.1
Canada	0.7	−4.6	5.9	2.8	5.3	−0.5	45.7	0.3
EU–15	−47.4	−45.9	36.6	14.7	−25.4	−0.4	19.6	0.1
Japan	−7.6	93.2	7.3	−149.3	−16.8	2.3	16.1	−3.7
New Zealand	2.7	4.4	0.5	0.8	57.2	5.4	9.8	0.9
Rest of Western Europe	−3.6	−8.4	88.3	−25.8	−25.8	−1.3	631.3	−4.0
United States	−6.0	−25.2	5.3	17.6	−5.3	−0.2	4.6	0.2
Hong Kong, China and Singapore	0.0	3.4	0.1	−3.4	2.2	2.1	10.3	−2.1
Developing countries	44.4	145.6	−38.8	−32.1	5.6	1.9	−4.9	−0.4
North Africa	−0.3	1.8	−0.1	0.7	−1.1	0.8	−0.3	0.3
Sub-Saharan Africa	−0.6	−2.0	−2.2	−1.3	−0.8	−0.5	−3.1	−0.3
East Asia	12.6	102.8	−23.6	−81.4	4.7	3.5	−8.9	−2.8
South Asia	−10.7	−2.1	−3.5	16.2	−6.7	−0.3	−2.2	2.7
Latin America	40.7	34.6	−10.8	40.2	37.0	2.3	−9.8	2.7
Middle East	8.9	6.1	−0.4	−5.7	25.4	0.9	−1.1	−0.8
Eastern Europe and Central Asia	−6.2	4.4	1.7	−0.9	−5.2	0.3	1.5	−0.1
World total	−14.2	174.2	105.4	−175.2	−1.2	0.5	8.8	−0.5

Source: Authors' World Bank Linkage model simulations.

reforms. For East Asia and Latin America, the gain to farmers is twice as much, for South Asia and North Africa it is less than half as much, and for Sub-Saharan Africa the gain is just above the developing-country average (although farmers in South Africa and Nigeria are made substantially worse off). However, among the countries listed in Africa, net farm incomes would increase substantially only in Mozambique, Zambia, and Zimbabwe, while for the continent as a whole they would fall very slightly (by less than 1 percent). Part of the reason for this result is that nonagricultural primary sectors—in which numerous African countries have a strong comparative advantage—have expanded (raising Africa's self-sufficiency in that sector from 182 to 191 percent), and that in turn has boosted nontradables production and employment. Net farm incomes are also estimated to have fallen in Bangladesh and Vietnam, but in those countries earnings in textiles and clothing expanded.

Prospective Effects of Global Removal of 2004 Price-Distorting Policies

In the light of the above assessment of partial reform over the past two decades, the potential results from removing the remaining policies as of 2004 are examined. In this case, the scenarios involve full global liberalization of both agricultural policies and nonagricultural goods trade policies.

Global and national economic welfare

Beginning with the baseline projection of the world economy in 2004, all agricultural subsidies and taxes plus import tariffs on other merchandise, as summarized in table 13.1,[13] are removed globally. The Linkage model results presented here suggest that would lead to a global gain of US$168 billion per year (table 13.13), compared with the above estimate of US$233 billion per year from the partial reform since the early 1980s (table 13.2), and suggesting that in a global economic welfare sense, by 2004 the world had moved three-fifths of the way toward global free trade in goods. As a share of national income, developing countries would gain nearly twice as much as high-income gains by completing that reform process (an average increase of 0.9 percent compared with 0.5 percent for high-income countries). The results vary widely across developing countries, ranging from slight losses in the case of some South Asian and Sub-Saharan African countries that would suffer exceptionally large adverse terms of trade changes (and thus be worthy candidates for "aid-for-trade" assistance as envisaged as part of the WTO's Doha Development Agenda) to 8 percent increases in the case of Ecuador (whose main export item, bananas, is now heavily discriminated against in the EU

Table 13.13. Impact on Real Income of Full Liberalization of Global Merchandise Trade, by Country/Region, 2004
(*relative to 2004 baseline*)

	Total real income gain per year (US$ billions)	Change in income due just to change in terms of trade (US$ billions)	Total real income gain (% of baseline)[a]	
North and Sub-Saharan Africa	**0.9**	**−6.0**	**0.2**	**(−1.1)**
Egypt, Arab Rep. of	−0.2	−0.6	−0.3	(−0.9)
Madagascar	0.0	0.0	−0.9	(−1.2)
Mozambique	0.1	−0.1	2.4	(−2.0)
Nigeria	0.3	−0.6	0.7	(−1.3)
Senegal	0.0	−0.1	−2.3	(−4.0)
South Africa	0.2	−0.7	0.1	(−0.5)
Tanzania	0.0	0.0	−0.5	(−0.4)
Uganda	0.0	0.0	−0.6	(−0.1)
Zambia	0.0	0.0	0.1	(−0.3)
Zimbabwe	0.1	0.0	3.4	(0.5)
Rest of Africa	0.5	−3.8	0.2	(−1.5)
East and South Asia	**29.7**	**−4.9**	**0.9**	**(−0.1)**
China	3.3	0.5	0.2	(0.0)
Korea, Rep. of	14.0	0.2	2.8	(0.0)
Taiwan, China	1.0	0.0	0.4	(0.0)
Indonesia	0.5	0.0	0.2	(0.0)
Malaysia	4.2	−1.0	4.7	(−1.1)
Philippines	0.0	−0.5	0.1	(−0.7)
Thailand	3.3	−0.1	1.4	(−0.1)
Vietnam	1.9	−0.9	5.3	(−2.5)
Bangladesh	−0.2	−0.8	−0.4	(−1.7)
India	−0.8	−2.9	−0.2	(−0.6)
Pakistan	−0.1	−0.6	−0.2	(−0.8)
Sri Lanka	0.8	0.5	5.1	(3.1)
Rest of East and South Asia	1.9	0.8	1.4	(0.5)
Latin America	**15.8**	**2.5**	**1.0**	**(0.2)**
Argentina	3.2	−0.7	2.6	(−0.6)
Brazil	6.8	5.6	1.6	(1.3)
Chile	0.3	0.2	0.4	(0.3)
Colombia	2.2	0.7	3.1	(1.0)
Ecuador	2.0	1.1	8.2	(4.4)
Mexico	−0.7	−3.4	−0.1	(−0.6)
Nicaragua	0.0	0.0	1.3	(0.4)
Rest of Latin America	2.0	−1.0	0.5	(−0.3)

Table 13.13. Impact on Real Income of Full Liberalization of Global Merchandise Trade, by Country/Region, 2004 (*continued*)

	Total real income gain per year (US$ billions)	Change in income due just to change in terms of trade (US$ billions)	Total real income gain (% of baseline)[a]	
Eastern Europe and Central Asia	**14.2**	**−3.6**	**1.2**	**(−0.3)**
Baltic states	0.5	0.1	1.8	(0.3)
Bulgaria	0.2	−0.2	1.4	(−1.4)
Czech Republic	1.0	−0.1	1.4	(−0.2)
Hungary	0.4	−0.1	0.6	(−0.1)
Poland	2.0	0.1	1.2	(0.1)
Romania	−0.1	−0.7	−0.3	(−1.9)
Slovak Republic	0.7	0.1	2.3	(0.4)
Slovenia	0.3	0.1	1.5	(0.3)
Russian Federation	5.4	−3.1	1.2	(−0.7)
Kazakhstan	0.4	0.2	1.1	(0.6)
Turkey	1.3	−0.5	0.6	(−0.2)
Rest of Eastern Europe and Central Asia	2.2	0.5	2.1	(0.4)
High-income countries	**102.8**	**11.3**	**0.5**	**(0.1)**
Australia	2.4	1.9	0.5	(0.4)
Canada	0.6	−1.2	0.1	(−0.2)
EU-15	56.8	−3.8	0.7	(0.0)
Japan	23.1	10.4	0.7	(0.3)
New Zealand	2.2	1.8	3.2	(2.6)
Rest of Western Europe	13.1	−0.1	2.7	(0.0)
United States	2.8	0.9	0.0	(0.0)
Hong Kong, China and Singapore	1.7	1.4	1.4	(1.1)
Developing countries	**64.9**	**−12.2**	**0.9**	**(−0.2)**
North Africa	0.9	−2.8	0.5	(−1.5)
Sub-Saharan Africa	0.0	−3.2	0.0	(−0.9)
East Asia	30.1	−1.0	1.1	(0.0)
South Asia	−0.4	−3.9	−0.1	(−0.6)
Latin America	15.8	2.5	1.0	(0.2)
Middle East	4.2	−0.2	0.8	(0.0)
Eastern Europe and Central Asia	14.2	−3.6	1.2	(−0.3)
World total	**167.7**	**−1.0**	**0.6**	**(0.0)**

Source: Authors' World Bank Linkage model simulations.

a. Numbers in parentheses refer to that due to terms of trade effects.

market, where former colonies (via the now-expired Cotonou Agreement) and least developed countries previously enjoyed preferential duty-free access).

The second column of numbers and those in parentheses in table 13.13 show the amount of that welfare gain due to changes in the international terms of trade for each country. For developing countries as a group, the terms-of-trade effect is slightly negative, while for high-income countries the effect is slightly positive.

Regional and sectoral distribution of welfare effects

One way to decompose the real income gains from full removal of price distortions globally, so as to better understand the sources for each region, is to assess the impacts of developing country liberalization versus high-income country liberalization in different economic sectors. These results are provided in table 13.14. They suggest global liberalization of agriculture and food markets would contribute 70 percent of the total global gains from merchandise reform. This is similar to the 63 percent found for 2015 by Anderson, Martin, and van der Mensbrugghe (2006b) using version 6 of the GTAP database anchored on 2001 estimates of distortions. This robust result is remarkable given the low shares of agriculture and food in global gross domestic product (GDP) and global merchandise trade (less than 7 percent). For developing countries, the importance of agricultural policies is even greater, at 72 percent (compared with 69 percent for high-income countries—see row 7 of table 13.14).

Five-sevenths of the global gains from removing agricultural policies are accounted for by the farm policies of high-income countries (columns 3 and 6 of table 13.14). Those policies also account for almost one-quarter of the overall gains from trade reform to developing countries, meanwhile, developing-country policies are responsible for 40 percent of high-income countries' gains (columns 1 and 3 of table 13.14). If only high-income countries were to liberalize their agricultural markets—as some countries have suggested in the WTO's ongoing Doha Round of trade negotiations—they would provide less than one-third of the potential gains to developing countries from global farm policy reform.

Quantities produced and traded

The full liberalization results suggest there would be little change in developing countries' aggregate shares of global output and exports of nonfarm products other than for textiles and apparel. Their shares in agricultural and processed food markets, however, change noticeably: the export share rises from 54 to 64 percent and the output share rises from 46 to 50 percent. More significantly, the increases occur in nearly all agricultural and food industries. As a result, the share of global

Table 13.14. Regional and Sectoral Sources of Welfare Gains from Full Liberalization of Global Merchandise Trade, 2004

(*relative to 2004 baseline*)

	Gains,[a] by region (US$ billion)			Regional gain (%)		
	Developing countries	High-income countries[b]	World	Developing countries	High-income countries[b]	World
Developing countries liberalize:						
Agriculture and light processing	31.8	3.9	35.6	48.6	3.8	21.3
Manufacturing and services	5.6	36.7	42.3	8.6	35.8	25.2
Total	37.4	40.6	77.9	57.2	39.6	46.5
High-income countries liberalize:						
Agriculture and light processing	15.1	66.4	81.6	23.2	64.9	48.6
Manufacturing and services	12.8	−4.6	8.2	19.6	−4.5	4.9
Total	28.0	61.8	89.8	42.8	60.4	53.5
All countries liberalize:						
Agriculture and light processing	46.9	70.3	117.2	71.8	68.7	69.9
Manufacturing and services	18.4	32.1	50.5	28.2	31.3	30.1
Total	65.3	102.3	167.7	100.0	100.0	100.0

Source: Authors' World Bank Linkage model simulations.

a. Small interaction effects are distributed proportionately; dollar values do not add exactly, due to rounding.
b. Includes European transition economies, excludes Rep. of Korea and Taiwan (which are included in 'developing countries').

production of farm products that is exported rises dramatically for many industries and, for the sector as a whole, increases from 8 to 13 percent excluding intra-EU trade (table 13.15). That "thickening" of international food markets would have a substantial dampening effect on the instability of prices and quantities traded in those markets.

The impact of full trade reform on agricultural and food output and trade is shown for each country or region in table 13.16, where it is clear that global farm trade is enhanced by more than one-third, whereas the global value of output is virtually unchanged, dropping just 2.6 percent. This suggests that, in aggregate, the proagricultural policies of high-income countries are not quite fully offset by the policies of developing countries—whereas the antitrade biases in policies of both groups of countries reinforce each other. The increase in exports of those goods from developing countries would be a huge US$163 billion per year. Granted, Latin America accounts for nearly half of that increase, but all developing regions' exports expand. This means developing countries' share of production exported would be much higher with full trade reform. In fact, table 13.17 shows exports would increase for almost all developing countries, rising in aggregate from 10 to 17 percent.

Also of interest is what happens to agricultural imports: developing countries as a group would see farm imports growing less than exports under full trade liberalization (table 13.16). That means their food and agricultural self-sufficiency ratios would rise, although in aggregate only slightly. For high-income countries, that ratio would fall 5 percentage points (slightly less if Eastern Europe is included), while in East Asia and Africa it would rise 2–3 points, for South Asia it would be unchanged, and for Latin America it would jump from 112 to 126 percent (table 13.18).

As already mentioned, full trade liberalization also substantially increases the share of agricultural and food production that is exported globally, thereby "thickening" international markets, which would dampen international food price fluctuations and thereby reduce concerns about vulnerability to import dependence. The extent of this global public good aspect of agricultural trade reform can be sensed for different products from the results reported in tables 13.19. Highly protected sugar and milk, as well as grains and oilseeds, are especially noteworthy. Also noteworthy from that table is the extent to which the developing-country shares of output exported rise for certain products. The share of their grain production that is exported would double, for example, and for meat it would more than double, while for sugar it would rise nearly four-fold. Cotton (plant-based fibers) too would become more of the domain of developing countries.

Table 13.15. Impact of Full Global Liberalization on Shares of Global Output Exported, and Developing Country Shares of Global Output and Exports,[a] by Product, 2004

(*percent*)

	Share of global output exported[a]		Developing countries' share of global output		Developing countries' share of global exports[a]	
	2004 benchmark	Full global liberalization	2004 benchmark	Full global liberalization	2004 benchmark	Full global liberalization
Paddy rice	1	2	81	82	56	42
Wheat	16	22	67	71	25	39
Other grains	11	15	55	57	35	56
Oilseeds	21	28	69	74	54	68
Plant-based fibers	25	25	74	83	50	79
Vegetables and fruits	9	15	72	77	69	80
Other crops	14	17	49	49	75	62
Cattle, sheep, goats	2	2	43	48	56	59
Other livestock	4	4	65	67	43	46
Wool	13	14	82	81	16	18
Beef and sheep meat	7	21	27	41	31	68
Other meat products	7	12	32	34	42	45
Vegetable oils and fats	20	30	52	58	80	84
Dairy products	5	11	29	33	28	41
Processed rice	5	7	76	79	85	87
Refined sugar	8	42	52	85	78	90
Other food, beverages, and tobacco	9	12	35	36	50	59
Other primary products	31	33	64	63	76	76
Textile and wearing apparel	28	35	53	57	74	77
Other manufacturing	24	26	32	31	43	43
Services	3	3	20	20	31	30
Agriculture and food	8	13	46	50	54	64
Agriculture	8	11	62	65	55	64
Processed foods	8	14	37	40	52	63

Source: Authors' World Bank Linkage model simulations.

a. Excluding intra-EU trade.

Table 13.16. Impacts of Full Global Trade Liberalization on Agricultural and Food Output and Trade, by Country/Region, 2004

(*relative to 2004 baseline*)

	US$ billions			Change relative to baseline (%)		
	Output	Exports	Imports	Output	Exports	Imports
North and Sub-Saharan Africa	**13.8**	**20.5**	**10.0**	**7.2**	**99.1**	**46.0**
Egypt, Arab Rep. of	0.4	0.5	−0.1	2.2	39.2	−4.2
Madagascar	0.0	0.0	0.0	−0.4	2.7	−4.3
Mozambique	0.9	1.0	0.1	52.3	597.1	33.3
Nigeria	−0.5	0.4	0.7	−2.9	92.8	43.1
Senegal	0.0	0.0	0.0	−1.9	35.0	0.3
South Africa	0.7	0.9	0.8	2.4	26.7	42.9
Tanzania	0.0	0.2	0.1	−0.7	28.5	31.2
Uganda	0.0	0.0	0.0	−0.6	1.3	1.5
Zambia	0.1	0.1	0.0	5.2	22.3	35.9
Zimbabwe	0.4	0.3	0.1	25.7	38.0	39.2
Rest of Africa	12.0	17.0	8.3	10.5	133.1	64.3
East and South Asia	**25.0**	**39.5**	**24.7**	**2.7**	**83.4**	**36.7**
China	6.2	7.7	6.7	1.7	76.5	27.5
Korea, Rep. of	−1.0	1.0	6.2	−1.7	194.1	75.0
Taiwan, China	−1.9	0.3	1.5	−9.1	62.8	35.5
Indonesia	1.1	1.6	1.0	1.8	21.6	21.5
Malaysia	1.6	1.3	0.7	8.9	17.0	17.8
Philippines	1.1	1.9	0.8	3.5	120.5	35.0
Thailand	9.5	8.3	1.9	17.4	133.0	78.1
Vietnam	0.5	1.1	0.6	3.3	54.0	55.6
Bangladesh	−0.6	0.4	0.8	−2.4	261.2	38.3

India	1.1	9.0	1.4	0.5	131.2	24.2
Pakistan	−0.6	0.5	1.0	−1.3	45.0	43.0
Sri Lanka	−0.1	−0.1	0.6	−1.2	−18.2	69.3
Rest of East and South Asia	8.0	6.4	1.4	41.5	266.1	29.5
Latin America	**87.2**	**71.5**	**7.2**	**26.8**	**106.4**	**29.8**
Argentina	12.2	15.1	0.3	37.8	95.6	81.8
Brazil	45.8	25.7	2.1	45.3	100.7	94.8
Chile	0.5	0.4	0.2	4.7	11.3	15.8
Colombia	3.1	4.9	1.1	14.6	161.4	81.7
Ecuador	4.2	4.6	0.3	46.1	198.7	71.8
Mexico	−0.3	0.3	0.4	−0.4	5.8	4.3
Nicaragua	0.0	0.1	0.0	2.9	21.6	19.4
Rest of Latin America	21.6	20.4	2.8	25.7	175.9	30.4
Eastern Europe and Central Asia	**−10.4**	**17.4**	**20.3**	**−2.6**	**79.7**	**77.6**
Baltic states	−1.2	−0.1	0.4	−16.9	−15.5	30.9
Bulgaria	4.2	2.6	0.6	6.6	366.5	118.1
Czech Republic	−2.2	−0.1	0.7	−12.0	−10.9	40.5
Hungary	−0.9	0.4	0.8	−6.0	17.1	66.6
Poland	1.7	2.5	2.5	3.9	80.7	88.8
Romania	−0.2	1.3	1.1	−1.0	190.5	78.3
Slovak Republic	−0.9	−0.1	0.4	−11.3	−12.0	64.1
Slovenia	−0.6	−0.1	0.2	−17.1	−54.1	26.2
Russian Federation	−12.9	3.2	8.8	−13.1	179.4	98.9
Kazakhstan	1.5	1.4	0.0	11.8	142.9	11.6
Turkey	−2.0	2.3	2.9	−3.1	61.5	92.1
Rest of Eastern Europe and Central Asia	3.0	4.1	2.0	7.7	71.3	53.4

(*Table continues on the following page.*)

Table 13.16. Impacts of Full Global Trade Liberalization on Agricultural and Food Output and Trade, by Country/Region, 2004 (*continued*)

(*relative to 2004 baseline*)

	US$ billions			Change relative to baseline (%)		
	Output	Exports	Imports	Output	Exports	Imports
High-income countries	**−233.2**	**−9.2**	**89.8**	**−13.1**	**−4.0**	**38.3**
Australia	12.0	7.0	0.2	19.8	41.2	11.1
Canada	−1.6	3.6	2.7	−2.4	24.1	32.8
EU-15	−190.9	−38.8	50.9	−21.2	−29.2	31.9
Japan	−39.1	0.4	16.8	−22.9	87.7	69.1
New Zealand	10.6	6.4	0.2	46.6	74.3	27.1
Rest of Western Europe	−11.6	11.7	9.8	−19.4	312.0	132.7
United States	−12.8	0.6	9.3	−2.6	1.1	32.4
Hong Kong, China and Singapore	0.1	0.0	0.1	2.1	6.3	1.6
Developing countries	**137.6**	**163.6**	**64.6**	**7.1**	**100.0**	**40.4**
North Africa	11.4	13.3	6.1	17.3	377.2	62.5
Sub-Saharan Africa	2.5	7.2	3.8	1.9	41.9	32.3
East Asia	25.1	29.5	20.8	4.0	77.4	37.4
South Asia	−0.1	10.0	3.9	0.0	108.3	33.2
Latin America	87.2	71.5	7.2	26.8	106.4	29.8
Middle East	22.0	14.8	2.5	21.5	222.7	12.1
Eastern Europe and Central Asia	−10.4	17.4	20.3	−2.6	79.7	77.6
World total	**−95.7**	**154.4**	**154.4**	**−2.6**	**39.1**	**39.1**

Source: Authors' World Bank Linkage model simulations.

Table 13.17. Impact of Global Liberalization on Share of Agricultural and Food Production Exported by Country/Region, 2004

(*percent*)

	2004 benchmark data	Full global liberalization
Developing countries	**9.5**	**16.9**
North Africa	6.3	20.6
Sub-Saharan Africa	13.8	19.3
East Asia	8.4	15.1
South Asia	3.7	7.5
Latin America	18.1	28.2
Middle East	7.4	17.2
Eastern Europe and Central Asia	6.8	11.1
High-income countries	**13.0**	**14.1**
World total	**11.4**	**15.4**

Source: Authors' World Bank Linkage model simulations.

Effects on product and factor prices

How do different agricultural prices in international markets change with liberalization of distortionary agricultural policies and other protection? The average real international prices of agricultural and lightly processed food products would be only 1.3 percent higher in the absence of all merchandise trade distortions, or 2.0 percent if just agricultural policies were liberalized (table 13.20). The net effects of present distortions especially dampen the international prices of beef, milk, rice, and cotton. But they are propping up the prices of some other products, because export taxes are still in place in some developing countries, most notably Argentina.

Because of the impacts on real rewards to labor, capital, and land, redistribution of welfare among groups within each country following trade reform can be much larger than the aggregate change. Those effects are reported in table 13.21, where factor rewards are deflated by the overall consumer price index. As shown in the table, food prices would fall more than that overall CPI. Consistent with trade theory, those results suggest that unskilled workers in developing countries—the majority of whom work on farms—would benefit most from reform, followed by skilled workers, and then capital owners. Returns to immobile agricultural land also rises in developing countries, but by less than for more mobile factors. Insofar as unskilled workers spend a higher share of their income

Table 13.18. Impact of Global Liberalization on Self-Sufficiency[a] in Agricultural and Other Products, by Region, 2004

	High-income countries		Developing countries		North and Sub-Saharan Africa		Latin America		East Asia		South Asia		Eastern Europe and Central Asia	
	2004 bench-mark	Global liberali-zation	2004 bench-mark	Global liberali-zation	2004 bench-mark	Global liberali-zation	2004 bench-mark	Global liberali-zation	2004 bench-mark	Global liberali-zation	2004 bench-mark	Global liberali-zation	2004 bench-mark	Global liberali-zation
Paddy rice	101	105	100	99	97	96	93	72	100	101	101	101	95	92
Wheat	141	140	88	89	67	46	80	98	68	65	100	98	102	117
Other grains	108	102	94	98	94	91	98	119	88	81	103	105	103	113
Oilseeds	104	92	97	103	104	130	140	167	66	51	100	101	106	115
Plant-based fibers	161	112	88	97	177	265	94	107	54	58	93	95	104	118
Vegetables and fruits	90	78	105	109	108	103	153	221	102	104	99	98	99	92
Other crops	90	91	113	110	138	138	143	133	110	104	104	104	90	88
Cattle, sheep, goats	100	100	100	100	101	99	102	102	98	97	100	100	102	102
Other livestock	101	101	100	100	101	100	101	100	99	99	100	100	99	98
Wool	161	180	92	91	103	104	103	102	78	75	96	93	96	99
Beef and sheep meat	101	85	97	134	96	102	108	183	83	77	126	652	95	85
Other meat products	100	99	100	103	92	85	121	143	101	103	96	95	96	93
Vegetable oils and fats	95	85	103	114	69	191	141	143	115	116	78	66	93	96
Dairy products	103	100	94	101	76	79	97	102	78	78	99	99	102	104
Processed rice	99	95	100	101	69	63	94	85	104	108	104	104	92	87
Refined sugar	98	41	102	133	95	100	131	227	98	196	96	91	98	70
Other food, beverages, and tobacco	99	97	103	105	101	100	108	112	105	113	106	94	100	98
Other primary products	76	76	122	122	180	189	148	155	84	82	75	69	115	116
Textile and wearing apparel	81	76	123	128	98	91	104	91	144	155	144	153	101	95
Other manufacturing	101	102	98	96	77	74	96	91	106	105	90	89	95	95
Services	101	101	101	101	101	102	100	100	101	100	100	101	101	101
Agriculture and food	100	95	101	105	100	103	112	126	100	102	100	100	99	98
Agriculture	99	96	100	102	104	103	115	126	96	95	100	100	100	101
Processed foods	100	95	101	108	94	103	110	126	104	111	100	101	99	96

Source: Authors' World Bank Linkage model simulations.

a. Self-sufficiency is defined as domestic production as a percentage of domestic consumption measured in value terms at fob prices.

Table 13.19. Share of Production Exported and of Consumption Imported by World, High-Income, and Developing Countries, before and after Full Global Liberalization of All Merchandise Trade, by Product, 2004

(*percent*)

	Share of production exported				Share of consumption imported			
	High-income countries[a]		Developing countries		High-income countries[a]		Developing countries	
	2004 benchmark	Global liberalization	2004 benchmark	Global liberalization	2004 benchmark	Global liberalization	2004 benchmark	Global liberalization
Paddy rice	3	7	1	1	2	3	1	2
Wheat	37	47	6	12	11	25	17	21
Other grains	15	16	7	15	9	14	11	15
Oilseeds	31	34	16	25	26	36	16	22
Plant-based fibers	50	31	17	24	18	22	26	25
Vegetables and fruits	10	13	9	15	18	30	4	7
Other crops	7	13	21	22	16	20	11	14
Cattle, sheep, goats	1	2	2	2	2	2	2	2
Other livestock	6	7	3	3	6	6	3	3
Wool	60	62	2	3	35	31	10	12
Beef and sheep meat	6	11	7	35	5	24	10	13
Other meat products	6	10	9	16	6	12	8	14
Vegetable oils and fats	8	11	31	43	12	24	26	34
Dairy products	5	10	4	14	2	10	10	14
Processed rice	3	4	5	8	4	9	5	7
Refined sugar	4	30	12	44	5	66	10	25
Other food, beverages, and tobacco	7	8	12	20	8	10	9	16
Other primary products	20	21	37	39	38	39	22	24
Textile and wearing apparel	15	19	39	48	30	37	23	31
Other manufacturing	20	21	32	36	19	20	32	38
Services	3	3	5	4	2	2	5	5
Agriculture and food	7	9	9	17	8	13	8	12
Agriculture	9	11	7	11	10	15	7	9
Processed foods	6	9	12	23	7	13	10	16

Source: Authors' Linkage model simulations.

a. Excluding intra-EU trade.

Table 13.20. Impact of Full Global Liberalization of Agricultural and All Goods Markets on Real International Product Prices, 2004

(*percent, relative to 2004 baseline*)

	Agricultural policies	All goods sectors policies
Paddy rice	6.9	6.6
Wheat	1.8	1.4
Other grains	2.6	2.7
Oilseeds	−2.2	−2.4
Sugar cane and beet	−1.1	−2.0
Plant-based fibers	4.7	2.9
Vegetables and fruits	2.4	1.8
Other crops	1.7	1.0
Cattle, sheep, goats	−0.2	−1.1
Other livestock	−1.2	−2.1
Raw milk	0.7	−0.2
Wool	3.5	3.3
Beef and sheep meat	5.6	4.6
Other meat products	1.3	0.6
Vegetable oils and fats	−1.4	−1.9
Dairy products	4.6	3.8
Processed rice	2.8	2.9
Refined sugar	2.5	1.3
Other food, beverages, and tobacco	−1.7	−1.3
Textile and wearing apparel	0.3	−1.2
Other manufacturing	0.2	−0.2
Merchandise trade	0.3	−0.2
Agriculture and food	0.8	0.3
Agriculture	1.5	0.9
Agriculture and light processing	2.0	1.3

Source: Authors' World Bank Linkage model simulations.

Note: Model numeraire is the export price index of high-income countries' manufactured exports.

on food than the average citizen, these results understate the extent of their gain. These results suggest both inequality and poverty could be alleviated by such reform.

Effects on sectoral value added

Of crucial interest in terms of these policies' impact on inequality and poverty is how they affect value added in agriculture, in other words net farm income.

Table 13.21. Impacts of Full Global Merchandise Trade Liberalization on Real Factor Prices,[a] 2004
(*percent, relative to 2004 baseline*)

	Unskilled wages	Skilled wages	Capital[b] user cost	Land[b] user cost	Aggregate CPI	Food CPI
Developing countries	**3.5**	**3.0**	**2.9**	**1.6**	**−0.9**	**−2.8**
North Africa	7.0	7.7	5.3	−0.5	−5.2	−7.2
Sub-Saharan Africa	3.2	3.2	3.8	0.2	−3.8	−4.9
East Asia	4.0	3.4	3.3	1.9	0.1	−2.7
South Asia	−0.6	2.3	1.2	−6.2	−1.6	0.3
Latin America	4.5	1.4	1.9	21.1	1.2	3.2
Middle East	8.3	2.9	4.7	43.8	−3.3	−10.5
Eastern Europe and Central Asia	1.7	3.2	2.6	−4.5	−2.3	−4.5
High-income countries	**0.2**	**1.0**	**0.5**	**−17.9**	**−0.6**	**−3.6**
World total	**0.9**	**1.3**	**1.2**	**−3.1**	**−0.7**	**−3.2**

Source: Authors' World Bank Linkage model simulations.

a. Nominal factor prices are deflated by national aggregate consumer price index (CPI) in columns 5 and 6.
b. The user cost of capital and land represents the subsidy inclusive rental cost.

These results for full global reform are reported in the first four columns of table 13.22.

The results show that for developing countries as a group, value added in agriculture rises by 5.6 percent, compared with 1.9 percent for nonagriculture, following full global reform of all merchandise trade. Latin America is where net farm income expands most, averaging 37 percent but exceeding 100 percent for Argentina and Ecuador and 40–50 percent for Brazil and Colombia. It also expands considerably in East Asia, and more than nonagricultural value added—including in China. However, among the countries listed in Africa, net farm incomes would increase substantially only in Mozambique, Zambia, and Zimbabwe, while for the continent as a whole they would fall very slightly (by less than 1 percent). Partly that is because nonagricultural primary sectors, in which numerous African countries have a strong comparative advantage, would expand (raising Africa's self-sufficiency in that sector from 180 to 189 percent; see table 13.18). In turn, that expansion would boost production and employment of nontradable goods and services. Net farm incomes are estimated to fall also in South Asia (by 7 percent), but textiles and clothing incomes in that region would expand (raising self-sufficiency from 144 to 153 percent). In India, where the skilled-to-unskilled wage differential rises, incomes in skill-intensive goods and services production would also expand.

Table 13.22. Effects of Full Global Liberalization of Agricultural and All Merchandise Trade on Sectoral Value Added, by Country and Region, 2004
(*relative to 2004 baseline*)

	US$ billions				Percent			
	Agricultural policies		All sectors' policies		Agricultural policies		All sectors' policies	
	Agricultural GDP	Non-agricultural GDP	Agricultural GDP	Non-agricultural GDP	Agricultural GDP	Non-agricultural GDP	Agricultural GDP	Non-agricultural GDP
North and Sub-Saharan Africa	0.1	5.1	−0.9	−0.2	0.1	0.8	−0.9	0.0
Egypt, Arab Rep. of	0.1	0.2	0.0	−0.7	1.3	0.4	−0.1	−1.1
Madagascar	0.0	0.0	0.0	−0.1	−3.2	0.1	−3.4	−3.1
Mozambique	0.3	0.0	0.3	0.0	23.6	0.6	22.7	0.1
Nigeria	−0.6	0.2	−1.2	−0.8	−4.8	0.5	−9.3	−1.7
Senegal	0.0	0.0	0.0	0.0	1.5	−0.8	−1.1	−0.8
South Africa	−0.2	0.7	−0.1	0.1	−2.7	0.4	−0.7	0.1
Tanzania	0.0	0.0	0.0	−0.1	0.6	−0.3	−0.3	−1.3
Uganda	−0.1	0.0	−0.1	−0.1	−1.6	−0.4	−2.9	−1.6
Zambia	0.0	0.0	0.0	0.0	0.7	0.5	0.6	0.6
Zimbabwe	0.1	0.0	0.2	0.2	24.2	0.8	38.9	4.9
Rest of Africa	0.5	3.9	0.0	1.4	0.7	1.4	0.1	0.5
East and South Asia	−1.4	24.4	2.0	100.7	−0.3	0.7	0.5	2.9
China	4.6	2.5	9.4	37.5	2.8	0.2	5.7	3.0
Korea, Rep. of	−4.0	7.2	−3.2	31.3	−18.7	1.2	−15.1	5.4
Taiwan, China	−0.5	0.8	−0.5	10.1	−11.3	0.3	−9.9	3.7
Indonesia	0.3	1.1	0.2	2.7	1.1	0.5	0.8	1.2

Malaysia	−0.2	0.9	−0.1	4.0	−6.3	0.8	−2.0	3.8
Philippines	1.7	0.3	1.9	1.0	13.8	0.5	15.6	1.7
Thailand	2.9	2.7	3.0	7.3	14.0	1.0	14.3	2.8
Vietnam	1.4	0.0	1.2	4.5	22.8	0.0	18.8	15.6
Bangladesh	−0.2	0.4	−0.3	−2.1	−2.6	0.9	−3.8	−4.4
India	−7.8	6.3	−10.6	−1.3	−6.1	1.4	−8.3	−0.3
Pakistan	−0.2	−0.1	−0.1	0.2	−1.0	−0.1	−0.5	0.2
Sri Lanka	0.0	0.0	0.3	1.3	0.0	0.1	7.1	9.6
Rest of East and South Asia	0.6	2.3	0.7	4.3	9.6	1.4	11.2	2.7
Latin America	40.0	42.2	40.7	34.6	36.3	2.8	37.0	2.3
Argentina	12.4	8.1	10.9	15.1	116.8	7.4	103.5	13.8
Brazil	12.2	22.7	13.0	21.3	40.1	4.4	42.6	4.2
Chile	0.2	0.3	0.2	0.7	5.0	0.3	5.5	0.9
Colombia	5.0	2.1	5.0	1.2	53.5	2.7	53.5	1.5
Ecuador	2.6	2.9	2.9	1.7	113.1	11.4	126.0	6.7
Mexico	−0.2	0.6	0.1	−3.4	−1.0	0.2	0.3	−1.0
Nicaragua	0.0	0.0	0.0	0.1	3.0	1.4	2.4	2.3
Rest of Latin America	7.9	5.5	8.6	−2.1	26.3	1.5	28.7	−0.6
Eastern Europe and Central Asia	−5.2	4.4	−6.2	4.4	−4.4	0.3	−5.2	0.3
Baltic states	−0.1	0.1	−0.1	0.2	−7.5	0.3	−8.9	0.5
Bulgaria	0.3	−0.1	0.4	0.1	5.1	−0.4	5.6	0.3
Czech Republic	−0.7	0.4	−0.7	−0.3	−19.2	0.4	−20.9	−0.3
Hungary	−0.7	0.3	−0.7	−0.1	−16.8	0.4	−17.9	−0.1

(*Table continues on the following pages.*)

Table 13.22. Effects of Full Global Liberalization of Agricultural and All Merchandise Trade on Sectoral Value Added, by Country and Region, 2004 (*continued*)

(*relative to 2004 baseline*)

	US$ billions				Percent			
	Agricultural policies		All sectors' policies		Agricultural policies		All sectors' policies	
	Agricultural GDP	Non-agricultural GDP	Agricultural GDP	Non-agricultural GDP	Agricultural GDP	Non-agricultural GDP	Agricultural GDP	Non-agricultural GDP
Poland	−2.4	2.1	−2.5	1.7	−21.8	1.1	−22.6	0.9
Romania	−0.3	0.2	−0.5	0.3	−3.7	0.4	−5.8	0.5
Slovak Republic	−0.1	0.1	−0.1	0.1	−11.8	0.2	−13.5	0.4
Slovenia	0.0	0.1	0.0	0.1	−9.2	0.4	−11.1	0.4
Russian Federation	−2.2	−0.7	−2.3	−1.3	−6.3	−0.2	−6.6	−0.3
Kazakhstan	0.5	0.4	0.5	0.5	23.1	1.1	23.0	1.2
Turkey	−1.0	0.9	−1.5	0.9	−3.2	0.4	−4.7	0.4
Rest of Eastern Europe and Central Asia	1.5	0.5	1.5	2.1	11.1	0.4	11.1	1.8
High-income countries	−55.1	61.9	−58.5	28.6	−13.8	0.2	−14.7	0.1
Australia	2.2	8.4	2.7	11.7	10.9	1.5	13.7	2.1
Canada	0.4	2.5	0.7	−4.6	3.4	0.3	5.3	−0.5
EU-15	−42.9	16.7	−47.4	−45.9	−23.0	0.2	−25.4	−0.4
Japan	−7.6	4.5	−7.6	93.2	−16.7	0.1	−16.8	2.3
New Zealand	2.7	4.1	2.7	4.4	57.7	5.0	57.2	5.4

Rest of Western Europe	−3.6	6.5	−3.6	−8.4	−25.8	1.0	−25.8	−1.3
United States	−6.4	18.6	−6.0	−25.2	−5.7	0.2	−5.3	−0.2
Hong Kong, China and Singapore	0.0	0.6	0.0	3.4	3.7	0.4	2.2	2.1
Developing countries	42.7	79.5	44.4	145.6	5.4	1.0	5.6	1.9
North Africa	−0.1	3.9	−0.3	1.8	−0.4	1.8	−1.1	0.8
Sub-Saharan Africa	0.2	1.2	−0.6	−2.0	0.3	0.3	−0.8	−0.5
East Asia	6.8	17.7	12.6	102.8	2.6	0.6	4.7	3.5
South Asia	−8.2	6.7	−10.7	−2.1	−5.1	1.1	−6.7	−0.3
Latin America	40.0	42.2	40.7	34.6	36.3	2.8	37.0	2.3
Middle East	9.2	3.3	8.9	6.1	26.3	0.5	25.4	0.9
Eastern Europe and Central Asia	−5.2	4.4	−6.2	4.4	−4.4	0.3	−5.2	0.3
World total	−12.4	141.4	−14.2	174.2	−1.0	0.4	−1.2	0.5

Source: Authors' World Bank Linkage model simulations.

Comparison with previous results based on version 6 of the GTAP protection data

Results from global CGE models can differ for myriad reasons, even when the same model is used (van der Mensbrugghe 2006; Valenzuela, Anderson, and Hertel 2008). The full liberalization results studied in this section use the same model and prospective global reform experiment as in Anderson, Martin, and van der Mensbrugghe (2006a, 2006b), differing in just two important respects. One is that the present results refer to the world economy with its distortions as of 2004, whereas the earlier exercise took 2001 as its base, projected the world forward to 2005 to include some key policy reforms over those four years, and then projected another decade to 2015 (using the dynamic version of the Linkage model), by which time developing countries are a larger share of the modeled global economy. The other difference is the use in the present exercise of the new 2004 agricultural distortions database for developing countries. As can be seen in the first column of table 13.A.1 in the annex, the estimates of assistance via trade taxes for agricultural and lightly processed food are somewhat lower for the developing-country regions in the new 2004 data set based on price comparisons than is the case in the GTAP model based predominantly on import tariffs. In particular, some agricultural export taxes are included in the revised distortions to incentives, particularly in Argentina, where they average 21 percent for agricultural products. With these differences, modeling a move to global free trade would generate less import growth and more export growth in farm products for developing countries, but to differing degrees in different regions.

In these new results, developing countries' share of global agricultural and food output rises from 46 to 50 percent, and their share of exports from 54 to 64 percent (compared with rises from 54 to 56 percent and from 51 to 55 percent, respectively, in the Anderson, Martin, and van der Mensbrugghe [2006a] study). The overall value of agricultural output in developing countries rises 7 percent in these new results, compared with just 2 percent previously. A major part of that difference is due to the simulated removal of Argentina's export taxes, which causes Argentina's farm output to jump. Argentinean export taxes are also partly responsible for a smaller set of impacts of liberalization on international prices of farm products. For primary agricultural prices in aggregate, the impact reported in table 13.20, 0.9 percent, compares with an average of 5.5 percent in Anderson, Martin, and van der Mensbrugghe 2006a, table 13.15.

These differences affect the new economic welfare results for South Asia and Sub-Saharan Africa especially. Previously, both regions were estimated to have gained from global reform, whereas the new estimates suggest they may lose slightly (0.1 percent). South Asian farmers lose less in the current results than

previously, however, because the new distortion estimates involve a lower level of agricultural protection in India's baseline data.

As with all modeling, the results depend on the assumptions made in structuring the model. Of particular relevance here is that several assumptions create a downward bias on the estimates of gains from trade. They include constant (rather than increasing) returns to scale, no productivity effects of reform (for example, of the sort stressed by Melitz 2003), and no possibility for new markets to be created following reform. In addition, there is always the issue of product and regional aggregation: the less disaggregated the specification of the world economy, the smaller the estimated benefits from reform.

Conclusions

By way of summing up, several key findings from this study are worth emphasizing, beginning with those from the retrospective experiment of comparing what conditions in 2004 would have been had the agricultural price and trade policy reforms over the previous quarter century not taken place:

- without those policy reforms, global welfare in 2004 would have been lower by US$233 billion per year;
- even though it depressed their terms of trade, developing economies benefited proportionately more than high-income economies (1.0 percent, compared with 0.7 percent of national income) from those policy reforms;
- developing countries' share of the world's primary agricultural exports rose from 43 to 55 percent, and its farm output share from 58 to 62 percent, because of those reforms, with rises in nearly all agricultural industries except rice and sugar, where the growth in protectionism in high-income countries has been greatest;
- the share of global farm production exported (excluding intra-EU trade) in 2004 was slightly smaller as a result of those reforms since 1980–84, because of less farm export subsidies, so agriculture's 8 percent share in 2004 stands in stark contrast to the 31 percent share for other primary products and the 25 percent for all other goods—a "thinness" that is an important contributor to the volatility of international prices for weather-dependent farm products;
- the average real price in international markets would have been 13 percent lower for agricultural and food products had policies not changed over the past quarter century;
- for developing countries as a group, value added in agriculture is 4.9 percent higher than it would have been without those reforms, and more than 10 times the proportional gain of just 0.4 percent for nonagriculture.

The findings from the second experiment, aimed at understanding the effects of the trade restrictions remaining in place as of 2004, are equally stark:

- the global welfare cost of the policies remaining in 2004 is US$168 billion per year, which, when compared with the estimated gain of US$233 billion annually from the partial reform since the early 1980s, suggests that in a global welfare sense the world had moved three-fifths of the way toward global free trade in goods between the early 1980s and the mid-2000s;
- as a share of national income, developing countries would gain nearly twice as much as high-income countries by completing the reform process (an average increase of 0.9 percent, compared with 0.5 percent for high-income countries, but as high as 8 percent for banana-exporting Ecuador);
- of those prospective welfare gains from global liberalization, 60 percent would come from agriculture and food policy reform—a striking result given that the shares of agriculture and food in global GDP and global merchandise trade are less than 9 percent;
- the contribution of agricultural policy reform to the prospective welfare gain for developing countries is even greater, at 83 percent;
- if only high-income countries were to liberalize their agricultural markets—as some countries have suggested in the WTO's ongoing Doha Round—that would provide less than two-thirds of the potential gains to developing countries from global agricultural policy reform;
- with full goods trade liberalization, the share of global production of farm products that is exported would rise from 8 to 13 percent, excluding intra-EU trade, thereby "thickening" international food markets and reducing the instability of prices and quantities traded in those markets;
- unskilled workers in developing countries—the majority of whom work on farms—would benefit most from reform, followed by skilled workers and then capital owners; and
- net farm incomes in developing countries would rise by 5.6 percent, compared with 1.9 percent for nonagricultural value added, even more than the estimated gain from the partial reforms of the past quarter century.

Together, those last two findings suggest both inequality and poverty could be alleviated by such reform, given that three-quarters of the world's poor are farmers in developing countries (Chen and Ravallion 2007). To get a more precise sense of whether that is so, and to explore the extent to which it is own-country as distinct from rest-of world policies that are doing the harm, requires country case studies using national economy-wide models that are

enhanced with detailed earning and spending information of numerous types of urban and rural households. One set of such studies for a dozen or so countries across three continents is forthcoming in Anderson, Cockburn, and Martin (forthcoming).

As for farmers in high-income countries, removal of agricultural price-supporting policies would undoubtedly lead to painful reductions in income and wealth if farmers are not compensated, though compensation by the gainers in other sectors could readily afford to compensate them from the benefits of freeing trade. The distortion estimates in table 13.1 show that all high-income countries have lowered the price supports for their farmers since the 1980s. In some countries, that has been partly replaced by assistance that is somewhat decoupled from production (not shown in the table). If that trend continues at the pace of the past quarter century, and if there is no growth of agricultural protection in developing countries, then before the middle of this century most of the disarray in world food markets that so worried D. Gale Johnson through much of his academic life may be removed. However, if the WTO's Doha Development Agenda collapses, and governments thereby find it more difficult to ward off agricultural protection lobbies, there is the possibility of the recent progress being reversed in high-income and of emerging economies—even those as poor as India—following the same agricultural protection path this century as the one Anderson and Hayami (1986) show was taken by high-income countries in the last century.

Table 13.A.1. Protection Structure[a] in GTAP Version 7 Prerelease and in the Distortion Rates Drawn from the World Bank Project, 2004

(*percent*)

	GTAP database version 7 prerelease				Amended rates			
	Primary agriculture	Agriculture and lightly processed food		Other goods	Primary Agriculture	Agriculture and lightly processed food		Other goods
	Domestic support	Export subsidy	Tariff	Tariff	Domestic support	Export subsidy	Tariff	Tariff
Eastern Europe and Central Asia								
Russian Federation	1.7	−0.1	7.5	7.4	1.7	−0.9	18.9	7.4
Kazakhstan	−0.9	0.0	2.9	2.7	−0.9	0.0	3.4	2.7
Kyrgyzstan	−1.0	−0.1	3.1	5.0	−1.0	−0.1	3.8	5.0
Turkey	0.8	0.0	29.0	3.1	0.8	0.0	33.3	3.1
Rest of Eastern Europe and Central Asia	−1.1	0.0	9.8	5.7	−1.1	−0.9	9.9	5.7
Bulgaria	0.6	0.0	17.0	11.5	0.6	0.0	14.8	11.5
Czech Republic	0.6	10.2	3.1	0.5	0.6	0.0	3.0	0.5
Estonia	0.0	9.7	6.2	0.9	0.0	0.0	5.0	0.9
Hungary	3.1	9.7	6.6	0.5	3.1	0.0	6.2	0.5
Latvia	13.1	9.9	3.7	0.9	13.3	0.0	3.3	0.9
Lithuania	0.5	9.4	13.1	1.0	0.5	0.0	12.1	1.0
Poland	0.4	8.3	6.1	0.8	0.4	0.0	6.2	0.8
Romania	1.3	0.0	19.8	9.8	1.3	0.0	18.0	9.8
Slovak Republic	0.0	10.4	5.5	0.4	0.0	0.0	5.2	0.4
Slovenia	0.0	10.5	6.3	0.4	0.0	0.0	7.8	0.4

East and South Asia								
Korea, Rep. of	0.0	0.0	172.7	5.9	0.0	0.0	319.4	5.9
Taiwan, China	−0.4	0.0	77.4	3.9	−0.4	0.0	84.2	3.9
China	0.0	0.0	12.6	7.1	0.0	0.2	6.5	7.1
Indonesia	0.0	0.0	6.4	4.9	0.0	−1.6	7.3	4.9
Malaysia	0.0	0.0	2.4	5.9	0.0	−0.2	5.0	5.9
Philippines	−4.7	0.0	20.0	3.4	−4.7	0.0	7.1	3.4
Thailand	−0.2	0.0	22.1	12.9	−0.2	0.0	26.2	12.9
Vietnam	−3.6	0.0	15.5	18.5	−3.6	−0.5	21.5	18.5
Bangladesh	−1.0	0.0	16.3	22.5	−1.0	0.0	9.9	22.5
India	3.9	0.0	29.8	20.9	10.1	2.5	2.9	20.8
Pakistan	0.0	0.0	10.8	18.5	0.0	−0.2	19.4	18.5
Sri Lanka	0.6	0.2	24.3	5.8	0.6	−0.3	23.8	5.8
Rest of South Asia	−0.5	0.0	5.0	15.6	−0.5	0.0	6.9	15.6
Rest of East Asia	−0.7	0.0	2.8	2.3	−0.7	0.0	3.2	2.3
Middle East	−12.4	0.0	9.0	5.7	−12.4	0.0	7.5	5.7
North and Sub-Saharan Africa								
Egypt, Arab Rep. of	0.0	0.0	4.0	13.5	0.0	0.0	5.0	13.5
Morocco	0.0	−0.3	33.3	20.0	0.0	−0.4	28.4	20.0
Rest of North Africa	−3.9	0.5	24.9	13.1	−3.9	1.3	30.7	13.1
Madagascar	0.0	0.0	3.9	2.7	0.0	−4.4	3.4	2.7
Mozambique	0.2	0.0	12.5	10.9	0.2	0.0	14.5	10.9
Nigeria	0.1	0.0	74.0	17.2	0.1	0.0	76.1	17.2
Senegal	0.0	0.0	8.4	8.9	0.0	−1.1	6.2	8.9
South Africa	0.0	0.0	9.7	6.5	0.0	0.0	10.2	6.5
Tanzania	−0.3	0.0	11.6	13.7	−0.3	0.0	11.8	13.7
Uganda	0.0	0.0	9.5	5.5	0.0	−2.6	9.2	5.5
Zambia	−0.8	0.0	5.6	9.0	−0.8	0.0	7.0	9.0
Zimbabwe	−3.2	0.0	13.6	15.4	−3.2	0.0	8.9	15.4
Rest of Western and Central Africa	−0.2	0.0	10.5	8.9	−0.2	0.0	10.8	8.9
Rest of Africa	−0.4	0.0	10.4	14.1	−0.4	0.0	10.6	14.1

Table 13.A.1. Protection Structure[a] in GTAP Version 7 Prerelease and in the Distortion Rates Drawn from the World Bank Project, 2004 (*continued*)

(*percent*)

	GTAP database version 7 prerelease				Amended rates			
	Primary agriculture	Agriculture and lightly processed food		Other goods	Primary Agriculture	Agriculture and lightly processed food		Other goods
	Domestic support	Export subsidy	Tariff	Tariff	Domestic support	Export subsidy	Tariff	Tariff
Latin America and the Caribbean								
Argentina	−4.9	0.0	2.9	5.7	0.0	−14.8	0.0	5.8
Brazil	0.0	0.0	4.5	8.9	0.0	0.0	4.8	8.9
Chile	−1.7	0.0	1.3	1.8	0.0	0.0	2.4	1.8
Colombia	0.0	0.0	12.9	9.8	0.0	0.0	21.6	9.8
Ecuador	0.0	0.0	6.8	10.4	0.0	0.0	13.4	10.4
Mexico	1.3	0.0	8.6	3.4	1.2	0.0	6.2	3.4
Nicaragua	0.0	0.0	8.0	3.9	0.0	−2.8	9.6	3.9
Rest of Latin America and the Caribbean	−1.7	0.6	9.8	9.9	−1.7	0.3	9.9	9.9
High-income countries								
Australia	0.0	0.0	0.7	3.3	0.0	0.0	0.5	3.3
New Zealand	0.0	0.0	2.8	3.3	0.0	−0.2	0.7	3.3
EU-15	1.0	10.8	7.1	0.7	1.2	12.8	6.9	0.7
Rest of Western Europe	2.6	8.6	52.9	2.2	2.6	13.4	53.9	2.2
Canada	1.6	2.0	23.1	1.4	1.6	3.6	18.9	1.4
United States	4.0	0.5	2.5	1.3	5.2	0.6	6.1	1.3
Japan	2.0	0.0	141.1	1.7	2.0	0.0	151.7	1.7
Other high-income countries	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Source: Valenzuela and Anderson (2009), drawing on the authors' calculations from the GTAP version 7 prerelease and estimates drawn from Anderson and Valenzuela (2008).

a. Using value of production at undistorted prices as weights.

Notes

1. That distortions database is documented fully in Anderson and Valenzuela (2008) and is based on the methodology described in Anderson et al. (2008a, 2008b). Its implications for 1980–84 and 2004 for the countries and sectors in the GTAP model have been included in a recent research memorandum for users of the GTAP and other databases of the global economy (Valenzuela and Anderson 2008).

2. Krueger, Schiff, and Valdés (1988), like Jensen, Robinson, and Tarp (2002), focus on effects of just own-country policies, the first using partial equilibrium and the second using national general equilibrium models. On the relationship between those two methodologies, see Bautista, Robinson, Wobst, and Tarp (2001).

3. Some of the questions raised here were addressed (but using the version 6 of the GTAP protection database) by Anderson, Martin, and van der Mensbrugghe (2006a), who use the same Linkage model as in the present analysis, and by Anderson and Valenzuela (2007a) using the GTAP-AGR model.

4. This is reflected in the results emerging from attempts to include services distortions in trade reform modeling, which have led to widely differing results. Compare, for example, Brown, Deardorff, and Stern (2003); Francois, van Meijl, and van Tongeren (2005); and Hertel and Keeney (2006).

5. Version 7 is fully documented in Narayanan and Walmsley (2008), or go to http://www.gtap.org.

6. No new distortion estimates are available for countries in the Middle East, so in what follows little attention is given to this small and relatively affluent part of the global agricultural economy.

7. More information on the MAcMaps database is available in Bouët et al. (2008) and at http://www.cepii.fr/anglaisgraph/bdd/macmap.htm. For details of its incorporation into the GTAP version 7 dataset, see Narayanan and Walmsley (2008).

8. The bilateral tariff structure for 1980–84 is also preserved, so as to capture the changes only in average distortions for each product and not changes in the bilateral preferential contributions to those averages.

9. Using the GTAP version 6 database for 2001, Anderson, Martin, and Valenzuela (2006) find that agricultural production and export subsidies together contributed just 7 percent of the global welfare cost of agricultural protection.

10. The size of the Armington elasticities matters, see Zhang (2006, 2008) and Valenzuela, Anderson, and Hertel (2008). The Linkage model assumes larger values than some other models because it is seeking to estimate long-run consequences of liberalization. An example of the difference this can make to the results is detailed in table 12A.2 in Anderson and Martin (2006).

11. The more affluent economies of Hong Kong, China and Singapore are in the World Bank's high-income category, but since they have close to free trade policies and almost no farm production anyway, their influence on the results is not noticeable.

12. In addition, the model does not include any divergences between private and social marginal costs and benefits that might arise from externalities, market failures, and other behind-the-border policies not represented in the amended GTAP protection database. These omissions could affect the welfare estimates in either direction. Also missing are any costs of adjustment to reform, since Linkage is not a dynamic model.

13. The only other policy change is the removal of export taxes on nonfarm products in Argentina This is done because they were introduced at the same time (end-2001) and for the same reason (for the government to gain popular support from the urban poor) as were the country's export taxes on farm products.

References

Anderson, K., J. Cockburn, and W. Martin, eds. Forthcoming. *Agricultural Price Distortions, Inequality and Poverty.*

Anderson, K., and Y. Hayami, eds. 1986. *The Political Economy of Agricultural Protection: East Asia in International Perspective.* Boston, London, and Sydney: Allen and Unwin.

Anderson, K., M. Kurzweil, W. Martin, D. Sandri, and E. Valenzuela. 2008a. "Methodology for Measuring Distortions to Agricultural Incentives." Agricultural Distortions Working Paper 02, World Bank, Washington, DC (and appendix A of this volume).

_____. 2008b. "Measuring Distortions to Agricultural Incentives, Revisited." World *Trade Review* 7 (4): 1–30.

Anderson, K., and W. Martin, 2006. *Agricultural Trade Reform and the Doha Development Agenda.* London: Palgrave Macmillan and Washington, DC: World Bank.

Anderson, K., W. Martin, and D. van der Mensbrugghe. 2006a. "Distortions to World Trade: Impacts on Agricultural Markets and Incomes." *Review of Agricultural Economics* 28 (2): 168–94.

_____. 2006b. "Market and Welfare Implications of the Doha Reform Scenarios." In *Agricultural Trade Reform and the Doha Development Agenda,* ed. K. Anderson and W. Martin. London: Palgrave Macmillan and Washington, DC: World Bank.

Anderson, K., W. Martin, and E. Valenzuela. 2006. "The Relative Importance of Global Agricultural Subsidies and Market Access." *World Trade Review* 5 (3): 357–76.

Anderson, K., and E. Valenzuela. 2007a. "Do Global Trade Distortions Still Harm Developing Country Farmers?" *Review of World Economics* 143 (1): 108–39.

_____. 2007b. "The World Trade Organization's Doha Cotton Initiative: A Tale of Two Issues." *The World Economy* 30 (8): 1281–304.

_____. 2008. "Estimates of Global Distortions to Agricultural Incentives, 1955 to 2007." World Bank, Washington DC, available at http://www.worldbank.org/agdistortions.

Bautista, R. M., S. Robinson, P. Wobst, and F. Tarp. 2001. "Policy Bias and Agriculture: Partial and General Equilibrium Measures." *Review of Development Economics* 5: 89–104.

Bouët, A., Y. Decreux, L. Fontagné, S. Jean, and D. Laborde. 2008. "Assessing Applied Protection Across the World." *Review of International Economics* 16 (5): 850–63.

Brown, D. K., A. V. Deardorff, and R. M. Stern. 2003. "Multilateral, Regional and Bilateral Trade-Policy Options for the United States and Japan." *The World Economy* 26: 803–28.

Chen, S., and M. Ravallion. 2007. "Absolute Poverty Measures for the Developing World, 1981–2004." Policy Research Working Paper 4211, World Bank, Washington, DC.

Francois, J. F., H. van Meijl, and F. van Tongeren. 2005. "Trade Liberalization in the Doha Development Round." *Economic Policy* 20: 349–91.

Hertel, T., ed. 1997. *Global Trade Analysis: Modeling and Applications.* Cambridge and New York: Cambridge University Press.

Hertel, T. W., and R. Keeney. 2006. "What's at Stake: The Relative Importance of Import Barriers, Export Subsidies and Domestic Support." In *Agricultural Trade Reform and the Doha Development Agenda,* ed. K. Anderson and W. Martin. London: Palgrave Macmillan and Washington, DC: World Bank.

Jensen, H. T., S. Robinson, and F. Tarp. 2002. "General Equilibrium Measures of Agricultural Policy Bias in Fifteen Developing Countries." TMD Discussion Paper 105, International Food Policy Research Institute, Washington, DC.

Johnson, D. G. 1991. *World Agriculture in Disarray* (revised edition). London: St. Martin's Press.

Krueger, A. O., M. Schiff, and A. Valdés. 1988. "Agricultural Incentives in Developing Countries: Measuring the Effect of Sectoral and Economy-wide Policies." *World Bank Economic Review* 2 (3): 255–72.

Malcolm, G. 1998. "Adjusting Tax Rates in the GTAP Data Base." GTAP Technical Paper 12, Purdue University, West Lafayette, IN. https://www.gtap.agecon.purdue.edu/resources/download/580.pdf.

Melitz, M. 2003. "The Impact of Trade on Intra-industry Reallocations and Aggregate Industry Productivity." *Econometrica* 71 (6): 1692–725.

Narayanan, G., and T. L. Walmsley, eds. 2008. *Global Trade, Assistance, and Production: The GTAP 7 Data Base.* West Lafayette, IN: Center for Global Trade Analysis, Purdue University. http://www.gtap.org.

Valenzuela, E., and K. Anderson. 2008. "Alternative Agricultural Price Distortions for CGE Analysis of Developing Countries, 2004 and 1980–84." Research Memorandum 13, Center for Global Trade Analysis, Purdue University, West Lafayette, IN. https://www.gtap.agecon.purdue.edu/resources/res_display.asp?RecordID=2925.

Valenzuela, E., K. Anderson, and T. Hertel. 2008. "Impacts of Trade Reform: Sensitivity of Model Results to Key Assumptions." *International Economics and Economic Policy* 4 (4): 395–420.

Valenzuela, E., D. van der Mensbrugghe, and K. Anderson. 2008. "General Equilibrium Effects of Price Distortions on Global Markets, Farm Incomes and Welfare." Agricultural Distortions Working Paper 73, World Bank, Washington, DC.

van der Mensbrugghe, D. 2005. "Linkage Technical Reference Document: Version 6.0." Unpublished paper, World Bank, Washington, DC. http://www.worldbank.org/prospects/linkagemodel.

_____. 2006. "Estimating the Benefits: Why Numbers Change." In *Trade, Doha and Development: A Window into the Issues,* ed. R. Newfarmer, 59–75. Washington, DC: World Bank.

World Bank. 2002. *Global Economic Prospects and the Developing Countries, 2002: Making Trade Work for the Poor.* Washington, DC: World Bank.

_____. 2004. *Global Economic Prospects: Realizing the Development Promise of the Doha Agenda.* Washington, DC: World Bank.

_____. 2005. *Global Economic Prospects: Trade, Regionalism, and Development.* Washington, DC: World Bank.

_____. 2006. *Global Economic Prospects: Economic Implications of Remittances and Migration.* Washington, DC: World Bank.

Zhang, X. G. 2006. "Armington Elasticities and Terms of Trade Effects in Global CGE Models." Staff Working Paper, Productivity Commission, Melbourne.

_____. 2008. "The Armington General Equilibrium Model: Properties, Implications and Alternatives." Staff Working Paper, Productivity Commission, Melbourne.

APPENDIX A

METHODOLOGY FOR MEASURING DISTORTIONS TO AGRICULTURAL INCENTIVES

*Kym Anderson, Marianne Kurzweil, Will Martin, Damiano Sandri, and Ernesto Valenzuela**

This appendix outlines the methodological issues associated with the task of measuring the impact of government policies on incentives faced by farmers and food consumers. The focus is on border and domestic measures that are due exclusively to governments' actions, and as such can be altered by a political decision and have an immediate effect on consumer choices, producer resource allocation, and net farm incomes. Most commonly, these measures are in the form of import or export taxes, subsidies, and quantitative restrictions, supplemented by domestic taxes or subsidies for farm outputs or inputs and consumer subsidies for food staples. The incentives faced by farmers are affected not only by direct protection or taxation of primary agricultural industries but also indirectly via policies assisting nonagricultural industries, since the latter can have an offsetting effect by drawing resources away from farming.

*The authors are thankful for invaluable comments from many project participants, including Bruce Gardner, Tim Josling, Will Masters, Alan Matthews, Johan Swinnen, Alberto Valdés, and Alex Winter-Nelson, plus Ibrahim Elbadawi. The text following was first circulated as Anderson et al. (2008a), and much of the material was first published as part of Anderson et al. (2008b).

What Theory Suggests Should Be Measured

Three key purposes of the distortion estimates generated by this project are:

- To provide a long annual time series of indicators showing the extent to which price incentives faced by farmers and food consumers have been distorted directly and indirectly by own-government policies in all major developing, transition, and high-income countries, and hence for the world as a whole (taking international prices as given);
- Insofar as there are also forms of assistance provided to farmers that are decoupled from their production decisions, to show the contribution of this additional assistance as a transfer to farm households; and
- At least for the most recent period, to attribute the price distortion estimates for each farm product to specific border or domestic policy measures, so that they can serve as inputs into various types of partial and general equilibrium economic models for estimating the effects of those various policies on indicators such as national and international agricultural markets; farm value added; income inequality; poverty; and national, regional, and global welfare.

The first objective, of providing a long time series for a wide range of countries at different stages of development and hence with different complexities and qualities of data, requires that the indicators be simple. Simple indicators also make subsequent updates of the data easier. The third purpose, of making indicators useful for modelers seeking to distinguish market and household welfare effects, requires that distortion estimates also be provided for at least lightly processed foods.[1]

The Bhagwati (1971) and Corden (1997) concept of a market policy distortion as something that governments impose to create a gap between the marginal social return to a seller and the marginal social cost to a buyer in a transaction is followed in this project. Such a distortion creates an economic cost to society that can be estimated using welfare-measuring techniques such as those pioneered by Harberger (1971). As Harberger notes, this focus allows for great simplification in evaluating the marginal costs of a set of distortions: changes in economic costs can be evaluated taking into account the changes in volumes directly affected by such distortions, ignoring all other changes in prices. In the absence of divergences such as externalities, the measure of a distortion is the gap between the price paid and the price received, irrespective of whether the level of these prices is affected by the distortion.

Other developments that change incentives facing producers and consumers can include flow-on consequences of the distortion, though these should not be

confused with the direct price distortion that this project aims to estimate. If, for instance, a country is a major player in world trade for a given commodity, imposition of an export tax may raise the price in international markets, reducing the adverse impact of the distortion on producers in the taxing country. Another flow-on consequence is the effect of trade distortions on the real exchange rate, which is the price of traded goods relative to nontraded goods. Neither of these flow-on effects are of immediate concern, however, because if the direct distortions are accurately estimated, they can be incorporated as price wedges into an appropriate country or global economy-wide computable general equilibrium (CGE) model, which in turn will capture the full general equilibrium impacts (inclusive of real exchange rate effects) of the various direct distortions to producer and consumer prices.

Importantly, the total effect of distortions on the agricultural sector will depend not just on the size of the direct agricultural policy measures, but also on the magnitude of distortions generated by direct policy measures altering incentives in nonagricultural sectors. It is relative prices, and hence relative rates of government assistance, that affect producers' incentives. In a two-sector model, an import tax has the same effect on the export sector as an export tax (see the Lerner [1936] Symmetry Theorem). This carries over to a model that has many sectors, and is unaffected if there is imperfect competition domestically or internationally or if some of those sectors produce only nontradables (Vousden 1990). The Symmetry Theorem is therefore also relevant for considering distortions within the agricultural sector. In particular, if import-competing farm industries are protected, for example via import tariffs, this has similar effects on incentives to produce exportables as does an explicit tax on agricultural exports; if both measures are in place, this is a double imposition on farm exporters.

Direct agricultural distortions

Consider a small, open, perfectly competitive national economy with many firms producing a homogeneous farm product with just primary factors. In the absence of externalities, processing, producer-to-consumer wholesale and retail marketing margins, exchange rate distortions, and domestic and international trading costs, that country would maximize national economic welfare by allowing both the domestic farm product price and the consumer price of that product to equal E times P, where E is the domestic currency price of foreign exchange and P is the foreign currency price of this identical product in the international market. That is, any government-imposed diversion from that equality, in the absence of any market failures or externalities, would be welfare reducing for that small economy.

Price-distorting trade measures at the national border

The most common trade distortion is an ad valorem tax on competing imports (usually called a tariff), t_m. Such a tariff on imports is the equivalent of a production subsidy and a consumption tax at rate t_m. If that tariff on the imported primary agricultural product is the only distortion, its effect on producer incentives can be measured as the nominal rate of assistance (NRA) to farm output conferred by border price support (NRA_{BS}), which is the unit value of production at the distorted price less its value at the undistorted free market price expressed as a fraction of the undistorted price:[2]

$$NRA_{BS} = \frac{E \times P(1 + t_m) - E \times P}{E \times P} = t_m \tag{A.1}$$

The effect of that import tariff on consumer incentives in this simple economy is to generate a consumer tax equivalent (CTE) on the agricultural product for final consumers:

$$CTE = t_m \tag{A.2}$$

The effects of an import subsidy are identical to those in equations A.1 and A.2 for an import tax, but t_m in that case would have a negative value.

Governments sometimes also intervene with an export subsidy s_x (or an export tax, in which case s_x would be negative). If that were the only intervention,

$$NRA_{BS} = CTE = s_x, \tag{A.3}$$

If any of these trade taxes or subsidies were specific rather than ad valorem (for example, $y/kilogram rather than z percent), the ad valorem equivalent can be calculated using slight modifications of equations A.1, A.2, and A.3.

Domestic producer and consumer price-distorting measures

Governments sometimes intervene with a direct production subsidy for farmers, s_f (or production tax, in which case s_f is negative, including via informal taxes in kind by local and provincial governments). In that case, if this is the only distortion present, the effect on producer incentives can be measured as the NRA to farm output conferred by domestic price support (NRA_{DS}), which is the same as above except s_f replaces t_m or s_x, though the *CTE* in that case is zero. Similarly, if the government imposes only a consumption tax, c_c, on this product (or consumption subsidy, in which case c_c is negative), the *CTE* is as above except c_c replaces t_m or s_x, but the NRA_{DS} in that case is zero.

The combination of domestic measures and border price support provides the following total rate of assistance to output, NRA_o, and total *CTE*:

$$NRA_o = NRA_{BS} + NRA_{DS} \tag{A.4a}$$

$$CTE = NRA_{BS} + c_t \tag{A.4b}$$

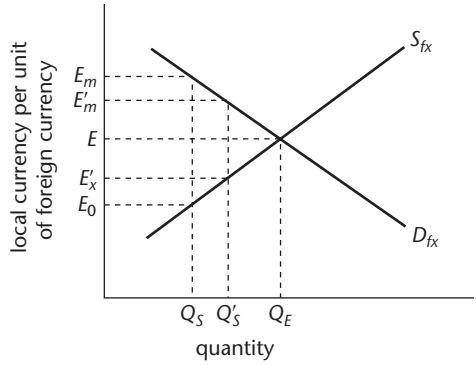
What if the exchange rate system also distorts prices?

When a multitier foreign exchange rate regime is in place, another policy-induced price wedge exists. A simple two-tier exchange rate system creates a gap between the price received by all exporters and the price paid by all importers for foreign currency, changing both the exchange rate received by exporters and that paid by importers from the equilibrium rate E that would prevail without this distortion in the domestic market for foreign currency (Bhagwati 1978).

Exchange rate overvaluation of the type considered here requires controls by the government on current account transfers. A common requirement is that exporters surrender their foreign currency earnings to the central bank for exchange to local currency at a low official rate. This is equivalent to a tax on exports to the extent that the official rate is below what the exchange rate would be in a market without government intervention. That implicit tax on exporters reduces the incentive to export, and hence reduces the supply of foreign currency flowing into the country. With less foreign currency, demanders are willing to bid up the purchase price. That provides a potential rent for the government, which can be realized by auctioning off the limited supply of foreign currency extracted from exporters or creating a legal secondary market. Either mechanism will create a gap between the official and parallel rates.

Such a dual exchange rate system is depicted in figure A.1, in which is it assumed that the overall domestic price level is fixed, perhaps by holding the money supply constant (Dervis, de Melo, and Robinson 1981). The supply of foreign exchange is given by the upward sloping schedule, S_{fx}, and demand by D_{fx}, where the official exchange rate facing exporters is E_0 and the secondary market rate facing importers is E_m. At the low rate, E_0, only Q_s units of foreign currency

Figure A.1. A Distorted Domestic Market for Foreign Currency



Source: Martin (1993). See also Dervis, de Melo, and Robinson (1981); Kiguel and O'Connell (1995, 1997); and Shatz and Tarr (2000).

are available domestically, instead of the equilibrium volume Q_E that would result if exporters were able to exchange at the "equilibrium rate" E units of local currency per unit of foreign currency.[3] The gap between the official and the secondary market exchange rates is an indication of the magnitude of the tax imposed on trade by the two-tier exchange rate: relative to the equilibrium rate E, the price of importables is raised by $e_m \times E$, which is equal to $(E_m - E)$, while the price of exportables is reduced by $e_x \times E$, which is equal to $(E - E_0)$, where e_m and e_x are the fractions by which the two-tier exchange rate system raises the domestic price of the importable and lowers the domestic price of the exportable, respectively. The estimated division of the total foreign exchange distortion between an implicit export tax, e_x, and an implicit import tax, e_m, will depend on the estimated elasticities of supply of exports and of demand for imports.[4] If the demand and supply curves in figure A.1 had the same slope, $e_m = e_x$ and $(e_m + e_x)$ is the secondary market premium or proportional rent extracted by the government or its agents.[5]

When a government chooses to allocate limited foreign currency to different groups of importers at different rates, it is pursuing a multiple exchange rate system. Some lucky importers may even be able to purchase foreign currency at the low official rate. The more currency that is allocated and sold to demanders whose marginal valuation is below E_m, the greater the unsatisfied excess demand at E_m and hence the stronger the incentive for an illegal (or "black") market to form, and for more scrupulous exporters to lobby the government to legalize the secondary market for foreign exchange and to allow exporters to retain some fraction of their exchange rate earnings for sale in the secondary market. Providing such a right to exporters to retain and sell a portion of foreign exchange receipts increases their incentives to export, thereby reducing the shortage of foreign exchange and hence the secondary market exchange rate (Tarr 1990). In terms of figure A.1, the available supply increases from Q_s to Q'_s, bringing down the secondary rate from E_m to E'_m such that the weighted average of the official rate and E'_m received by exporters is E'_x (the weights being the retention rate r and $(1 - r)$). Again, if the demand and supply curves in figure A.1 had the same slope, then the implicit export and import taxes resulting from this regime would be each equal to half the secondary market premium.

In the absence of a secondary market and with multiple rates for importers below E_m and for exporters below E_0, a black market often emerges. The more the government sells its foreign currency to demanders whose marginal valuation is below E_m and the more active is the government in catching and punishing exporters selling in that illegal market, the more the rate for buyers will be above E. If the black market is allowed to operate "frictionlessly," there would be no foreign currency sales to the government at the official rate and the black market rate

would fall to the equilibrium rate E. So even though in the latter case the observed premium would be positive (equal to the proportion by which E is above the nominal official rate E_0), there would be no distortion. For present purposes, since the black market is not likely to be completely frictionless, it can be thought of as similar to the system involving a retention scheme. In terms of figure A.1, E'_m would be the black market rate for a proportion of sales and the weighted average of that and E_0 would be the exporters' return. Calculating E'_x in this case (and hence being able to estimate the implicit export and import taxes associated with this regime) by using the same approach as in the case with no illegal market thus requires knowing not only E_0 and the black market premium but also guessing the proportion, r, of sales in that black market.

In short, where a country has distortions in its domestic market for foreign currency, the exchange rate relevant for calculating the NRA_o or CTE for a particular tradable product depends, in the case of a dual exchange rate system, on whether the product is an importable or an exportable, while in the case of multiple exchange rates it depends on the specific rate that applies to that product each year.

What about real exchange rate changes?

A change in the real exchange rate alters equally the prices of exportables and importables relative to the prices of nontradable goods and services. Such a change can arise for many reasons, including changes in the availability of capital inflows, macroeconomic policy adjustments, or changes in the international terms of trade. When the economy receives a windfall—such as a greater inflow of foreign exchange from remittances or foreign aid or a commodity boom—the community moves to a higher indifference curve (Collier and Gunning 1998). While net imports of tradables can change in response to this inflow of foreign exchange, the domestic supply of and demand for nontradables must balance. The equilibrating mechanism is the price of nontradables. The price of nontradables rises to bring forth the needed increase in the supply of nontradables, and to reduce the demand for these products to bring it into line with supply (Salter 1959).

While this type of change in the real exchange rate affects the incentive to produce tradables, it is quite different from distortions in the market for foreign currency analyzed above, in two respects. First, this real exchange rate appreciation reduces the incentive to produce importables and exportables to the same degree. In contrast with the multiple-tier exchange rate case, that appreciation does not generate any change in the prices of exportables relative to importables. Second, most such changes do not involve direct economic distortions of the type measurable using tools such as producer or consumer surplus. If the government, or the private sector, chooses to borrow more from abroad to increase domestic spending, this may raise the real exchange rate, but such an outcome is not obviously a

distortion. Moreover, symmetric treatment of any such "overvaluation" during periods of high foreign borrowing would require taking into account exchange rate "undervaluation" during periods of low foreign borrowing or repayment of foreign debt. For these reasons, the Krueger, Schiff, and Valdés (1988) and Orden et al. (2007) methodology of including deviations of real exchange rates from benchmark values is not followed in this project, unless these deviations arise from direct exchange rate distortions such as multiple-tier exchange rates.[6]

What if trade costs are sufficiently high for the product to be not traded internationally?

Suppose the transport costs of trading are sufficient to make it unprofitable for a product to be traded internationally, such that the domestic price fluctuates over time within the band created by the cost, insurance, and freight (cif) import price and the free on board (fob) export price. Any trade policy measure (t_m or s_x) or the product-specific exchange rate distortion (for example, e_m or e_x) then becomes redundant. In that case, in the absence of other distortions, $NRA_o = 0$ and $CTE = 0$. However, in the presence of any domestic producer or consumer tax or subsidy (s_f or t_c), the domestic prices faced by both producers and consumers will be affected. The extent of the impact depends on the price elasticities of domestic demand and supply for the nontradable (the standard closed-economy tax incidence issue).

To give a specific example, suppose just a production tax is imposed on farmers producing a particular nontradable, so $s_f < 0$ and $t_c = 0$. In that case:

$$NRA_{DS} = \frac{s_f}{1 + \frac{\varepsilon}{\eta}} \tag{A.5}$$

and

$$CTE = \frac{-s_f}{1 + \frac{\eta}{\varepsilon}}, \tag{A.6}$$

where ε is the price elasticity of supply and η is the (negative of the) price elasticity of demand.[7]

What if farm production involves not just primary factors but also intermediate inputs?

Where intermediate inputs are used in farm production, any taxes or subsidies on their production, consumption, or trade will alter farm value added and thereby also affect farmer incentives. Sometimes a government will have directly offsetting measures in place, such as a domestic subsidy for fertilizer use by farmers, while simultaneously maintaining a tariff on fertilizer imports. In other situations, there

will be farm input subsidies but an export tax on the final product.[8] In principle, all these distortions could be brought together to calculate an effective rate of direct assistance (ERA) to farm value added. The nominal rate of direct assistance to farm output, NRA_o, is a component of that the ERA, as is the sum of the nominal rates of direct assistance to all farm inputs, or NRA_i. In principle, all three rates can be positive or negative.

ERAs were not estimated in this project because to do so requires knowing each product's value added share of output. Such data are not available for most developing countries even every few years, let alone for every year in the time series. In most developing countries, distortions to farm inputs are also very small compared to distortions to farm output prices, and purchased inputs are a small fraction of the value of output. But where there are significant distortions to input costs, the ad valorem equivalent of various distortions is accounted for by summing each input's NRA times its input-output coefficient to obtain the combined NRA_i, and then adding that to the farm industry's nominal rate of direct assistance to farm output, NRA_o, to get the total NRA to farm production, called simply NRA:[9]

$$NRA = NRA_o + NRA_i. \tag{A.7}$$

What about post-farmgate costs?

If a state trading corporation charges excessively for its marketing services, thereby lowering the farmgate price of a product (for example, as a way of raising government revenue in place of an explicit tax), the extent of that excess should be treated as if it is a tax.

Some farm products, including some that are not internationally traded, are inputs into a processing industry that may also be subject to government interventions. In that case, the effect of those interventions on the price received by farmers for the primary product also needs to be taken into account. Before explaining how, it is helpful to first to review the role that the value chain's marketing and distribution margins can play in the calculation of distortions to primary agricultural activities, so as to ensure nondistortionary price wedges are not inadvertently included in any distortion calculation.

Nondistortionary price wedges

Thus far, it has been assumed there are no divergences between farmer, processor and wholesaler, consumer, and border prices other than because of subsidies or taxes on production, consumption, trade, or foreign currency. In practice, of course, this is not the case, and these costly value chain activities need to be explicitly recognized and netted out when using comparisons of domestic and border

prices to derive estimates of government policy induced distortions.[10] Such recognition also offers the opportunity to compare the size of the NRA with wedges associated with things such as trade and processing costs (used in trade facilitation and value chain analyses, respectively). It may also expose short-term situations where profits of importers or exporters are amplified by less-than-complete adjustment by agents in the domestic value chain.

Domestic trading costs

Trading costs can be nontrivial both intranationally and internationally, especially in developing countries with poorly developed infrastructure.[11] For example, domestic trading costs are involved in getting farm products to a port or to a domestic wholesaler (assuming the latter are at the international border—otherwise another set of domestic transport costs needs to be added to obtain a relevant price comparison). Suppose domestic transport costs are equal to the fraction T_f of the price received by the farmer.

Processor and wholesaler costs

Domestic processing costs and wholesale and retail distribution margins can represent a large share of the final retail price. Indeed, Reardon and Timmer (2009) argue that they are becoming an increasingly important part of the value chain in developing countries as consumers desire that ever more postfarm processing and services be added to their farm products, aided by the supermarket revolution's contribution to globalization.[12] Here, the increases in the consumer price due to the processing and wholesaling activities are denoted as m_p and m_u, respectively, above the farmgate price plus domestic trade cost (or just m_u above the price of the imported processed product, if the processing must be done prior to the product being internationally tradable) in the absence of market imperfections or government distortions along the value chain.

International trading costs

International trading costs are not an issue in distortion calculations if the international price used is the cif import unit value for an importable or the fob export unit value for an exportable. But they are relevant if there is no trade (because of, say, a prohibitive trade tax on the product) or if border prices are unrepresentative of actual prices (because of low trade volumes, for example). In those instances, it is recommended that an international indicator price series (such as from the World Bank or International Monetary Fund) be used to account for international trading costs (ocean or air freight, insurance, etc.).[13] T_m denotes the proportion by which the domestic price of the import-competing product is raised above what it otherwise would be at the country's border, or equivalently that the price abroad of the exported product is greater by a fraction T_x of the fob price.

Product quality and variety differences

The quality of a product traded internationally is usually considered to be different from that of the domestically sold substitute, with consumers typically having a home-country bias.[14] When appropriate, the domestic price should be deflated (inflated) by the extent to which the good imported is deemed by domestic consumers to be inferior (superior) in quality to the domestic product.[15] Thus, q_m is denoted as the deflating fraction to adjust for product quality and variety differences in the case of importables. Similarly, for exported goods, and especially if an international indicator price is used in lieu of the fob export unit value (for example, when exports are close to zero and unrepresentative), the international price must be deflated (inflated) by the extent to which the good is deemed by foreign consumers to be inferior (superior) in quality relative to the indicator good. Here, q_x denotes the deflating fraction to adjust for product quality and variety differences in the case of exportables.

Net effect of nondistortionary influences

With all these influences, and so long as the product is still traded internationally, the relationship between the domestic farmers' price and the international price in the absence of government-imposed price and trade policies becomes the following for an importable:

$$E \times P = \frac{P_f(1 + T_f)(1 + m_p)(1 - q_m)}{1 + T_m}. \tag{A.8}$$

For an exportable, it becomes:

$$E \times P = \frac{P_f(1 + T_f)(1 + m_p)(1 + T_x)}{1 + q_x}. \tag{A.9}$$

In both of these cases, the urban consumer price is above the producer price to the following extent:

$$P_c = P_f(1 + T_f)(1 + m_p)(1 + m_u), \tag{A.10}$$

where P_f is the farmgate price.

Impact of distortions to food processing on agricultural NRAs

Some farm products that are not internationally traded in their primary form (for example, raw milk and cane sugar) are tradable once lightly processed, and the downstream processing industry may also be subject to government interventions. In that case, the effect of the latter interventions on the price received by farmers for the primary product also needs to be taken into account, and that primary product should be classified as tradable.

In the past, some analysts assumed any protection to processors is fully passed back to primary agriculture (as may be the case with a farmer-owned cooperative processing plant, for example). Such a situation effectively raises the farmers' price by the rise in the processors' price divided by the proportional contribution of the primary product to the value of the processed product. Another equally extreme but opposite assumption is zero pass-through by the processor back down the value chain to the farmer. That is likely to be the case if the raw material can be sourced internationally, but seems unlikely if the primary product is nontradable and there is a positive price elasticity of farm supply (since an assisted processor would want to expand). A more neutral assumption is proportional pass-through by the processor either down the value chain to farmers and their transporters or up the value chain to consumers. This last assumption is equivalent to an equal sharing of the benefits along the value chain, which is more likely to be the case the more equally market power is spread among the players in the chain.

This trio of examples illustrates the importance both of separating the primary and processed activities for the purpose of calculating agricultural assistance rates, and of being explicit about the extent of pass-through that is occurring in practice, and hence its consequences for the *NRAs* in both primary agricultural and processing activities.[16]

The above examples involving processors also can be generalized to any participants in the value chain. In particular, state trading enterprises and parastatal marketing boards may well intervene significantly, especially if they have been granted monopoly status by the government. Such domestic institutions may explain the econometrically estimated low degree of transmission of price changes at a border to farmgate domestic prices—even after significant reform of more-explicit price and trade policies (see Baffes and Gardner 2003, Warr 2008, and the references cited therein). Where reform also involves freeing up previously controlled parts of the marketing chain, the reduced marketing margin can provide a benchmark against which to compare the prereform margin (as in Uganda from the mid-1990s, see Matthews, Claquin, and Opolot 2009).

The mean and standard deviation of agricultural NRAs

Only when a weighted average NRA for covered products for each country is generated can the NRA for noncovered products be summed to obtain the NRA for all agriculture. When it comes to averaging across countries, here, each polity is an observation of interest, so a simple average is meaningful for the purpose of political economy analysis. But if one wants a sense of how distorted agriculture is in a whole region, a weighted average is needed. The weighted average *NRA* for covered primary agriculture can be generated by multiplying each primary industry's

value share of production (valued at the farmgate equivalent undistorted prices) by its corresponding *NRA* and adding across industries.[17] The overall sectoral rate, denoted as *NRAag*, can be obtained by adding the actual or assumed information for the noncovered commodities and, where it exists, the aggregate value of non-product-specific (NPS) assistance to agriculture.

A weighted average can be similarly generated for the tradables part of agriculture—including for industries producing products such as milk and sugar that require only light processing before they can be traded—by assuming all NPS assistance goes to tradables. That is denoted as $NRAag^t$.

In addition to the mean, it is important to provide a measure of the dispersion or variability of the NRA estimates across the covered products. The cost of government policy distortions to incentives in terms of resource misallocation tend to be greater the greater the degree of substitution in production (Lloyd 1974). In the case of agriculture, which involves the use of farmland that is sector-specific but transferable among farm activities, greater variation of NRAs across industries within the sector will result in higher welfare cost of those market interventions. A simple indicator of dispersion is the standard deviation of industry NRAs within agriculture.[18]

Trade bias in agricultural assistance

A trade bias index (TBI) also is needed, to indicate the changing extent to which a country's policy regime has an antitrade bias within the agricultural sector. This is important because, as mentioned above, the Lerner (1936) Symmetry Theorem demonstrates that a tariff assisting import-competing farm industries has the same effect on farmers' incentives as if there were a tax on agricultural exports; if both measures are in place, this is a double imposition on farm exports. The higher the NRA to import-competing agricultural production ($NRAag_m$) relative to that for exportable farm activities ($NRAag_x$), the more incentive producers in that subsector will have to bid for mobile resources that would otherwise have been employed in export agriculture, other things equal.

Once each farm industry is classified as import-competing, or a producer of exportables, or as producer of nontradables (though the status sometimes changes over the years—see the next section), it is possible to generate for each year the weighted average NRAs for each of the two groups of tradable farm industries. The weighted NRAs can then be used to generate an agricultural TBI, defined as:

$$TBI = \left[\frac{1 + NRAag_x}{1 + NRAag_m} - 1\right], \tag{A.11}$$

where $NRAag_m$ and $NRAag_x$ are the average NRAs for the import-competing and exportable parts of the agricultural sector (their weighted average being $NRAag^t$).

This index has a value of zero when the import-competing and export subsectors are equally assisted, and its lower bound approaches −1 in the most extreme case of an antitrade policy bias.

Indirect agricultural assistance and taxation via nonagricultural distortions

In addition to direct assistance to or taxation of farmers, the Lerner (1936) Symmetry Theorem further demonstrates that incentives are also affected indirectly by government assistance to nonagricultural production in an economy. The higher the NRA to nonagricultural production (*NRAnonag*), the more incentive producers in other sectors have to bid up the value of mobile resources that would otherwise have been employed in agriculture, other things equal. If *NRAag* is below *NRAnonag*, one might expect there to be fewer resources in agriculture than under free-market conditions in the country, notwithstanding any positive direct assistance to farmers, and, conversely, if *NRAag* > *NRAnonag*. A weighted average can be generated for the tradables part of nonagriculture too, called $NRAnonag^t$.

One of the most important negative effects on farmers is protection from import competition for industrialists. Tariffs are part of that, but so too—especially in past decades—are nontariff barriers to imports. Other primary sectors (fishing, forestry and minerals, and energy raw material extraction) on average tend to be subject to less direct distortions than either agriculture or manufacturing, but there are important exceptions. One example is a ban on logging, but if such a ban is for genuine natural resource conservation reasons it should be ignored. Another example is a resource rent tax on minerals. Unlike an export tax or quantitative restriction on exports of such raw materials (which are clearly distortive and would need to be included in the NRA for mining), a resource rent tax, like a land tax, can be fairly benign in terms of resource reallocation (see Garnaut and Clunies-Ross 1983) and so can be ignored.

The largest part of most economies is the services sector. It produces mostly nontradables, many of them by the public sector. Distortions in services markets have proven to be extraordinarily difficult to measure, and no systematic estimates across countries are available even for a recent period, let alone over time. The only feasible way forward in generating time series estimates of *NRAnonag* for this project is to assume all services are nontradable and that they, along with other nonagricultural nontradables, face no distortions. All the other nonagricultural products can be separated into exportables and import-competing products for estimating correctly their weighted average *NRAs*, ideally using production valued at border prices as weights (although in practice most country study authors had to use gross domestic product [GDP] shares).

As already mentioned in the previous section on agriculture, foreign exchange rate misalignment relative to what fundamentals suggest is the value of a country's currency are ignored. This is because a real appreciation of the general foreign exchange rate uniformly lowers the price of all tradables relative to the price of nontradables, and conversely for a real devaluation. If a change in the exchange rate is caused by aid or foreign investment inflows, the excess of tradables consumption over tradables production leads to a new equilibrium. Certainly, such a new inflow of funds would reduce incentives for farmers producing tradable products, but this is not a welfare-reducing policy distortion. Thus, it is only the exchange rate distortions due to a dual or multiple exchange rate system that need to be included in the calculation of the NRAs for the exportable and import-competing parts of the nonagricultural sector, and hence of $NRAnonag^t$, in the same way as discussed above for their inclusion in the calculation of $NRAag^t$.

Assistance to agricultural relative to nonagricultural production

Given the calculation of $NRAag^t$ and $NRAnonag^t$ as above, it is then possible to calculate a relative rate of assistance, or *RRA*, defined as:

$$RRA = \left[\frac{1 + NRAag^t}{1 + NRAnonag^t} - 1\right] \tag{A.12}$$

Since an NRA cannot be less than -1 if producers are to earn anything, neither can the *RRA*. This measure is a useful indicator for providing international comparisons over time of the extent to which a country's policy regime has an antiagricultural or proagricultural bias.

How Theory Is Put into Practice in This Study

Making the above theory operational in the real world, where data are often scarce, especially over a long time period, is as much an art as a science.[19] Thankfully, the project did not have to start from scratch in many countries. NRAs are available from as early as 1955 in some cases, and at least from the mid-1960s or early or mid-1980s for the 18 countries included in the Krueger, Schiff, and Valdés (1988, 1991) and Anderson and Hayami (1986) studies. Much has been done to provide detailed estimates since 1986 of direct distortions to farmer (though not food processing) incentives in the high-income countries that are now members of the OECD, and (since the early or mid-1990s) in select European transition economies and Brazil, China, and South Africa (OECD 2007). In addition, at least for direct distortions, the Krueger, Schiff, and Valdés measures have been updated

to the mid-1990s for some Latin American countries (Valdés 1996) and also provided for some European transition countries (Valdés 2000); a new set of estimates of simplified PSEs for a few key farm products for China, India, Indonesia, and Vietnam since 1985 is also now available from International Food Policy Research Institute (IFPRI; see Orden et al. 2007). Each of these studies uses variations on the above methodology, but the basic price data at least, as well as the narratives attached to those estimates, are invaluable springboards for the present study.[20]

Time period coverage

For European transition economies, it is difficult to obtain meaningful data prior to 1992. Estimates are not very meaningful before the 1980s for China and Vietnam for the same reason. For all other countries, the target start date is 1955, especially if that includes some preindependence years, as they show what a difference independence made, although for numerous developing countries the data simply are not available. The target finish date is 2004, though 2005 data are included where available. In most cases, the most recent few years offer the highest quality data.

Farm product coverage

Agricultural commodity coverage includes all major food items (rice, wheat, maize or other grains, soybeans or other temperate oilseeds, palm or other tropical oils, sugar, beef, sheep or goat meat, pork, chicken and eggs, and milk) plus other key country-specific farm products (for example, other staples, tea, coffee or other tree crop products, tobacco, cotton, wine, and wool). Globally, as of 2001 (according to the Global Trade Analysis Project (GTAP) database, see Dimaranan 2006), one-third of the value added in all agriculture and food industries is highly processed food, beverages, and tobacco, which is handled in the same cursory way as for nonagricultural products. Fruit and vegetables are another one-sixth, while the remainder of products constitute the other half. Of that other half, meats are one-third, grains and oilseeds are almost another one-third, dairy products are one-sixth, and sugar, cotton, and other crops account for just over one-fifth. When high-income countries are excluded, those shares change quite a bit: highly processed food, beverages and tobacco are only half as important, fruits and vegetables are somewhat more important and, when those two groups (which together account for 41 percent of the total) are excluded, the residual is equally divided between three groups: meats, grains and oilseeds, and other crops and dairy products. By focusing on all major grain, oilseed, and livestock products plus any key horticultural and other crop products, the coverage reaches the target

of 70 percent of most countries' value added in agriculture and lightly processed foods. Priority is given to the most-distorted industries because the residual will have not only a low weight but also a low degree of distortion.

In terms of household food expenditure, if highly processed food, beverages, and tobacco are excluded, fruits and vegetables account for almost one-quarter of spending in developing countries. When fruits and vegetables are also excluded, three groups each account for almost 30 percent of expenditure: pig and poultry products, red meat and dairy products, and grains and oilseed products. All other crops account for the remaining one-eighth. So from the consumer tax viewpoint, the desired product coverage is the same as suggested above from a production viewpoint.

Each product is explicitly identified as import-competing, exporting, or nontradable. For many products, that categorization changes over time, in some cases moving monotonically through those three categories and, in others, fluctuating in and out of nontradability. Hence, an indication of a product's net trade status is given for each year rather than just one categorization for the whole time series. For large-area countries with high internal and coastal shipping costs, some regions within the country may be exporting abroad even while other regions are net importers from other countries. In such cases, it is necessary to estimate separate NRAs for each region and then generate a national weighted average.

Farm input coverage

The range of input subsidies considered in any particular country study will depend on the degree of distortions in that country's input markets. In addition to fertilizer, other large input subsidies are likely to be electric or diesel power, pesticides, and credit (including occasional large-scale debt forgiveness, as in Brazil and Russia, although determining how that is spread beyond the year of forgiveness is problematic).[21] There are also distortions to water, but the task of measuring water subsidies is especially controversial and complex, so they are not included in the NRA calculations presented here (just as the OECD ignores them in its PSE calculations).[22] Similarly, distortions to land and labor markets are excluded, apart from qualitative discussion in the analytical narrative of some country case studies.

Trade costs

For the international trading costs t_m and T_x, the fob-cif gap in key bilateral trading in the product in years when the product was traded in significant quantities is used. Both international and domestic trading costs are a function of both the

quality of hard infrastructure (roads, railways, and ports) and soft infrastructure (business regulations and customs clearance procedures at state and national borders), each of which can be affected by government actions. But since it is difficult to allocate those costs between items that are avoidable and those that are unavoidable, measuring the aggregate size of the distortions involved in a comparable way for a range of countries is beyond the scope of this study.[23]

Classifying farm products as import-competing, exportable, or nontradable

The criteria used in classifying farm products—import-competing (M), exportable (X), or nontradable (H)—are not straightforward. Apart from the complications raised above about whether a product is nontraded simply because of trade taxes or nontariff barriers, there will be cases where trade is minimal, or where the trade status is reversed because of the policy distortions, or the industry is characterized by significant imports *and* exports. A judgment must be made for each sector, for each year, as to whether the product should be classified as M, X, or H. In the case of the two tradable classifications, the choice of classification will determine which exchange rate distortion to use. If trade is minimal for trade cost rather than trade policy reasons, then it is classified as nontradable if the share of production exported *and* the share of consumption imported are each less than 2.5 percent—except in cases (for example, rice for China) where it is clearly an exportable year after year even though the self-sufficiency rate is rarely above 101 percent. Otherwise, where the share of production exported is substantially above (below) the share of consumption imported, the sector is classified as exportable (importable).

In cases where the trade status has been reversed because of the policy distortion (for example, an export subsidy, in combination with a prohibitive import tariff, is sufficiently large as to encourage production enough to generate an export surplus), that product should be given the classification of the trade status that would prevail without the intervention (that is, import-competing). The same methodology applies where tariff preferences reverse a country's trade status for a product. Many countries enjoy preferential access for their exports into protected markets of other countries. In some cases, these are bilateral or plurilateral free-trade agreements or customs unions. In other cases, they are unilaterally offered by high-income countries to developing countries under schemes such as the Generalized System of Preferences, the Cotonou Agreement (the now-expired agreement between European Union [EU] member countries and their former colonies), and the EU's Everything but Arms Agreement with least developed countries. In the few extreme cases where these preferences are such that they (in

combination with a prohibitive import tariff) cause the developing country to become an exporter of a product that would otherwise be import-competing (for example, sugar in the Philippines), the product is nonetheless classified as import-competing, since it is this developing country's import-restrictive policy that allows the domestic price of the product to equal what is earned in exporting the product to the preference-providing country.

In the case in which there are significant exports *and* imports of a product in a given year, closer scrutiny is required. If, for example, there are high credit or storage costs domestically, a product may be exported immediately following harvest but imported later in the year to satisfy consumers out of season. The product would be considered an exportable for the purposes of calculating the NRA, because even if there are policies restricting out-of-season imports (which would affect the CTE calculation), they would not increase that year's earlier production in the presence of high credit or storage costs.

If trade and exchange rate distortions are sufficiently large to choke off international trade in a product, then they contribute to the NRA and CTE only to the extent needed to drive trade in that product to zero: any trade taxes larger than that have an element of redundancy. Where there are trade policy distortions with no trade passing over them (that is, they are prohibitive), there may still be policy effects that need to be measured, though they will differ from those implied above. One example is where a prohibitive tariff that is high enough to force the price of imported goods above the autarky price results in no imports. In that case, the NRA would be less than that prohibitive tariff rate. Another common example is where there is an import tariff but the world price is high enough that the country is freely exporting this product. In that case, the domestic price would be determined by the world price less export trade costs and the import tariff would be irrelevant: there would be no distortion despite the presence of the import tariff measure.

Similar conditions apply to exportable goods, where a prohibitive export tax may create a distortion equal to less than the tax rate. In this case, the distortion wedge would be equal to the difference between the autarky price and the world price less export trade costs. Or, if the country were freely importing the good, the export tax would be irrelevant and there would be no distortion despite the presence of the export tax measure. The choice of international price to be compared with domestic prices therefore is not based solely on the actual trading status of the country (Byerlee and Morris 1993). Moreover, different prices may be needed for different regions of a large country that simultaneously export and import because internal (including coastal shipping) trading costs are so high relative to international trading costs (Koester 1986). In that case, the value of production is split according to those regions' production shares. If the only intervention in this

sector is a tariff on imports, the tariff rate is the NRA estimate for the import-competing part and zero is the NRA for the other part of the sector. Those different NRAs would be included in the weighted average calculations of the NRAs for the import-competing, exportable, and all tradables subsectors of agriculture used in the calculation of the TBI and RRA.

Transmission of assistance and taxation along the agricultural value chain

A crucial aspect of the *NRA* calculation for agricultural products is how any policy measure beyond the farmgate is transmitted back to farmers and forward to consumers. Only a few parameters and exogenous variables are needed to obtain meaningful estimates of an individual agricultural product's NRA and CTE.

Specifically, to take account of pass-through of distortions along the value chain, the following parameters are identified (although the default is equi-proportionate pass-through):

- θ_f, the extent to which any distortion to a primary farm product at the wholesale level is passed back to farmers; and
- θ, the extent to which any distortion to the downstream processed product is passed back to wholesalers of a primary farm product that is nontradable.

CTE of the farm product

Many farm products are processed and often used as an ingredient in further manufacturing of a food product before purchase by the final consumer (for example, wheat is ground to flour and then mixed with other ingredients before being baked and often sliced and packaged for sale as bread). Other farm products are used as inputs into different farm activities—again, often after some processing (for example, soybeans are crushed and the meal is mixed with maize or other feedgrains for use as animal feed, while the oil is sold for cooking). Because of these many and varied value chain paths, and because in practice it is difficult anyway to determine the extent to which a change in the primary farm product would be passed along any of those value chains, the OECD expresses its CSE simply as the level at which a product is first traded (for example, as wheat or soybean or beef). That practice is adopted here too for generating a consistent set of estimates across countries of the CTE for chapter 1 (even though authors of some individual country studies report CTEs that they may have estimated in a more sophisticated way further along the value chain). In the absence of any domestic production or consumption taxes or subsidies directly affecting that product, the

CTE at the point at which a product is first traded will be the same as the NRA_o (and recall that the NRA_o in that case also equals the NRA if NRA_i is zero).

Key required information

A template spreadsheet has been designed to aid the management of individual country information and ensure a consistent comparison across regions and periods. The precise ways in which parameters and exogenous variables entered each country spreadsheet to endogenously generate the NRAs and CTEs are detailed in Anderson et al. (2008a). Most are straightforward, the main exception being the treatment of exchange rate distortions described below.

The key exogenous variables needed are agricultural quantities produced and consumed (or imported and exported if a proxy for consumption is to be production plus net imports); wholesale and border prices of primary and lightly processed agricultural goods (and, where relevant, a quality adjustment to match border prices); agricultural input and output domestic subsidies and taxes (the default is zero); if there are distorted farm input markets, the input's share in the value of farm output at border prices (and, if there are only farmgate rather than wholesale prices for a primary good, the proportion of the farmgate value in the value at the wholesale level at border price); final food consumer domestic subsidies or taxes (the default is zero); and the official exchange rate (and, where prevalent, the parallel exchange rate and the share of currency going through that secondary or illegal market, plus the product-specific exchange rate if a multiple exchange rate system is in place).

Exchange rate distortions

The treatment of exchange rate distortions in this project is worth spelling out since it differs from the method used by Krueger, Schiff, and Valdés (1988, 1991).

If there are no exchange rate distortions, the official exchange rate is used. However, in the presence of a parallel market rate (which could be the black market rate if no legal secondary market exists), this is reported along with an estimate of the proportion of foreign currency that is actually sold by exporters at the parallel market rate. This proportion would be the formal retention rate where a formal dual exchange regime is in place, or otherwise a guesstimate of the proportion traded on the black market (premiums for which are provided by Easterly 2006 and International Currency Analysis 1993). The spreadsheet then computes an estimate for the equilibrium exchange rate for the economy, or the rate at which international prices are converted into local currency, to compute each NRA.

Relevant exchange rates for importers and exporters are then computed endogenously. If they are distorted away from the official exchange rate, the relevant exchange rates for importers and exporters are, respectively, the discounted parallel market rate and the weighted average of the official exchange rate and the discounted parallel rate according to the proportion of the exporter's currency that is sold on the parallel market. However, if a multiple exchange rate system is in place and that system provides for a specific rate for a product that differs from the general rates automatically calculated as above, then the automatically computed relevant exchange rate is replaced by the industry-specific rate.

Guesstimates of NRAs for the noncovered agricultural products

In calculating the weighted average rates of assistance for a sector or subsector, *NRAs* have to be guesstimated for the noncovered agricultural products for which price comparisons are not calculated (comprising 30 percent or so of the value of all farm production). In its PSE work, the OECD assumes the not-measured part has the same market price support as the average of the measured part. Another default is to assume the rates are zero. Orden et al. (2007) show that these two alternatives produce significantly different results for India, and so it is preferable to make informed judgments for the import-competing, exporting, and nontradable parts of the residual group of farm products. An average applied import tariff is often the best guess for only the import-competing products in that set if there is no evidence of explicit production, consumption, or export taxes or subsidies. Even though such a guess will miss nontariff trade barriers affecting these residual products, the bias will be small if their weight is small.

NPS assistance to agriculture

If there are NPS forms of agricultural subsidies or taxes in addition to product-specific ones, these are included in the *NRAag* in the same way (as a percentage of the total value of production) as done for these types of interventions in the calculation by the OECD (2007) of its total support estimate. Here, it is assumed that assistance goes only to tradables and is allocated as between importables and exportables on a pro-rata basis.

No attempt is made to estimate the discouraging effects of underinvestment in rural infrastructure and underdevelopment of pertinent institutions. Also important is the structure of that expenditure within the rural sector. Though such expenditure may well be a nontrivial part of the distortions to agricultural incentives, unfortunately it is not captured in the above measures of distortions.

In some high-income countries, governments also assist farm households with payments that are purported to be decoupled from production incentives. An example is the single farm payment in the EU. These payments are shown separately as part of *NRAag* because even though they are not intended to impact production, typically they do alter producer incentives somewhat. Where these payments are significant, their ad valorem equivalent is shown in charts when discussing assistance to farmers as a social group, so as to be able to compare their order of magnitude with support from measures that more directly alter production incentives.

Assistance to nonagricultural sectors

If the nonagricultural sectors are assisted only via import tariffs on manufactures or export taxes on minerals, it is a relatively easy task to estimate a weighted average *NRAnonag* once the shares of import-competing, exporting, and nontradables production are determined. In practice, however, there are also nontariff trade measures to consider among the measures affecting tradables (Dee and Ferrantino 2005; OECD 2005); most economies have myriad regulations affecting their many service industries. Those regulations can be very complex (see Findlay and Warren 2001). Since most of the outputs of service industries (including the public sector) are nontradable, the default in this study is to assume their average rate of government assistance—along with that of nontradable nonagricultural goods—is zero. The task of estimating the *NRAnonag* is then reduced to obtaining NRAs for only producers of import-competing and export-oriented nonagricultural goods, plus their shares of the undistorted value of production of nonagricultural tradables, in order to obtain the weighted average $NRAnonag^t$ for entering into the *RRA* calculation.

Use of percentages in the chapters

In order to simplify the presentation in the chapters, the NRA_o, NRA_i, *NRA*, *CTE*, and *RRA* are expressed as percentages rather than proportions.

Dollar values of farmer assistance and consumer taxation

Country authors' estimates of NRAs are multiplied by the gross value of production at undistorted prices to obtain an estimate in current U.S. dollars of the direct gross subsidy equivalent (GSE) of assistance to farmers. The GSEs can then simply be added up across products for a country and across countries for any or all products to obtain regional aggregate transfer estimates for the studied countries. To get

an aggregate estimate for the rest of the region, the weighted average NRA for nonstudied countries is assumed to be the same as the weighted average NRA for the studied countries, and the nonstudied countries' share of the region's gross value of farm production at undistorted prices each year is assumed to be the same as its share of the region's agricultural GDP measured at distorted prices.

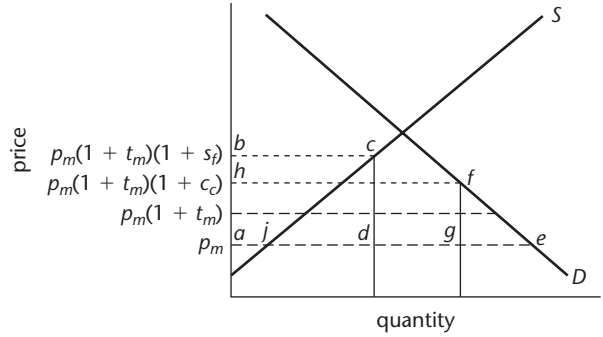
Just as the NRA (the percentage distortion to the gross price of farm products) is used to generate the GSE of assistance to farmers, so the RRA (the percentage distortion to the relative price of farm products as a group) can be used to generate a net subsidy equivalent (NSE) of aggregate assistance to farmers. The same inflation technique as for GSE is used to obtain a regional aggregate NSE estimate that includes nonstudied countries.

To obtain comparable dollar value estimates of the consumer transfer, the CTE estimate at the point at which a product is first traded is multiplied by the gross value of consumption at undistorted prices (proxied by production at undistorted prices plus net imports) to obtain an estimate in current U.S. dollars of the tax equivalent to consumers (TEC) of primary farm products. This, too, can be added up across products for a country and across countries for any or all products to obtain regional aggregate transfer estimates for the studied countries. An aggregate estimate for noncovered products in the studied countries, or for the region's or world's nonstudied countries, is not attempted in the project.

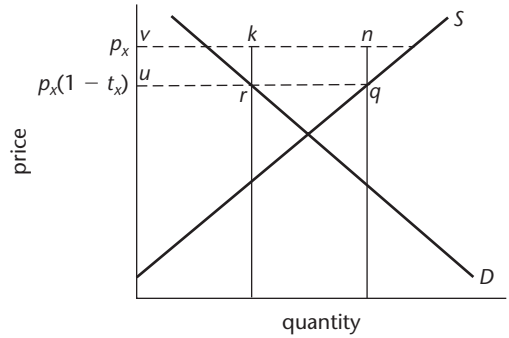
The GSE and TEC dollar values can be illustrated in a supply-demand diagram for a distorted domestic market for a farm product of a small trading economy (see figure A.2). In the case of an import-competing product subjected to an import tariff t_m, a production subsidy s_f, and a consumption tax c_c, the GSE is the rectangle *abcd* and the TEC is the rectangle *ahfg*. The GSE estimate is an overstatement to the extent of triangle *cdj* and the TEC estimate is an understatement to the extent of triangle *efg*, where those triangles are smaller the more price-inelastic are the supply and demand curves S and D, respectively. In the case of an exportable product subjected to an export tax t_x, the GSE is the negative of the rectangle *kruv* and the TEC is the negative of the rectangle *nquv*.

Figure A.2. Distorted Domestic Markets for Farm Products

a. An import-competing product subjected to an import tariff t_m plus a production subsidy s_f and a consumption tax c_c



b. An exportable product subjected to an export tax t_x



Source: Authors' derivation.

Notes

1. Although it is not an explicit objective of the project, providing comparable estimates of distortions to lightly processed food industries in addition to primary agricultural industries at the farmgate level and to food consumers at the retail level could illuminate trade and processing costs that contribute to price gaps at different points in the value chain.

2. The NRA thus differs from the producer support estimate (PSE) as calculated by the Organisation for Economic Co-operation and Development (OECD), in that the PSE is expressed as a fraction of the distorted value. It is thus $t_m/(1 + t_m)$, and so for a positive t_m it is smaller than the NRA and is necessarily less than 100 percent.

3. "Equilibrium" in the sense of what would prevail without this distortion in the domestic market for foreign currency. In the diagram, and in the discussion that follows, the equilibrium exchange rate E exactly balances the supply and demand for foreign currency. Taken literally, this implies a zero balance on the current account. The approach here can readily be generalized to accommodate exogenous capital flows and transfers, which would shift the location of Q_E. With constant-elasticity supply and demand curves, all the results would carry through, and any exogenous change in those capital flows or transfers would imply a shift in the D_{fx} or S_{fx} curves.

4. From the viewpoint of wanting to use the NRA_o and *CTE* estimates later as parameters in a CGE model, it does not matter what assumptions are made here about these elasticities, as the CGE model's results for real variables will not be affected. What matters for real impacts is the magnitude of the total distortion, not its allocation between an export tax and an import tax: the traditional incidence result from tax theory that also applies to trade taxes (Lerner 1936). For an excellent general equilibrium treatment using an early version of the World Bank's 1-2-3 Model, see de Melo and Robinson (1989). There, a distinction is made between traded and nontraded goods (using the Armington [1969] assumption of differentiation between products sold on domestic markets and those sold on international markets), in contrast to the distinction between tradable and nontradable products made below in the text.

5. Note that this same type of adjustment could be made where the government forces exporters to surrender all foreign currency earnings to the domestic commercial banking system and importers to buy all needed foreign currency from the banking system and where that system is allowed by regulation to charge excessive fees. This apparently occurs in, for example, Brazil, where the spread is reportedly 12 percent. If actual costs in a nondistorted competitive system are only 2 percent (as they are in the less-distorted Chilean economy), the difference of 10 points could be treated as the equivalent of a 5 percent export tax and a 5 percent import tax applying to all tradables (but, as with non tariff barriers, there would be no government tariff revenue but rather rent, in this case accruing to commercial banks rather than to the central bank). This is an illustration of the point made by Rajan and Zingales (2004) of the power of financial market reform in expanding opportunities.

6. Results from a multicountry research project with a macro policy focus are reported in Little et al. (1993).

7. As in the two-tier exchange rate case, the elasticities are used merely to identify the incidence of these measures: as long as both *NRAo* and the CTE are included in any economic model used to assess the impact of the production tax, the real impacts will depend only on the magnitude of the total distortion, s_f, not on the estimated NRA and CTE.

8. On this general phenomenon of offsetting distortions for outputs and inputs (and even direct payments or taxes), see Rausser (1982).

9. Bear in mind that a fertilizer plant or livestock feedmix plant may enjoy import tariff protection that raises the domestic price of fertilizer or feedmix to farmers by more than any consumption subsidy (as had been the case for fertilizer in the Republic of Korea—see Anderson 1983), in which case the net contribution of this set of input distortions to the total NRA for agriculture would be negative.

10. That is not to say there is no interest in comparisons across countries or over time in, say, the farmgate price as a proportion of the fob export price, which summarizes the extent to which the producer price is depressed by the sum of internal transport, processing, and marketing costs plus effects such as explicit or implicit production or export taxes. Prominent users of that proportion, which can be less than half in low-income countries even where there is little or no processing, include Bates (1981) and Binswanger and Scandizzo (1983). Users need to be aware, though, that this ratio understates the extent of farmer assistance (that is, it understates the rate of protection or overstates the rate of disprotection to farmers), possibly by a large margin.

11. On the basic economics of trading costs, see Limao and Venables (2001), Venables and Limao (2002), and Venables (2004). Such costs are affected by factors such as infrastructure within the country, at the border (ports and airports) and, in the case of landlocked countries, in transit countries. Also relevant are international freight etc. costs, and their impact on both the aggregate volume and product structure of international trade. See also the survey by Anderson and van Wincoop (2004), where it is reported that the tax equivalent of trading costs are estimated to be more than 170 percent in high-income countries and even higher in developing and transition economies, especially those that are small, poor, and remote. Trade facilitation, through lowering those trading costs (for example, streamlining customs clearance procedures), can be the result of not only technological changes but also of government policy choices such as restrictions on which ships can be used in bilateral trade. For example, Fink, Mattoo, and Neagu (2002) estimate that the policy contribution to costs of shipping goods from developing countries to the United States is greater than the border import barriers. For more general background on imperfect competition in services markets, including cartelized international shipping, see Francois and Wooten (2001, 2006).

12. The costs of processing and of wholesale/retail distribution, as well as domestic trading costs, change over time not only because of technological advances but also following policy changes. For example, government investment in rural infrastructure can lower trading costs. Reardon and Timmer (2007) argue that the global supermarket revolution is in part driven by the opening of domestic markets following the relaxation of government restrictions on foreign direct investment since the 1980s. These types of government policies are not included in the present project's measurement of distortions.

13. Trading costs may be unrelated to the product price (that is, specific rather than ad valorem), in which case the formulas should be adjusted accordingly (for example, if T_f is in dollars per ton). If this were the case with internationally traded costs, the domestic price of importables (exportables) would change less (more) than proportionately to P. The ad valorem assumption is preferable to the specific one in situations where international price and exchange rate changes are less than fully passed though the domestic value chain to the farmer and consumer because of incomplete market integration caused, for example, by poor infrastructure or weak institutions. Ideally, in such cases one would estimate econometrically the extent to which the price transmission elasticity is below unity and use it to calculate the margin each year.

Trading costs include storage costs that would be incurred to hold domestic products until the same time in the season when international trade takes place. Any subsidies or taxes on these or any other trading costs should be included in the distortion calculus. On the importance of these domestic trading costs in low-income countries, see the case studies of Madagascar (Moser, Barrett, and Minten 2005), Rwanda (Diop, Brenton, and Asarkaya 2005), and Bangladesh (Balkht, Koolwal, and Khandker 2006).

14. On how and why the quality and variety of traded goods vary by country of origin, see Hummels and Klenow (2005).

15. It is assumed that the quality difference arises because one good provides more effective units of services than another, so that the relative price is a constant proportion of the value of the first good. When products are simply differentiated, without such a quality dimension (as in Armington 1969), there will be no fixed relationship between the two prices.

16. As with the incidence of the exchange rate distortion discussed above, from the viewpoint of wanting to use the NRA and CTE estimates later as parameters in a CGE model, the assumptions made here about the extent of pass-though along the value chain may not greatly affect the model's results for real variables such as prices, output, and value added.

17. Corden (1971) proposed that free-trade volume be used as weights, but since they are not observable (and an economy-wide model is needed to estimate them), the common practice is to compromise by using actual distorted volumes but undistorted unit values or, equivalently, distorted values divided by $(1 + NRA)$. If estimates of own-price and cross-price elasticities of demand and supply are available, a partial equilibrium estimate of the quantity at undistorted values could be generated, but if those estimated elasticities are unreliable this may introduce more error than it seeks to correct.

18. The mean and standard deviation could be captured by a single measure, namely, the trade restrictiveness index developed by Anderson and Neary (2005). Calculating the TRI requires knowing the elasticity of import demand or, if the NRA and CTE are not identical, the price elasticities of domestic demand and supply for each product. However, by making the simplifying assumption that supply and demand elasticities are identical, it is a much simpler matter to calculate welfare-reducing and trade-reducing indexes, as shown in chapter 11 of this volume (Lloyd, Croser, and Anderson 2009).

19. In addition to the methodologies of Krueger, Schiff, and Valdés (1988, 1991) and the OECD (2007a) for estimating agricultural distortion and producer support indicators, see the recent review of methodologies of other previous studies by Josling and Valdés (2004).

20. Also of great help, particularly for trade and exchange rate distortions, are trade policy studies including the various multicountry studies such as the one summarized in Bhagwati (1978) and Krueger (1978) and more recent ones summarized in Bevan, Collier, and Gunning (1989); Michaely, Papageorgiou, and Choksi (1991); Bates and Krueger (1993); and Rodrik (2003).

21. For an analysis of agricultural input subsidies in India, see Gulati and Narayanan (2003).

22. On the difficulties in even defining property rights in water markets, even in advanced economies, see Donohew (2009) and Young and McColl (2009).

23. That these costs vary hugely across countries, and often dwarf trade taxes, is now clearly established. See, for example, World Bank (2006a, 2006b) and also http://www.doingbusiness.org and the

governance and anticorruption indicators at http://info.worldbank.org/governance. Also now available is a database on information and communications cost indicators for 144 countries, at http://www.worldbank.org/ic4d. In some settings, trading cost-induced price bands due to missing or imperfect markets in rural areas cause poor farmers to forego cash crop production in order to ensure enough food production for survival (de Janvry, Fafchamps, and Sadoulet 1991; Fafchamps 1992). This contributes to a low level of supply responsiveness of poor producers to international price changes for those cash crops.

References

Anderson, J., and P. Neary. 2005. *Measuring the Restrictiveness of International Trade Policy*. Cambridge, MA: MIT Press.

Anderson, J., and E. van Wincoop. 2004. "Trade Costs." *Journal of Economic Literature* 42 (3): 691–751.

Anderson, K. 1983. "Fertilizer Policy in Korea." *Journal of Rural Development* 6 (1): 43–57.

Anderson, K., and Y. Hayami, eds. 1986. *The Political Economy of Agricultural Protection: East Asia in International Perspective*. London: Allen and Unwin.

Anderson, K., M. Kurzweil, W. Martin, D. Sandri, and E. Valenzuela. 2008a. "Methodology for Measuring Distortions to Agricultural Incentives." Agricultural Distortions Working Paper 02, World Bank, Washington, DC.

_____. 2008b. "Measuring Distortions to Agricultural Incentives, Revisited." *World Trade Review* 7 (4): 1–30.

Armington, P. 1969. "A Theory of Demand for Products Distinguished by Place of Production." *IMF Staff Papers* 16 (1): 159–78.

Baffes, J., and B. Gardner. 2003. "The Transmission of World Commodity Prices to Domestic Markets Under Policy Reforms in Developing Countries." *Journal of Policy Modeling* 6 (3): 159–80.

Balkht, Z., G. B. Koolwal, and S. R. Khandker. 2006. "The Poverty Impact of Rural Roads: Evidence from Bangladesh." Policy Research Working Paper 3875, World Bank, Washington, DC.

Bates, R. H. 1981. *Markets and States in Tropical Africa.* Berkeley, CA: University of California Press.

Bates, R. H., and A. O. Krueger, eds. 1993. *Political and Economic Interactions in Economic Policy Reform: Evidence from Eight Countries*. Oxford: Blackwell.

Bevan, D., P. Collier, and J. W. Gunning. 1989. *Peasants and Governments: An Economic Analysis*. Oxford: Clarendon Press.

Bhagwati, J. N. 1971. "The Generalized Theory of Distortions and Welfare." In *Trade, Balance of Payments and Growth,* ed. J .N. Bhagwati, et al. Amsterdam: North-Holland.

_____. 1978. *Foreign Trade Regimes and Economic Development: Anatomy and Consequences of Exchange Control Regimes*. Cambridge, MA: Ballinger.

Binswanger, H., and P. L. Scandizzo. 1983. "Patterns of Agricultural Protection." Report ARU 15, Agricultural and Rural Development Department, World Bank, Washington, DC.

Byerlee, D., and M. Morris. 1993. "Calculating Levels of Protection: Is it Always Appropriate to Use World Reference Prices Based on Current Trading Status?" *World Development* 21 (5): 805–15.

Collier, P., and J. W. Gunning, with associates. 1998. *Trade Shocks in Developing Countries: Theory and Evidence*. Oxford: Clarendon Press.

Corden, W. M. 1971. *The Theory of Protection*. Oxford: Clarendon Press.

_____. 1997. *Trade Policy and Economic Welfare* (second edition). Oxford: Clarendon Press.

Dee, P., and M. Ferrantino, eds. 2005. *Quantitative Methods for Assessing the Effects of Non-Tariff Measures and Trade Facilitation*. London: World Scientific.

de Janvry, A., M. Fafchamps, and E. Sadoulet. 1991. "Peasant Household Behaviour with Missing Markets: Some Paradoxes Explained." *Economic Journal* 101(409): 1400–17.

de Melo, J., and S. Robinson. 1989. "Product Differentiation and the Treatment of Foreign Trade in Computable General Equilibrium Models of Small Economies." *Journal of International Economics* 27: 47–67.

Dervis, K., J. de Melo, and S. Robinson. 1981. "A General Equilibrium Analysis of Foreign Exchange Shortages in a Developing Country." *Economic Journal* 91: 891–906.

Dimaranan, B. V., ed. 2006. *Global Trade, Assistance, and Production: The GTAP 6 Data Base*. West Lafayette, IN: Center for Global Trade Analysis, Purdue University. http://www.gtap.org.

Diop, N., P. Brenton, and Y. Asarkaya. 2005. "Trade Costs, Export Development and Poverty in Rwanda." Policy Research Working Paper 3784, World Bank, Washington, DC.

Donahew, Z. 2009. "Property Rights and Western United States Water Markets." *Australian Journal of Agricultural and Resource Economics* 53 (1): 85–103.

Easterly, W. 2006. *Global Development Network Growth Database.* New York University Development Research Institute, New York, NY. http://www.nyu.edu/fas/institute/dri/globaldevelopmentnetworkgrowthdatabase.html.

Fafchamps, M. 1992. "Cash Crop Production, Food Price Volatility, and Rural Market Integration in the Third World." *American Journal of Agricultural Economics* 74 (1): 90–99.

Findlay, C., and T. Warren. 2001. *Impediments to Trade in Services: Measurement and Policy Implications*, London and New York: Routledge.

Fink, C., A. Mattoo, and I. Neagu. 2002. "Trade in International Maritime Services: How Much Does Policy Matter?" *World Bank Economic Review* 16 (1): 81–108.

Francois, J., and I. Wooton. 2001. "Trade in International Transport Services: The Role of Competition." *Review of International Economics* 9 (2): 249–61.

_____. 2006. "Market Structure and Market Access." Unpublished paper, Erasmus University, Rotterdam.

Garnaut, R., and A. Clunies-Ross. 1983. *The Taxation of Mineral Rents*. London: Oxford University Press.

Gulati, A., and S. Narayanan. 2003. *The Subsidy Syndrome in Indian Agriculture*. New Delhi: Oxford University Press.

Harberger, A. 1971. "Three Basic Postulates for Applied Welfare Economics: An Interpretative Essay." *Journal of Economic Literature* 9 (3): 785–97.

Hummels, D. L., and P. J. Klenow. 2005. "The Variety and Quality of a Nation's Exports." *American Economic Review* 95 (3): 704–23.

International Currency Analysis. 1993 and earlier years. *World Currency Yearbook* (formerly *Pick's Currency Yearbook*). Brooklyn, NY: International Currency Analysis, Inc.

Josling, T. E., and A. Valdés. 2004. "Agricultural Policy Indicators." ESA Working Paper 04-04, Food and Agriculture Organization, Rome.

Kiguel, M., and S. A. O'Connell. 1995. "Parallel Exchange Rates in Developing Countries." *World Bank Research Observer* 10 (1): 21–52.

_____, eds. 1997. *Parallel Exchange Rates in Developing Countries*. London: Macmillan and New York: St Martin's Press.

Koester, U. 1986. "Regional Cooperation to Improve Food Security in Southern and Eastern African Countries." International Food Policy Research Institute (IFPRI) Research Report 53, IFPRI, Washington, DC.

Krueger, A. O. 1978. *Foreign Trade Regimes and Economic Development: Liberalization Attempts and Consequences*. Cambridge, MA: Ballinger.

Krueger, A. O., M. Schiff, and A. Valdés. 1988. "Agricultural Incentives in Developing Countries: Measuring the Effect of Sectoral and Economy-wide Policies." *World Bank Economic Review* 2 (3): 255–72.

_____. 1991. *The Political Economy of Agricultural Pricing Policy, Volume 1: Latin America, Volume 2: Asia,* and *Volume 3: Africa and the Mediterranean*. Baltimore: Johns Hopkins University Press for the World Bank.

Lerner, A. 1936. "The Symmetry Between Import and Export Taxes." *Economica* 3(11): 306–13.

Limao, N., and A. J. Venables. 2001. "Infrastructure, Geographical Disadvantage, Transport Costs, and Trade." *World Bank Economic Review* 15 (3): 451–79.

Little, I. M. D., R. N. Cooper, W. M. Corden, and S. Rajapatirana, eds. 1993. *Boom, Crisis and Adjustment: The Macroeconomic Experience of Developing Countries*. London: Oxford University Press.

Lloyd, P. J. 1974. "A More General Theory of Price Distortions in an Open Economy." *Journal of International Economics* 4 (4): 365–86.

Lloyd, P. J., J. Croser, and K. Anderson. 2009. "Welfare-Based and Trade-Based Indicators of National Agricultural Distortions." Chapter 11 in this volume.

Martin, W. 1993. "Modeling the Post-Reform Chinese Economy." *Journal of Policy Modeling* 15 (5&6): 545–79.

Matthews, A., P. Claquin, and J. Opolot. 2009. "Uganda." Ch. 12 in K. Anderson and W. A. Masters (eds.), *Distortions to Agricultural Incentives in Africa,* Washington, DC: World Bank.

Michaely, M., D. Papageorgiou, and A. Choksi, eds. 1991. *Liberalizing Foreign Trade, 7: Lessons from Experience in the Developing World*. Oxford: Basil Blackwell.

Moser, C., C. B. Barrett, and B. Minten. 2005. "Missed Opportunities and Missing Markets: Spatio-Temporal Arbitrage of Rice in Madagascar." Unpublished paper, Colgate University, Hamilton, NY.

OECD (Organisation for Economic Co-operation and Development). 2005. *Looking Beyond Tariffs: The Role of Non-Tariff Barriers in World Trade*. Paris: OECD.

_____. 2007. OECD PSE-CSE Database (Producer and Consumer Support Estimates, OECD Database 1986–2007). OECD http://www.oecd.org/document/59/0,3343,en_2649_33727_39551355_1_1_1_1,00.html.

Orden, D., F. Cheng, H. Nguyen, U. Grote, M. Thomas, K. Mullen, and D. Sun. 2007. "Agricultural Producer Support Estimates for Developing Countries: Measurement Issues and Evidence from India, Indonesia, China and Vietnam." International Food Policy Research Institute (IFPRI) Research Report 152, Washington, DC.

Rajan, R., and Zingales. 2004. *Saving Capitalism from the Capitalists: Unleashing the Power of Financial Markets to Create Wealth and Spread Opportunity*. Princeton, NJ: Princeton University Press.

Rausser, G. C. 1982. "Political Economic Markets: PERTs and PESTs in Food and Agriculture." *American Journal of Agricultural Economics* 64 (5): 821–33.

Reardon, T., and C. P. Timmer. 2007. "Transformation of Markets for Agricultural Output in Developing Countries Since 1950: How Has Thinking Changed?" In *Handbook of Agricultural Economics, Volume 3A*, ed. R. E. Evenson, P. Pingali, and T. P. Schultz. Amsterdam: Elsevier.

Rodrik, D., ed. 2003. *In Search of Prosperity: Analytical Narratives on Economic Growth*. Princeton: Princeton University Press.

Salter, W. E. G. 1959. "Internal and External Balance: The Role of Price and Expenditure Effects." *Economic Record* 35 (71): 226–38.

Shatz, H. J., and D. Tarr. 2000. "Exchange Rate Overvaluation and Trade Protection: Lessons from Experience." World Bank Policy Research Working Paper 2289, World Bank, Washington, DC.

Tarr, D. 1990. "Second-Best Foreign Exchange Policy in the Presence of Domestic Price Controls and Export Subsidies." *World Bank Economic Review* 4 (2): 175–93.

Valdés, A. 1996. " Surveillance of Agricultural Price and Trade Policy in Latin America During Major Policy Reforms." World Bank Discussion Paper 349, World Bank, Washington, DC.

_____, ed. 2000. "Agricultural Support Policies in Transition Economies." World Bank Technical Paper 470, World Bank, Washington, DC.

Venables, A. J. 2004. "Small, Remote and Poor?" *World Trade Review* 3 (3): 453–57.

Venables, A. J., and N. Limao. 2002. "Geographical Disadvantage: A Heckscher-Ohlin-von Thunen Model of International Specialization." *Journal of International Economics* 58 (2): 239–63.

Vousden, N. 1990. *The Economics of Trade Protection*. Cambridge: Cambridge University Press.

Young, M. D., and J. C. McColl. 2009. "Double Trouble: The Importance of Accounting For and Defining Water Entitlements Consistent with Hydrological Integrity." *Australian Journal of Agricultural and Resource Economics* 53 (1): 19–35.

Warr, P. G. 2008. "The Transmission of Import Prices to Domestic Prices: An Application to Indonesia." *Applied Economics Letters* 15 (7): 499–503.

World Bank. 2006a. *Assessing World Bank Support for Trade, 1987–2004: An IEG Evaluation*. Independent Evaluation Group, World Bank, Washington, DC.

_____. 2006b. *Information and Communications for Development 2006: Trends and Policies*. Washington, DC: World Bank.

APPENDIX B

GLOBAL DISTORTIONS DATABASE, 1955–2007

Kym Anderson and Ernesto Valenzuela[*]

The core global database developed as an integral part of the World Bank's Agricultural Distortions Project was a huge team effort involving more than 90 consultants, who prepared national case studies and associated spreadsheets, plus a small team of doctoral students (listed above), who served as research assistants in Washington, DC, and Adelaide, Australia. The core database is publicly available at http://www.worldbank.org/agdistortions (Anderson and Valenzuela 2008).

The case studies involve a total of 75 countries that together account for 92 percent of the world's population and agricultural gross domestic product (GDP) and 95 percent of total GDP. The same set of countries also accounts for more than 85 percent of farm production and employment in each of Africa, Asia, Latin America, and the transition economies of Europe and Central Asia. The only countries not well represented in the sample are those in the Middle East and the many small ones that together account for less than 5 percent of the global economy.

Nominal rates of assistance (NRAs) and consumer tax equivalents (CTEs) are estimated for more than 70 products, with an average of 11 products per country. In aggregate, the coverage represents around 70 percent of the gross value of agricultural production in the focus countries, and just under two-thirds of global farm production valued at undistorted prices over the period covered. Not all countries had data for all of the entire 1955–2007 period; the average number of years covered is 41 per country.[1] Of the 30 most valuable agricultural products, the NRAs presented here cover 77 percent of global output, ranging from two-thirds for livestock, three-quarters for oilseeds and tropical crops, and five-sixths

*The compilation of this database would not have been possible without the dedicated assistance of Johanna L. Croser, Esteban Jara, Marianne Kurzweil, Signe Nelgen, Francesca de Nicola, and Damiano Sandri.

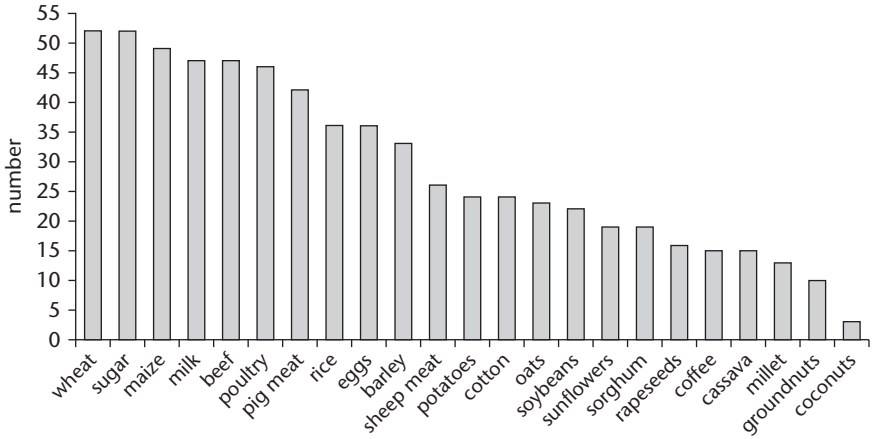
for grains and tubers. Those products represent an even higher share (85 percent) of global agricultural exports.

Tables B.1–B.7 provide further details of the above coverage statistics. The tables that follow provide trade propensities of the different regions for the 30 major products (table B.8), per capita incomes (in purchasing power parity) of the study's 75 focus economies (table B.9), and a list of the key variables included in the core database (table B.10). Figure B.1 shows the number of countries for which NRA and CTE estimates are produced for each of the 23 key farm products, while figure B.2 shows the share of global production of each of those 23 key farm products that is covered by NRA and CTE estimates.

The core database is the source of all the indicators of distortions to agricultural incentives in the four regional books[2] that are summarized in part III of the present volume, as well as in the high-income country studies in part II of this volume. The database has also been used to provide new estimates of distortions to producer and consumer prices of farm products for use by national and global sectoral or economy-wide models (Valenzuela and Anderson 2008), one application of which is reported in chapter 13 of this volume.

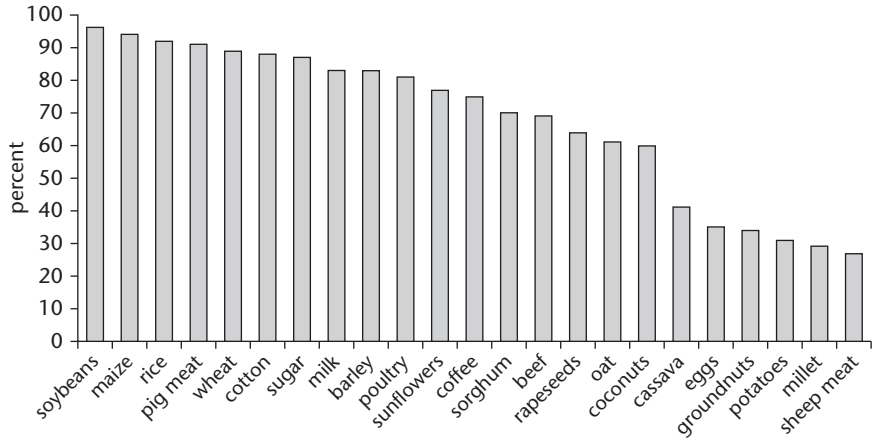
Furthermore, the core database of NRAs and CTEs has been the main source for a supplementary database of partial equilibrium indexes of the trade and welfare reductions due to government interventions in agricultural markets in the 75 focus countries (Anderson and Croser 2009). The theory of those trade and welfare reduction indexes is developed in chapter 11 of this volume (see also

Figure B.1. Number of Countries for Which NRA and CTE Estimates Are Provided for 23 Key Farm Products



Source: Drawn from estimates in Anderson and Valenzuela (2008).

Figure B.2. Shares of Global Production of 23 Key Farm Products Covered in NRA and CTE Estimates



Source: Drawn from estimates in Anderson and Valenzuela (2008).

Lloyd, Croser, and Anderson 2009a, 2009b), and a global summary of the indexes themselves is provided for countries in chapter 11 and for commodities in chapter 12. A list of the key variables included in that supplementary database of agricultural trade and welfare reduction indexes is shown in table B.11.

Table B.1. Summary of NRA Coverage Statistics, World Bank Agricultural Distortions Project

		2000–04 % of global:	
Number and size of countries	Number	Population	Agricultural GDP
Africa	21	11	7
Asia	12	51	37
Latin America	8	7	8
Subtotal, all developing countries	**41**	**69**	**52**
European transition economies	14	7	7
High-income countries	20	14	33
Total	**75**	**92**	**92**

(*Table continues on the following page.*)

Table B.1. Summary of NRA Coverage Statistics, World Bank Agricultural Distortions Project (*continued*)

Number of years covered	Maximum	Average per country
Africa	51	43
Asia	53	42
Latin America	51	39
Subtotal, all developing countries	53	43
European transition economies	47	17
High-income countries	53	52
Total	**51**	**41**

Number of products covered	Maximum	Average per country
Africa	44	8
Asia	35	8
Latin America	27	10
Subtotal, all developing countries	59	9
European transition economies	25	12
High-income countries	39	15
Total	**74**	**11**

Total number of NRA estimates (years and products)	Total	Average per country
Africa	7,318	348
Asia	3,546	296
Latin America	2,881	360
Subtotal, all developing countries	13,745	335
European transition economies	2,847	203
High-income countries	13,377	669
Total, focus countries	***29,969***	**400**

Share of global agricultural production of 30 key covered products, 2000–04	Percent
Africa	5
Asia	28
Latin America	7
Subtotal, all developing countries	41
European transition economies	6
High-income countries	29
Total, focus countries	**77**

Source: Anderson and Valenzuela (2008).

Table B.2. Coverage of Gross Value of Global Agricultural Production at Undistorted Prices, for 30 Key Products and Four Product Groups, 2000–04

	Coverage of product's global gross value of production, %	Product's share of global gross value of production of 30 key products, %
Grains and tubers	**85**	**31.4**
Rice	92	9.5
Wheat	89	8.0
Maize	94	7.2
Cassava	41	2.4
Barley	83	1.6
Sorghum	70	0.7
Yams	77	0.8
Millet	29	0.6
Oats	61	0.3
Oilseeds	**78**	**8.1**
Soybeans	96	4.0
Groundnuts	34	1.2
Palm oil	90	1.0
Rapeseeds	64	1.0
Sunflower seeds	77	0.6
Sesame seeds	9	0.3
Tropical crops	**74**	**7.6**
Sugar	87	2.5
Cotton	88	1.9
Coconut	60	0.9
Coffee	75	0.7
Rubber	74	0.7
Tea	21	0.6
Cocoa	71	0.4
Chickpeas	61	0.3
Livestock products	**72**	**52.9**
Pig meat	91	12.4
Milk	83	12.0
Beef	69	10.5
Poultry	81	7.6
Eggs	35	6.5
Sheep meat	27	3.3
Wool	42	0.6
All above products	**77**	**100.0**

Source: Authors' calculations from Agricultural Distortions Project database.

Note: Fruit and vegetables, which account for around 23 percent of global agricultural gross value of production in 2001 (according to GTAP database—see Dimaranan 2007) are not included in this table, even though several fruits and vegetables for selected countries are included in the analysis.

Table B.3. Project's Coverage of National Agricultural Production in Focus Countries at Undistorted Prices, Regional Averages, 1980–2004

(*percent*)

	1980–84	1990–94	2000–04
Africa	67	66	68
Asia	75	73	66
Latin America	65	69	70
Subtotal, focus developing countries	72	72	67
European transition economies	62	61	63
High-income countries	73	73	72
Total, all focus countries	**72**	**71**	**68**

Source: Anderson and Valenzuela (2008).

Table B.4. Shares of Global Agricultural Production for 30 Major Covered Products, by Region, 2000–04

	Regional shares (%) of global gross value of agricultural production								Product share (%) of global gross value of production of 30 products
	Covered products in focus countries								
	Africa	Asia	Latin America	European transition economies	High-income countries	All focus countries	Residual	World	
Grains and tubers	**11**	**40**	**5**	**6**	**23**	**85**	**15**	**100**	**31**
Rice	3	81	2	0	5	92	8	100	9
Wheat	6	32	4	14	33	89	11	100	8
Maize	11	26	13	5	40	94	6	100	7
Cassava	39	2	0	0	0	41	59	100	2
Barley	0	0	1	25	57	83	17	100	2
Sorghum	26	13	14	0	17	70	30	100	1
Yams	77	0	0	0	0	77	23	100	1
Millet	29	0	0	0	0	29	71	100	1
Oats	0	0	0	28	33	61	39	100	0
Oilseeds	**4**	**22**	**20**	**4**	**28**	**78**	**22**	**100**	**8**
Soybeans	0	15	37	0	43	96	4	100	4
Groundnuts	17	17	0	0	0	34	66	100	1
Palm oil	8	81	2	0	0	90	10	100	1
Rapeseeds	0	12	0	4	47	64	36	100	1
Sunflower seeds	3	5	16	39	14	77	23	100	1
Sesame	8	0	0	0	0	9	91	100	0

(*Table continues on the following page.*)

Table B.4. Shares of Global Agricultural Production for 30 Major Covered Products, by Region, 2000–04 (*continued*)

	Regional shares (%) of global gross value of agricultural production								Product share (%) of global gross value of production of 30 products
	Covered products in focus countries								
	Africa	Asia	Latin America	European transition economies	High-income countries	All focus countries	Residual	World	
Tropical crops	**10**	**36**	**12**	**5**	**11**	**74**	**26**	**100**	**8**
Sugar	5	43	17	6	16	87	13	100	2
Cotton	17	30	5	14	22	88	12	100	2
Coconut	0	60	0	0	0	60	40	100	1
Coffee	11	12	52	0	0	75	25	100	1
Rubber	0	74	0	0	0	74	26	100	1
Tea	11	10	0	0	0	21	79	100	1
Cocoa	68	0	3	0	0	71	29	100	0
Chickpeas	0	61	0	0	0	61	39	100	0
Livestock products	**3**	**21**	**6**	**7**	**36**	**72**	**28**	**100**	**53**
Pig meat	0	49	3	6	34	91	9	100	12
Milk	3	21	4	12	43	83	17	100	12
Beef	6	1	16	5	41	69	31	100	10
Poultry	2	27	9	5	38	81	19	100	8
Eggs	0	1	3	7	23	35	65	100	6
Sheep meat	5	0	0	3	18	27	73	100	3
Wool	0	0	0	0	42	42	58	100	1
Total of above 30 products	**6**	**28**	**7**	**6**	**29**	**77**	**23**	**100**	**100**

Sources: Authors' calculations based on Food and Agriculture Organization (FAO) commodity balance to get volume of production data, and the Agricultural Distortions Project database to convert this to value of production at undistorted prices so we can add up across commodities.

Table B.5. Share of Regional Agricultural Production for 30 Major Covered Products, by Region, 2000–04

	Covered product shares (%) of regional gross value of agricultural production					
	Africa	Asia	Latin America	European transition economies	High-income countries	All focus countries
Grains and tubers	**37.3**	**21.8**	**14.3**	**16.8**	**15.2**	**19.6**
Rice	2.8	13.6	1.9	0.1	1.0	6.3
Wheat	4.7	4.6	3.0	10.2	5.6	5.3
Maize	8.4	3.3	8.3	2.7	6.2	5.0
Cassava	9.8	0.1	0.0	—	—	0.7
Barley	—	0.0	0.2	3.2	2.0	1.0
Sorghum	2.5	0.2	0.9	—	0.3	0.4
Yams	7.0	—	—	—	—	0.5
Millet	2.1	—	—	—	—	0.1
Oats	—	—	—	0.6	0.2	0.1
Oilseeds	**3.3**	**3.1**	**14.5**	**2.2**	**4.8**	**4.5**
Soybeans	0.0	1.1	13.3	0.0	3.6	2.8
Groundnuts	2.0	0.4	0.0	—	—	0.3
Palm oil	0.9	1.4	0.1	—	—	0.6
Rapeseeds	—	0.2	—	0.2	1.0	0.4
Sunflower seeds	0.2	0.1	0.9	2.0	0.2	0.4
Sesame seeds	0.2	—	0.0	—	—	0.0

(*Table continues on the following page.*)

Table B.5. Share of Regional Agricultural Production for 30 Major Covered Products, by Region, 2000–04 (*continued*)

	Covered product shares (%) of regional gross value of agricultural production					
	Africa	Asia	Latin America	European transition economies	High-income countries	All focus countries
Tropical crops	**7.9**	**5.1**	**8.1**	**3.5**	**1.7**	**4.2**
Sugar	1.2	1.9	3.8	1.3	0.8	1.6
Cotton	2.3	1.0	0.9	2.1	0.9	1.1
Coconut	—	0.8	—	—	—	0.3
Coffee	0.8	0.1	3.3	—	—	0.4
Rubber	—	0.9	—	—	—	0.4
Tea	0.7	0.1	—	—	—	0.1
Cocoa	3.0	0.0	0.1	—	—	0.2
Chickpeas	—	0.3	—	—	—	0.1
Livestock products	**13.7**	**19.0**	**29.9**	**30.5**	**40.4**	**27.9**
Pig meat	—	10.6	3.0	6.6	8.9	8.3
Milk	3.5	4.5	4.4	11.8	11.1	7.3
Beef	6.8	0.2	14.7	4.6	9.1	5.3
Poultry	1.6	3.6	5.9	2.9	6.2	4.5
Eggs	—	0.1	1.9	3.7	3.2	1.7
Sheep meat	1.8	—	—	0.9	1.3	0.7
Wool	—	—	—	—	0.6	0.2
Total of above 30	**62.2**	**48.8**	**66.7**	**52.9**	**62.2**	**56.2**
All covered	**68.2**	**66.1**	**70.3**	**60.9**	**72.4**	**68.3**
Noncovered products	**31.8**	**33.9**	**29.7**	**39.1**	**27.6**	**31.7**
All agricultural products	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Source: Authors' calculations based on Agricultural Distortions Project database.

Note: — = not available.

Table B.6. Share of Global Agricultural and Processed Food Exports for 30 Major Covered Products, by Region, 2000–03

	Share (%) of global agricultural and food exports							Product's share (%) of global gross value of agriculture and food exports
	Focus countries							
	Africa	Asia	Latin America	High-income countries	European transition economies	All focus countries	Residual	
Grains and tubers	**0.9**	**16.0**	**7.4**	**60.4**	**5.2**	**89.9**	**10.1**	**8.0**
Rice	2.0	53.9	0.3	27.2	0.0	83.4	16.6	1.5
Wheat	0.3	3.2	8.1	75.9	7.5	95.0	5.0	3.4
Maize	1.4	12.6	14.7	66.5	3.0	98.3	1.7	2.2
Cassava	0.1	72.6	0.0			72.8	27.2	0.1
Barley		0.0	0.0	75.0	17.2	92.2	7.8	0.6
Sorghum	0.4	0.1	0.0	0.4		0.9	99.1	0.2
Yams	21.5					21.5	78.5	0.0
Millet	3.2					3.2	96.8	0.0
Oats				45.9	0.8	46.7	53.3	0.0
Oilseeds	**0.6**	**32.4**	**19.7**	**29.2**	**3.1**	**85.1**	**14.9**	**3.8**
Soybeans	0.0	3.6	45.4	45.0	0.0	94.1	5.9	1.5
Groundnuts	1.0	8.3	3.4			12.7	87.3	0.1
Palm oil	0.1	84.4	0.6			85.0	15.0	1.4
Rapeseeds		0.1		87.5	3.4	91.0	9.0	0.4
Sunflower seeds	0.5	0.1	21.8	22.9	33.9	79.1	20.9	0.3
Sesame seeds	19.0		0.5			19.5	80.5	0.1

(*Table continues on the following page.*)

Table B.6. Share of Global Agricultural and Processed Food Exports for 30 Major Covered Products, by Region, 2000–03 (*continued*)

	Share (%) of global agricultural and food exports							
	Focus countries							
	Africa	Asia	Latin America	High-income countries	European transition economies	All focus countries	Residual	Product's share (%) of global gross value of agriculture and food exports
Tropical crops	**14.9**	**18.6**	**14.7**	**18.4**	**1.3**	**70.9**	**29.1**	**5.8**
Sugar	3.2	11.4	23.3	30.9	3.2	71.9	28.1	2.2
Cotton	23.6	4.2	1.7	46.7	0.8	76.9	23.1	0.8
Coconuts		62.2				62.2	37.8	0.0
Coffee	9.8	14.4	34.5			58.7	41.3	0.9
Rubber		93.3				93.3	6.7	0.5
Tea	15.6	27.9				43.6	56.4	0.6
Cocoa	69.1	0.6	2.3			71.9	28.1	0.7
Chickpeas		0.2				0.2	99.8	0.1
Livestock products	**0.0**	**3.3**	**5.6**	**75.1**	**3.8**	**87.9**	**12.1**	**16.7**
Pig meat		3.0	3.8	79.5	3.3	89.6	10.4	3.4
Milk	0.0	0.4	1.6	81.0	4.9	87.9	12.1	6.3
Beef	0.1	0.0	11.1	77.4	2.3	90.9	9.1	3.5
Poultry	0.1	16.6	13.0	54.6	5.0	89.3	10.7	2.5
Eggs		0.0	0.1	0.3	5.1	5.5	94.5	0.2
Sheep meat	0.0			89.8	0.2	90.0	10.0	0.5
Wool				79.6		79.6	20.4	0.2
Total of above 30 products	**2.8**	**12.1**	**9.1**	**57.0**	**3.7**	**84.7**	**15.3**	**34.2**
All agricultural and processed food exports	**2.4**	**10.8**	**10.0**	**60.5**	**4.0**	**87.9**	**12.1**	**100.0**

Source: Authors' calculations based on FAO trade data.

Table B.7. Share of Global Agricultural and Processed Food Imports for 30 Major Products, by Region, 2000–03[a]

	Share (%) of global agricultural and food imports for each region							Product's share (%) of global gross value of agricultural and food imports
	Focus countries							
	Africa	Asia	Latin America	High-income countries	European transition economies	All focus countries	Residual	
Grains and tubers	**6.9**	**7.4**	**8.9**	**21.3**	**2.9**	**47.4**	**52.6**	**9.0**
Rice	10.6	12.3	4.6	19.5	1.3	48.3	51.7	1.6
Wheat	7.8	6.8	9.5	24.9	3.4	52.5	47.5	3.8
Maize	6.2	7.6	10.3	19.6	3.4	47.0	53.0	2.5
Cassava	0.0	0.0	0.0			0.0	100.0	0.1
Barley		0.6	0.5	27.9	3.5	32.5	67.5	0.6
Sorghum	0.9		50.2	0.0		51.0	49.0	0.2
Yams						0.0	100.0	0.0
Millet	0.0					0.0	100.0	0.0
Oats				14.9	1.3	16.1	83.9	0.1
Oilseeds	**0.9**	**11.1**	**2.7**	**23.5**	**0.9**	**39.1**	**60.9**	**4.2**
Soybeans	0.0	25.9	6.7	43.4	0.2	76.2	23.8	1.7
Groundnuts	0.5	0.0	0.0			0.5	99.5	0.1
Palm oil	2.3	1.4	0.0			3.7	96.3	1.5
Rapeseeds				28.0	0.3	28.3	71.7	0.5
Sunflower seeds	1.1	3.2	0.2	40.3	10.9	55.7	44.3	0.3
Sesame seeds	0.0		0.0			0.0	100.0	0.1

(*Table continues on the following page.*)

Table B.7. Share of Global Agricultural and Processed Food Imports for 30 Major Products, by Region, 2000–03[a] (*continued*)

	Share (%) of global agricultural and food imports for each region							
	Focus countries							
	Africa	Asia	Latin America	High-income countries	European transition economies	All focus countries	Residual	Product's share (%) of global gross value of agricultural and food imports
Tropical crops	**1.0**	**6.5**	**0.8**	**11.1**	**6.0**	**25.5**	**74.5**	**6.1**
Sugar	2.5	8.0	1.0	28.8	12.9	53.2	46.8	2.3
Cotton	0.4	16.2	3.1	0.7	8.0	28.4	71.6	0.8
Coconut		0.2				0.2	99.8	0.0
Coffee	0.0	0.1	0.2			0.3	99.7	0.9
Rubber		6.7				6.7	93.3	0.5
Tea	0.2	0.4				0.6	99.4	0.6
Cocoa	0.0	4.3	0.0			4.3	95.7	0.8
Chickpeas		23.5				23.5	76.5	0.1
Livestock products	**0.5**	**3.3**	**3.7**	**62.3**	**4.5**	**74.4**	**25.6**	**16.8**
Pig meat		2.2	2.5	78.7	5.6	89.0	11.0	3.6
Milk	0.6	2.3	3.0	57.2	3.2	66.3	33.7	6.3
Beef	1.2	5.8	7.6	68.8	3.8	87.2	12.8	3.4
Poultry	0.4	5.7	3.0	55.9	8.7	73.6	26.4	2.4
Eggs		0.1	2.1	0.4	4.2	6.8	93.2	0.2
Sheep meat	0.5			52.8	0.0	53.3	46.7	0.6
Wool				1.3		1.3	98.7	0.2
Total of above 30 products	**2.3**	**5.8**	**4.4**	**39.0**	**3.9**	**55.3**	**44.7**	**36.0**
All agricultural and processed food imports	**2.4**	**11.1**	**4.4**	**62.2**	**5.8**	**85.9**	**14.1**	**100.0**

Source: Authors' calculations based on FAO trade data.

a. The overall coverage of imports is less than that of exports because a major food-importing region, the Middle East and North Africa, is represented in the project only by the Arab Republic of Egypt.

Table B.8. Shares of Production Exported (X/Q) and Consumption Imported (M/C), by Farm Product and Region, 2000–03

(*percent*)

		Africa	Asia	Latin America	European transition economies	High-income countries	World
Grains	**X/Q**	**2**	**7**	**11**	**13**	**29**	**16**
	M/C	**17**	**9**	**22**	**11**	**27**	**8**
Rice	X/Q	6	6	1	2	32	7
	M/C	28	1	12	59	15	3
Wheat	X/Q	4	3	46	13	49	24
	M/C	44	4	51	6	27	15
Maize	X/Q	4	8	15	10	20	15
	M/C	14	5	14	9	5	7
Cassava	X/Q	0	75	1			16
	M/C	0	0	0			0
Barley	X/Q		1	0	13	29	23
	M/C		44	24	5	14	11
Sorghum	X/Q	0	0	0		45	15
	M/C	0	0	42		0	12
Millet	X/Q	0					0
	M/C	0					0
Oats	X/Q				0	17	9
	M/C				1	7	3
Oilseeds	**X/Q**	**4**	**32**	**35**	**25**	**30**	**33**
	M/C	**2**	**51**	**27**	**6**	**62**	**23**
Soybeans	X/Q	10	2	32	15	38	31
	M/C	5	49	12	41	23	26
Groundnuts	X/Q	0	3	87			2
	M/C	0	0	1			0
Palm oil	X/Q	1	85	18			80
	M/C	15	11	2			11
Sunflower seeds	X/Q	0	0	6	17	18	13
	M/C	0	0	0	4	34	9
Sesame seeds	X/Q	78		160			78
	M/C	0		0			0
Tropical crops	**X/Q**	**52**	**38**	**45**	**32**	**47**	**24**
	M/C	**13**	**18**	**12**	**42**	**42**	**13**
Sugar	X/Q	27	12	40	20	31	25
	M/C	20	9	4	46	25	18

(*Table continues on the following page.*)

Table B.8. Shares of Production Exported (X/Q) and Consumption Imported (M/C), by Farm Product and Region, 2000–03 (*continued*)

(*percent*)

		Africa	Asia	Latin America	European transition economies	High-income countries	World
Cotton[a]	X/Q	29	1	5	2	31	11
	M/C	2	4	9	21	3	5
Coconuts	X/Q		9				9
	M/C		0				0
Coffee	X/Q	77	78	73			75
	M/C	2	3	5			4
Rubber	X/Q		96				96
	M/C		71				71
Tea	X/Q	88	78				82
	M/C	22	6				9
Cocoa	X/Q	88	448	87			94
	M/C	1	2434	14			49
Livestock	**X/Q**	**1**	**4**	**10**	**7**	**20**	**7**
	M/C	**8**	**6**	**5**	**9**	**14**	**5**
Pig meat	X/Q		1	12	6	21	9
	M/C		2	8	12	20	9
Milk	X/Q	0	0	5	2	7	4
	M/C	1	1	5	1	3	2
Beef	X/Q	1	2	10	6	23	17
	M/C	9	48	5	14	20	15
Poultry	X/Q	1	10	16	7	19	15
	M/C	9	11	5	28	10	11
Eggs	X/Q		0	0	1	6	4
	M/C		1	1	1	6	4
Sheep meat	X/Q	2			2	35	26
	M/C	7			0	22	16
Wool	X/Q					43	43
	M/C					3	3
Total of above 30 products	**X/Q**	**16**	**22**	**19**	**11**	**24**	
	M/C	**13**	**14**	**12**	**11**	**19**	

Source: Authors' calculations based on FAO commodity balances data.

a. Excluding data for the five cotton-exporting countries of Benin, Burkina Faso, Chad, Mali, and Togo.

Table B.9. Per Capita Income, Focus Countries, 2005
(*US$ thousands, Purchasing Power Parity*)

Africa	
Benin	1.2
Burkina Faso	1.1
Cameroon	2.0
Chad	1.5
Côte d'Ivoire	1.6
Egypt, Arab Rep. of	4.6
Ethiopia	0.6
Ghana	1.2
Kenya	1.4
Madagascar	0.8
Mali	1.0
Mozambique	0.7
Nigeria	1.5
Senegal	1.5
South Africa	22.5
Sudan	1.7
Tanzania	0.9
Togo	0.7
Uganda	0.8
Zambia	1.2
Zimbabwe	0.2
Asia	
Bangladesh	1.1
China	4.1
India	2.2
Indonesia	3.2
Korea, Rep. of	21.3
Malaysia	11.7
Pakistan	2.2
Philippines	3.0
Sri Lanka	3.4
Taiwan, China	26.1
Thailand	7.1
Vietnam	2.1
Latin America	
Argentina	10.8
Brazil	8.5
Chile	12.2
Colombia	5.9
Dominican Republic	—
Ecuador	6.7
Mexico	11.4
Nicaragua	—
European transition economies	
Bulgaria	9.3
Czech Republic	20.3
Estonia	16.5
Hungary	17.0
Kazakhstan	8.7
Latvia	13.2
Lithuania	14.1
Poland	13.5
Romania	9.4
Russian Federation	11.9
Slovak Republic	15.9
Slovenia	22.5
Turkey	7.8
Ukraine	5.6
High-income countries	
Australia	34.1
Austria	34.1
Canada	35.0
Denmark	33.6
Finland	30.5
France	30.6
Germany	30.4
Iceland	35.5
Ireland	37.9
Italy	27.8
Japan	30.3
Netherlands	34.5
New Zealand	24.6
Norway	47.5
Portugal	20.0
Spain	27.1
Sweden	32.0
Switzerland	35.2
United Kingdom	31.4
United States	41.8

Source: International Comparisons Project (World Bank 2008, table 1a).

Note: — = not available.

Table B.10. Variables in the Global Agricultural Distortions Database, 1955–2007

Variable	Description
ccode	Country code
country	Country
year	Year
product	Product (the word "general" refers to aggregate information)
trade_status	Product trade status
nra	Nominal rate of assistance (NRA), by product NRA = NRA_{bms} + NRA_{dms} + NRA_{inputs}, where NRAoutput = NRAbms + NRAdms
nra_o	NRAo, nominal rate of assistance to output, by product
nra_i	NRAi, nominal rate of assistance to input, by product
nra_bms	NRAbms, nominal rate of assistance to output conferred by border market price support, by product
nra_bms_x	NRAbms (exportable product), nominal rate of assistance to output conferred by border market price support, by product
nra_bms_M	NRAbms (importable product), nominal rate of assistance to output conferred by border market price support, by product
nra_dms	NRAdms, nominal rate of assistance to output conferred by domestic price support, by product
nra_covt	NRA_covered_products, value of production-weighted average of covered products
	NRA to covered products can be decomposed into:
	NRA_COVT = NRA_cov_bms + NRA_cov_dms + NRA_cov_inputs, where NRA_covered_output = NRA_cov_bms + NRA_cov_dms
nra_cov_i	NRA to inputs, value of production-weighted average of covered products
nra_cov_o	NRA to output, value of production-weighted average of covered products
nra_cov_dms	NRA to output conferred by domestic market price support, value of production-weighted average of covered products
nra_cov_bms	NRA to output conferred by border market price support, value of production-weighted average of covered products
nra_bms_covm	NRA to output conferred by border market price support, value of production-weighted average of covered products, importables
nra_bms_covx	NRA to output conferred by border market price support, value of production-weighted average of covered products, exportables
nra_covh	NRA, covered products, value of production-weighted average, nontradables
nra_covm	NRA, covered products, value of production-weighted average, importables
nra_covx	NRA, covered products, value of production-weighted average, exportables
nra_covt_simpleave	NRA, simple average of covered products

Table B.10. Variables in the Global Agricultural Distortions Database, 1955–2007 (*continued*)

Variable	Description
nra_ncm	NRA, noncovered products, value of production-weighted average, importables
nra_ncx	NRA, noncovered products, value of production-weighted average, exportables
nra_nch	NRA, noncovered products, value of production-weighted average, nontradables
nra_nct	NRA, noncovered products (total), value of production-weighted average
nps	Non-product-specific assistance (NPSA), in U.S. dollars
NRA_TOTAL accounts for covered and noncovered products	
nra_tott	NRA, all (primary) agriculture, total for covered and noncovered and NPSA, value of production-weighted average.
nra_totp	NRA, all (primary) agriculture, total excluding NPSA
nra_totm	NRA, all (primary) agriculture, value of production-weighted average, importables
nra_totx	NRA, all (primary) agriculture, value of production-weighted average, exportables
nra_toth	NRA, all (primary) agriculture, value of production-weighted average, nontradables
nra_agtrad	NRA, tradables-only in (primary) agriculture, value of production-weighted average
nra_nonagtrad	NRA, nonagricultural sectors, tradables
rra	RRA, relative rate of assistance
nra_totd	NRA, total agriculture, including NPSA and decoupled payment (in HI countries)
nra_agtrad_decpay	NRA, agricultural tradables, including decoupled support in HI countries
decpay	Decoupled paymets (% of total value of production)
nps_input	Non-product-specific payments (only) to inputs, relevant to HI countries
rra_decpay	RRA with decoupled payments included, HI countries
er_econ	Exchange rate, estimated equilibrium, used in calculations
q	Volume of production, MT
pd	Domestic producer farmgate price, LC/MT
er_prod	(if available) product specific exchange rate
vop_prod	Value of production (at undistorted farm price), by product, U.S. dollars
vop_covt	Value of production, total covered products (at undistorted farm price), US$
vop_covh	Value of production, covered products, nontradables (at undistorted farm price), US$
vop_covm	Value of production, covered products, importables (at undistorted farm price), US$

(*Table continues on the following page.*)

Table B.10. Variables in the Global Agricultural Distortions Database, 1955–2007 (*continued*)

Variable	Description
vop_covx	Value of production, covered products, exportables (at undistorted farm price), US$
vop_nch	Value of production, noncovered products, nontradables (at undistorted farm price), US$
vop_ncm	Value of production, noncovered products, importables (at undistorted farm price), US$
vop_ncx	Value of production, noncovered products, exportables (at undistorted farm price), US$
vop_nct	Value of production, noncovered products, total (at undistorted farm price), US$
vop_tot	Value of production, total agriculture (at undistorted farm price), US$
cte	CTE, by product, US$
cte_covh	CTE, all covered products, value of consumption-weighted average, nontradables
cte_covm	CTE, all covered products, value of consumption-weighted average, importables
cte_covx	CTE, all covered products, value of consumption-weighted average, exportables
cte_covt	CTE, total for all covered products, value of consumption-weighted average
cte_covt_ave	CTE, total for all covered products, simple average
voc_prod	Value of consumption (at undistorted farm price), by product, US$
voc_covh	Value of consumption, covered products, nontradables (at undistorted farm price), US$
voc_covm	Value of consumption, covered products, importables (at undistorted farm price), US$
voc_covx	Value of consumption, covered products, exportables (at undistorted farm price), US$
voc_covt	Value of consumption, total covered products (at undistorted farm price), US$
Derived variables to estimate trade flows	
ssr	Self-sufficiency ratio, from FAO (= Q/C (volume)) or from OECD (= Q/C (value at undistorted prices))
shrimp	Share of imports in consumption, FAOSTAT
shrexp	Share of exports in production, FAOSTAT
ac_prod	Apparent consumption (volume)
pop_agreconact	Population total economically active in agricultural (from FAOSTAT)
pop_agric	Population, agricultural (FAOSTAT)
pop_nonagric	Population, nonagricultural (FAOSTAT)
pop_rural	Population, rural (FAOSTAT)
pop_total	Population, total (FAOSTAT)
pop_urban	Population, urban (FAOSTAT)
pop_toteconact	Population, total economically active (FAOSTAT)

Source: Anderson and Valenzuela (2008).

Table B.11. Variables in the Supplementary Global Agricultural Trade and Welfare Reduction Indexes Database, 1955–2007

Variable	Description
country	Country, including regional aggregates
ccode	Country code
year	Year, 1955 to 2007
period	Indicator for five-year periods
prod2	Product, including product aggregates
trstat2	Trade status by product (X = exportable, M = import-competing)
nra	NRA, percent
cte	CTE, percent
vop_prod	Value of production, at undistorted prices in current US$
voc_prod	Value of consumption, at undistorted prices in current US$
tri_covt	Trade reduction index (TRI), country-level, all covered tradable products
tri_covm	TRI, country-level, covered import-competing products
tri_covx	TRI, country-level, covered exportable products
tri_p_covt	TRI, country-level, production side of the economy, all covered tradable products
tri_c_covt	TRI, country-level, consumption side of the economy, all covered tradable products
tri_p_covm	TRI, country-level, production side of the economy, covered import-competing products
tri_c_covm	TRI, country-level, consumption side of the economy, covered import-competing products
tri_p_covx	TRI, country-level, production side of the economy, covered exportable products
tri_c_covx	TRI, country-level, consumption side of the economy, covered exportable products
cc_to_TRI_ctry	Commodity-contribution to the country-specific TRI, percent
tri_comm_covt	TRI, commodity-specific, all covered tradable products
tri_comm_covm	TRI, commodity-specific, covered import-competing products
tri_comm_covx	TRI, commodity-specific, covered exportable products
tri_comm_p_covt	TRI, commodity-specific, production side of the economy, all covered tradable products
tri_comm_c_covt	TRI, commodity-specific, consumption side of the economy, all covered tradable products
tri_comm_p_covm	TRI, commodity-specific, production side of the economy, covered import-competing products
tri_comm_c_covm	TRI, commodity-specific, consumption side of the economy, covered import-competing products

(*Table continues on the following page.*)

Table B.11. Variables in the Supplementary Global Agricultural Trade and Welfare Reduction Indexes Database, 1955–2007 (*continued*)

Variable	Description
tri_comm_p_covx	TRI, commodity-specific, production side of the economy, covered exportable products
tri_comm_c_covx	TRI, commodity-specific, consumption side of the economy, covered exportable products
cc_to_TRI_comm	Country-contribution to the commodity-specific TRI, percent
wri_covt	Welfare reduction index (WRI), country-level, all covered tradable products
wri_covm	WRI, country-level, covered import-competing products
wri_covx	WRI, country-level, covered exportable products
wri_p_covt	WRI, country-level, production side of the economy, all covered tradable products
wri_c_covt	WRI, country-level, consumption side of the economy, all covered tradable products
wri_p_covm	WRI, country-level, production side of the economy, covered import-competing products
wri_c_covm	WRI, country-level, consumption side of the economy, covered import-competing products
wri_p_covx	WRI, country-level, production side of the economy, covered exportable products
wri_c_covx	WRI, country-level, consumption side of the economy, covered exportable products
cc_to_WRI_ctry	Commodity-contribution to the country-specific WRI, percent
wri_comm_covt	WRI, commodity-specific, all covered tradable products
wri_comm_covm	WRI, commodity-specific, covered import competing products
wri_comm_covx	WRI, commodity-specific, covered exportable products
wri_comm_p_covt	WRI, commodity-specific, production side of the economy, all covered tradable products
wri_comm_c_covt	WRI, commodity-specific, consumption side of the economy, all covered tradable products
wri_comm_p_covm	WRI, commodity-specific, production side of the economy, covered import-competing products
wri_comm_c_covm	WRI, commodity-specific, consumption side of the economy, covered import-competing products
wri_comm_p_covx	WRI, commodity-specific, production side of the economy, covered exportable products
wri_comm_c_covx	WRI, commodity-specific, consumption side of the economy, covered exportable products
cc_to_WRI_comm	Country contribution to the commodity-specific WRI, percent

Source: Anderson and Croser (2009).

Notes

1. By way of comparison, the seminal multicountry study of agricultural pricing policy by Krueger, Schiff, and Valdés (1991) covers an average of 23 years to the mid-1980s for its 18 focus countries, which together accounted for 5–6 percent of global agricultural output; producer and consumer support estimates in OECD (2008) cover 22 years for 30 countries that account for just over one-quarter of the world's agricultural output valued at undistorted prices.

2. The project's regional books cover Africa (Anderson and Masters 2009), Asia (Anderson and Martin 2009), Latin America (Anderson and Valdés 2008), and European transition economies (Anderson and Swinnen 2008).

References

Anderson, K., and J. Croser. 2009. *National and Global Agricultural Trade and Welfare Reduction Indexes, 1955 to 2007*. Supplementary database at http://www.worldbank.org/agdistortions.

Anderson, K., and W. Martin, eds. 2009. *Distortions to Agricultural Incentives in Asia*. Washington, DC: World Bank.

Anderson, K., and W. A. Masters, eds. 2009. *Distortions to Agricultural Incentives in Africa*. Washington, DC: World Bank.

Anderson, K., and J. Swinnen, eds. 2008. *Distortions to Agricultural Incentives in Europe's Transition Economies*. Washington, DC: World Bank.

Anderson, K., and A. Valdés, eds. 2008. *Distortions to Agricultural Incentives in Latin America*. Washington, DC: World Bank.

Anderson, K., and E. Valenzuela. 2008. "Estimates of Global Distortions to Agricultural Incentives, 1955 to 2007." World Bank, Washington, DC. http://www.worldbank.org/agdistortions.

Dimaranan, B. D. 2007. *Global Trade, Assistance and Protection: The GTAP 6 Data Base*. West Lafayette: Center for Global Trade Analysis, Purdue University.

Krueger, A. O., M. Schiff, and A. Valdés. 1991. *The Political Economy of Agricultural Pricing Policy, Volume 1: Latin America, Volume 2: Asia, and Volume 3: Africa and the Mediterranean*. Baltimore: Johns Hopkins University Press for the World Bank.

Lloyd, P. J., J. L. Croser, and K. Anderson. 2009a. "Global Distortions to Agricultural Markets: New Indicators of Trade and Welfare Impacts, 1960 to 2007." Policy Research Working Paper 4865, World Bank, Washington, DC.

_____. 2009b. "How Do Agricultural Policy Restrictions to Global Trade and Welfare Differ Across Commodities?" Policy Research Working Paper 4864, World Bank, Washington, DC.

OECD (Organisation for Economic Co-operation and Development). 2008 and earlier years. *Agricultural Policies in OECD Countries: Monitoring and Evaluation*. Paris: OECD.

Valenzuela, E., and K. Anderson. 2008. "Alternative Agricultural Price Distortions for CGE Analysis of Developing Countries, 2004 and 1980–84." Research Memorandum 13, Center for Global Trade Analysis, Purdue University, West Lafayette, IN. https://www.gtap.agecon.purdue.edu/resources/res_display.asp?RecordID=2925.

World Bank. 2008. *International Comparisons Project PPP Tables for 2005*. Washington, DC: World Bank.

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