

DISTORTIONS TO AGRICULTURAL INCENTIVES IN LATIN AMERICA

Editors

Kym Anderson • Alberto Valdés



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and Alberto Valdés, Editors*



THE WORLD BANK
Washington, D.C.

© 2008 The International Bank for Reconstruction and Development / The World Bank

1818 H Street NW

Washington DC 20433

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Internet: www.worldbank.org

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1 2 3 4 11 10 09 08

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Cover design: Tomoko Hirata/World Bank.

Cover photo: Curt Carnemark/World Bank Photo Library.

ISBN: 978-0-8213-7513-6

eISBN: 978-0-8213-7514-3

DOI: 10.1596/978-0-8213-7513-6

Library of Congress Cataloging-in-Publication Data

Distortions to agricultural incentives in Latin America / edited by Kym Anderson and Alberto Valdés.

p. cm.

Includes bibliographical references and index.

ISBN 978-0-8213-7513-6 — ISBN 978-0-8213-7514-3 (electronic)

1. Agriculture and state—Latin America. 2. Agricultural subsidies—Latin America. 3. Agricultural industries—Latin America. I. Anderson, Kym. II. Valdés, Alberto, 1935—

HD1790.5.Z8D57 2008

338.1'88—dc22

2008010766

DEDICATION

To the authors of the country case studies and their assistants, especially for generating the time series of distortion estimates that underpin the chapters; and to our long-suffering wives, Bron and Isabel, for putting up with our long working hours and frequent absences from home while we completed this book.

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ACKNOWLEDGMENTS

This book provides an overview of the evolution of distortions to agricultural incentives caused by price and trade policies in the World Bank–defined region of Latin America and the Caribbean. Following the introduction and summary, it includes commissioned country studies of one Caribbean, one Central American, and six South American economies. The chapters are followed by two appendixes. The first describes the methodology used to measure the nominal and relative rates of assistance to farmers and the taxes and subsidies involved in food consumption; the second provides country and regional summaries, in tables, of annual estimates of these rates of assistance.

Together, the eight countries studied account for 79 percent of the region's agricultural value added, 78 percent of its population, and 84 percent of its total gross domestic product.

To the authors of the country case studies, who are listed on the following pages, we are extremely grateful for the dedicated way in which they have delivered far more than we might have reasonably expected. John Nash of the World Bank's Agriculture and Rural Development Department, Environmentally and Socially Sustainable Development Vice Presidency, provided generous and insightful advice and assistance throughout the project. Other staff in that department participated in a Bank-wide seminar on the draft studies and provided helpful suggestions, as did the World Bank's country directors for the eight countries. We have also benefited from the feedback provided by participants at various conferences at which draft papers have been circulated over the past year or so. Johanna Croser, Esteban Jara, Marianne Kurzweil, Signe Nelgen, Damiano Sandri, and Ernesto Valenzuela generously assisted in compiling material for the opening overview chapter; Johanna Croser and Marie Damania assisted in copyediting the country chapters. Our thanks go to the Development Research Group of the

World Bank and to the trust funds of the governments of the Netherlands and the United Kingdom for financial assistance. This support has made it possible for these eight countries to be included as part of a wider study that covers more than 30 other developing countries, 18 economies in transition from central planning, and 20 high-income countries. There are three companion volumes that examine case studies of other developing economies in a similar way and for a similar time period (back to the mid-1950s or early 1960s, except for the transition economies). Also published in 2008, these volumes cover Africa (coedited by Kym Anderson and Will Masters), East and South Asia (coedited by Kym Anderson and Will Martin), and Eastern Europe and Central Asia (coedited by Kym Anderson and Johan Swinnen). A global overview volume edited by Kym Anderson will be published a few months thereafter.

Finally, 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. 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 2008, Bruce Gardner.

Kym Anderson and Alberto Valdés
May 2008

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ABBREVIATIONS

ASERCA	Apoyos y Servicios a la Comercialización Agropecuaria (Mexico)
Banrural	Banco Nacional de Crédito Rural (Mexico)
CBT	export certificates for nontraditional goods (Nicaragua)
cif	cost, insurance, and freight
Conasupo	Compañía Nacional de Subsistencias Populares (Mexico)
CTE	consumer tax equivalent
FIRA	Fideicomisos Instituidos en Relación con la Agricultura (Mexico)
fob	free on board
FTA	free trade agreement
GDP	gross domestic product
GTAP	Global Trade Analysis Project
IDEMA	Institute for Agricultural Marketing (Colombia)
MFN	most favored nation
MPP	minimum price policy (Brazil)
NAFTA	North American Free Trade Agreement
NPS	non-product-specific assistance
NRA	nominal rate of assistance
Odepa	Oficina de Estudios y Políticas Agrarias
OECD	Organisation for Economic Co-operation and Development
Procampo	Programa de Apoyos Directos al Campo (Mexico)
RER	real exchange rate
RCA	revealed comparative advantage
RRA	relative rate of assistance
SAFP	Andean price band system (Andean Community)
TBI	trade bias index

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

The Focus Countries of Latin America



INTRODUCTION AND SUMMARY

Kym Anderson and Alberto Valdés

The vast majority of the world's poorest households depend on farming for their livelihoods. Because of higher levels of development, the larger share of the nonfarm sector in economies, the more extensive urbanization, and the greater concentration of landownership, poverty tends to be less heavily centered on rural areas in Latin America than is the case in Africa or Asia, but it is nonetheless sufficiently prevalent to be a concern. In the past, farm earnings have often been depressed by the pro-urban, antiagricultural bias of government policies. True, progress has been made over the past two decades by numerous developing countries in reducing the policy bias, but many trade-reducing price distortions remain between sectors, as well as within the agricultural sector of low- and middle-income countries, including in Latin America.

This study is part of a global research project seeking to understand the extent and the effects of the reduction in policy bias and the reasons behind the reforms in Africa, Asia, and Europe's transition economies, as well as in Latin America and the Caribbean.¹ The first main purpose is to obtain quantitative indicators of past and recent policy interventions. The second purpose is to gain a deeper understanding of the political economy of distortions in agricultural incentives in different national settings. Our third purpose is to use this deeper understanding to explore the prospects for reducing the distortions to agricultural incentives and discover the likely implications for the agricultural competitiveness and trade of the various Latin American countries.

Thus, a core element of the project is the compilation of new annual time series estimates of protection and taxation over the past half century. These are used to help address such questions as the following: 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 northeast Asia? What are the political economy forces behind the more-successful reformers, and how do they compare with those in less-successful countries where distortions in agricultural incentives remain? How important have domestic political forces been in bringing about reform relative to international forces during the past two decades (such as loan conditionality, rounds of multilateral trade negotiations within the General Agreement on Tariffs and Trade, regional integration agreements, accession to the World Trade Organization, 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 within the agricultural sector of each country? What policy lessons and trade implications may be drawn from these differing experiences with a view to ensuring better growth-enhancing and poverty-reducing outcomes—including less overshooting that results in protectionist regimes—in these and less well developed and still-distorted countries during their reforms in the future?

Such a study is now especially timely because countries are seeking to achieve their United Nations–encouraged Millennium Development Goals by 2015 and position themselves favorably in preferential and multilateral trade negotiations in the wake of other forces of globalization such as the information, communication, agricultural-biotechnology, and supermarket revolutions.

This study on Latin America is based on a sample of eight countries, comprising the big four economies of Argentina, Brazil, Chile, and Mexico; Colombia and Ecuador, two of the poorest South American tropical 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.

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 1.1. 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. 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. In contrast, the per capita incomes of Argentina and Chile are one-eighth below the global average, and the income of Mexico is one-eighth above the average. Only Argentina, Brazil, and

Table 1.1. Key Economic and Trade Indicators, Latin America, 2000–04

Country or subregion	Share of world, %			Index, world = 100			Agricultural trade specialization index ^b	Poverty incidence ^c	Gini index of per capita income ^d
	Population	Total GDP	Agricultural GDP	GDP per capita	Agricultural land per capita	RCA ^a			
Countries under study	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 America	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 America	8.33	5.33	9.78	64	171	—	—	—	—

Sources: Sandri, Valenzuela, and Anderson 2007; World Development Indicators Database 2007.

Note: — = no data are available.

a. The index of revealed comparative advantage (RCA) for agriculture and processed foods (this case) is the share of agriculture and processed food in national exports as a ratio of the worldwide sectoral share in global exports.

b. The index of primary agricultural trade specialization is the ratio of net exports to the sum of the exports and imports of agricultural and processed food products (the world average = 0.0).

c. The percentage of the population living on less than \$1 a day.

d. Poverty incidence and the 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 countries under study use population as the basis for weights.

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 the region 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, but above 0.7 for 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 landownership 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 through a process of major economy-wide policy reforms, which began, for some countries, approximately in the mid-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 policies as they affected agriculture before and after the reforms of the mid-1980s to mid-1990s. It then introduces the methodology used by the authors of the individual country studies to estimate the nominal rate of assistance (NRA) and the relative rate of assistance (RRA) to farmers delivered by national farm and non-farm policies over the past several decades (depending on data availability), as well as the impact of these policies on the consumer prices of farm products. Both farmer assistance and consumer taxation will be negative in periods where there is an antiagricultural, pro-urban consumer bias in a country's policy regime. The chapter subsequently provides a synopsis of the empirical results detailed in the country studies in this volume. The final section draws out key policy implications.

Growth and Structural Change

Before we examine policy changes, it is helpful to review the economic growth and intersectoral changes that have taken place in Latin America's economies over the past few decades. Since 1980, the region's real GDP 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 the region 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's economy back in the 1980s, but, in the 1990s, the economy grew two times more rapidly than the economy of Ecuador.)

The industrial sector has grown much more slowly than overall GDP during the past 25 years, but 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, which was disrupted by the prolonged civil conflict in the 1980s (table 1.2).

Table 1.2. Growth of Real GDP, Latin America, 1980–2004

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

Country or subregion	Agriculture	Industry	Services	Total GDP	GDP per capita
Countries under study	3.1	4.0	7.0	5.7	3.9
Argentina	3.8	2.8	6.1	4.8	3.5
Brazil	3.5	3.1	6.2	5.0	3.2
Chile	4.1	6.9	7.6	7.2	5.5
Colombia	2.7	4.0	6.8	5.4	3.4
Dominican Republic	3.3	6.7	5.7	5.6	3.8
Ecuador	2.4	2.0	5.8	4.1	2.0
Mexico	2.4	5.3	7.7	6.7	4.8
Nicaragua	1.1	1.7	4.0	2.7	0.4
Other Latin America	—	—	—	4.2	2.1
Caribbean	—	—	—	3.5	2.1
Central America	3.5	6.8	6.9	6.3	3.9
South America	4.4	5.0	7.1	3.7	1.6
All Latin America	—	—	—	5.4	3.6

Sources: Sandri, Valenzuela, and Anderson 2007; World Development Indicators Database 2007.

Note: — = no data are available.

Table 1.3. Sectoral Shares of GDP, Latin America, 1965–2004
(percent)

Country or subregion	Agriculture			Industry			Services		
	1965–69	1985–89	2000–04	1965–69	1985–89	2000–04	1965–69	1985–89	2000–04
Countries under study	13	9	6	35	37	28	53	54	66
Argentina	10	8	7	48	39	28	42	53	65
Brazil	13	9	8	30	40	32	57	51	61
Chile	8	8	4	40	38	37	53	53	59
Colombia	28	17	11	27	36	26	45	47	63
Dominican Republic	21	14	11	25	24	31	53	61	57
Ecuador	26	15	8	23	37	30	51	48	61
Mexico	12	8	4	27	31	24	62	61	72
Nicaragua	24	26	17	24	28	26	52	46	56
Other Latin America	—	—	9	—	—	33	—	—	58
Caribbean	—	—	7	—	—	32	—	—	61
Central America	—	20	13	—	22	23	—	59	64
South America	—	9	7	—	42	37	—	50	56
All Latin America	—	—	6	—	—	29	—	—	65

Sources: Sandri, Valenzuela, and Anderson 2007; World Development Indicators Database 2007.

Note: — = no data are available.

As a result of the 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. By 2000–04, agriculture's GDP share 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 (table 1.3).

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 of the United Nations (which, because of definitional differences, is not always consistent with databases within countries). These shares remain at much higher levels than the GDP shares, 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 (table 1.4).

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 (table 1.5). The

Table 1.4. Agriculture's Share in Employment, Latin America, 1965–2004

(percent)

Country or subregion	1965–69	1985–89	2000–04
Countries under study	44	27	17
Argentina	17	12	9
Brazil	50	27	16
Chile	26	19	15
Colombia	47	31	20
Dominican Republic	52	27	16
Ecuador	54	35	25
Mexico	47	30	21
Nicaragua	55	32	19
Other Latin America	49	35	28
Caribbean	61	51	44
Central America	59	42	32
South America	41	29	23
All Latin America	45	29	19

Sources: Sandri, Valenzuela, and Anderson 2007; FAOSTAT Database 2007.

Table 1.5. Sectoral Shares in Merchandise Exports, Latin America, 1965–2004
(percent)

Country or subregion	Agriculture and processed food			Other primary			Other goods		
	1965–69	1985–89	2000–04	1965–69	1985–89	2000–04	1965–69	1985–89	2000–04
Countries under study	—	32	20	—	29	17	—	38	63
Argentina	90	65	48	1	5	20	9	29	30
Brazil	83	35	32	8	14	13	9	50	54
Chile	8	34	34	89	56	48	4	9	16
Colombia	77	54	24	15	25	40	8	20	37
Dominican Republic	—	48	42	—	0	18	—	51	34
Ecuador	97	48	43	1	50	46	2	2	10
Mexico	58	14	6	22	46	11	20	40	83
Nicaragua	87	89	85	4	1	2	8	9	12
Other Latin America	—	25	—	—	—	—	—	17	—
Caribbean	—	14	—	—	—	—	—	40	—
Central America	78	77	45	5	3	5	17	19	50
South America	—	14	14	—	74	71	—	12	15
All Latin America	—	31	—	—	—	—	—	33	—

Sources: Sandri, Valenzuela, and Anderson 2007; World Development Indicators Database 2007.

Note: — = no data are available.

declining 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). Note, however, that there has been a marked upturn in these two indexes during the past decade 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 the only country in the sample with a revealed comparative disadvantage in agriculture (table 1.6).

Finally, before examining the region's policy reforms, we 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 biggest economies (Argentina, Brazil, and Mexico), but it has changed little in the other countries in our sample, apart from Chile, where it rose a few years earlier (table 1.7). Another indicator, reported in table 1.8, 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 over 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, which came into effect in 1994. It is important to note, however, that import dependence has also grown as a consequence of trade specialization (table 1.8, chart b). 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 (excepting Mexico) are more than 100 percent self-sufficient in agricultural products as an aggregate (table 1.8, chart c) 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 (World Bank 2007).² This is important in the politics of policy making on food imports.

The Evolution of Agricultural and Trade Policies

Like most other regions, Latin America shows a diverse range of policies, political structures, and institutions, but there has been, to some extent, a common evolution in the ideology motivating economic policies beginning in the 1960s.

Table 1.6. Indexes of Comparative Advantage in Agriculture and Processed Food, Latin America, 1965–2004**a. Index of revealed comparative advantage***(world = 1.0)*

Country or subregion	1965–69	1975–79	1985–89	1995–99	2000–04
Countries under study	—	2.8	2.2	2.2	2.2
Argentina	3.5	3.8	4.4	4.9	5.4
Brazil	3.3	2.9	2.4	3.2	3.6
Chile	0.3	1.1	2.3	3.4	3.9
Colombia	3.0	3.9	3.6	3.2	2.6
Dominican Republic	—	3.9	3.2	1.2	4.7
Ecuador	3.8	2.3	3.2	5.5	4.9
Mexico	2.3	1.8	0.9	0.7	0.6
Nicaragua	3.4	4.3	6.1	7.4	9.5
Other Latin America	—	1.1	1.7	2.5	—
Caribbean	—	0.6	0.9	1.5	—
Central America	3.1	3.8	5.2	5.4	5.0
South America	—	0.5	1.0	1.6	1.6
All Latin America	—	2.1	2.1	2.2	2.2

b. Trade specialization index*(world = 0.0)*

Country or subregion	1965–69	1985–89	2000–04
Countries under study	—	0.5	0.4
Argentina	0.7	0.9	0.9
Brazil	0.6	0.7	0.7
Chile	–0.5	0.7	0.6
Colombia	0.7	0.7	0.3
Dominican Republic	—	0.5	0.3
Ecuador	0.7	0.7	0.6
Mexico	0.6	–0.1	–0.2
Nicaragua	0.7	0.4	0.3
Other Latin America	—	—	—
Caribbean	—	—	—
Central America	0.6	0.6	0.3
South America	—	0.0	0.2
All Latin America	—	—	—

Sources: Sandri, Valenzuela, and Anderson 2007; World Development Indicators Database 2007.

Note: See the text for an explanation of the terms. — = no data are available.

Table 1.7. Exports of Goods and Services as a Share of GDP, Latin America, 1975–2004
(percent)

Country or subregion	1975–79	1980–84	1985–89	1990–94	1995–99	2000–04
Countries under study	12	13	14	13	16	22
Argentina	12	12	10	8	10	18
Brazil	7	10	10	9	8	15
Chile	22	20	32	30	28	35
Colombia	16	12	16	17	13	18
Dominican Republic	21	20	43	48	46	45
Ecuador	24	23	28	27	25	28
Mexico	11	15	20	16	31	29
Nicaragua	35	19	12	21	20	21
Other Latin America	27	25	24	25	24	26
Caribbean	52	44	37	42	42	42
Central America	32	24	23	25	28	28
South America	24	23	22	23	20	24
All Latin America	15	15	15	14	17	23

Sources: Sandri, Valenzuela, and Anderson 2007; World Development Indicators Database 2007.

Table 1.8. Export Orientation, Import Dependence, and Self-Sufficiency in Primary Agricultural Production, Latin America, 1965–2004

(percent, at undistorted prices)

a. Exports as a share of production

Country	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–04
Countries under study ^a	28	27	24	17	17	16	22	27
Argentina	33	22	28	27	28	27	28	28
Brazil ^b	35	40	23	11	12	11	18	26
Chile	1	1	5	23	16	13	13	18
Colombia	21	21	26	25	27	17	18	16
Dominican Republic	33	35	42	56	22	16	13	9
Ecuador ^b	35	33	30	49	35	35	39	34
Mexico ^c	—	—	—	11	15	16	27	31
Nicaragua	—	—	—	—	—	10	15	14

b. Imports as a share of apparent consumption

Country	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–04
Countries under study ^a	4	4	5	7	6	10	12	16
Argentina	1	1	0	0	0	1	2	1
Brazil ^b	8	7	6	5	3	4	6	5
Chile	7	14	15	13	3	5	7	6
Colombia	2	2	2	3	3	3	6	10
Dominican Republic	1	1	1	0	1	2	2	1
Ecuador ^b	0	0	1	2	2	2	4	2
Mexico ^c	—	—	—	15	15	25	31	39
Nicaragua	—	—	—	—	—	4	2	2

Table 1.8 (continued)**c. Self-sufficiency ratio**

Country	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–04
Countries under study ^a	133	132	126	110	113	107	112	114
Argentina	152	127	140	142	145	136	136	138
Brazil ^b	142	161	122	109	110	107	114	130
Chile	93	87	89	95	115	109	107	115
Colombia	124	124	134	130	136	117	114	108
Dominican Republic	149	152	173	143	126	117	113	108
Ecuador ^b	152	150	143	132	153	151	157	148
Mexico ^c	—	—	106	94	99	90	95	89
Nicaragua	—	—	—	—	—	107	115	115

Sources: Compiled using project estimates of total agricultural production valued at undistorted prices; FAO Agricultural Trade Database 2007.

Note: — = no data are available.

a. Excluding Mexico pre-1979 and Nicaragua pre-1990.

b. 1965–69 = 1966–69.

c. 1980–84 = 1979–84.

Prior to the reforms of the mid-1980s/early 1990s

Until approximately the mid-1980s, agricultural price interventions 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 sets of 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 then prevailing theory) 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 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. 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/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. 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 introduced strong policy changes starting in the mid-1980s, before the signing of the North American Free Trade Agreement. 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.

Argentina has simpler interventions. Agricultural exportables that are also wage goods have been subjected to export taxes, complemented by export bans in some years.

To capture the net effect of these various interventions on farmer and consumer incentives, a common methodology has been adopted by the authors of the country case studies in this volume. A summary follows, and additional details may be found in appendix A.

The Methodology for Measuring Rates of Assistance and Taxation

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, then the measured NRA will also be the consumer tax equivalent (CTE) rate at that same point in the value chain.

There are several purposes for which NRAs and CTEs may be applied, and the purposes affect the choice of methodology. Our project seeks to achieve three purposes. One is to generate a comparable set of numbers across a wide range of countries and over a long time period; so, the methodology needs to be both simple and somewhat flexible.

Another purpose is to provide a single number (the NRA) to indicate the total extent of transfer to or from farmers because of agricultural policies and another number (the CTE) to indicate the extent of transfer to or from consumers. Both are expressed either as a percentage or in dollar terms. This is what the Organisation

for Economic Co-operation and Development's (OECD's) producer support estimate and consumer support estimate do, and both of these may be negative if the transfers away from the relevant group exceed the transfers toward that group. However, this research project's agricultural NRA and CTE are different in important ways to the producer support estimate and consumer support estimate. These differences are outlined below.

The third purpose for which NRAs and CTEs may be applied is to enable economic modelers to use the NRAs for individual primary and lightly processed agricultural products as producer price wedges and the CTEs as consumer price wedges in single-sector, multisector, and economy-wide policy simulation models by allocating these wedges to particular policy instruments such as trade taxes or domestic subsidies.

The NRAs are based on estimates of assistance to individual industries. Great care has gone into generating the NRA for each covered agricultural industry, particularly in countries where trade costs are high, where pass-throughs along the value chain are affected by imperfect competition, and where the markets for foreign currency have been highly distorted at various times and to varying degrees.

Most distortions in industries producing tradables arise from trade measures such as tariffs imposed on cost-insurance-freight import prices or export subsidies or taxes imposed on free on board prices at the country's border. Because an ad valorem tariff or export subsidy is the equivalent of a production subsidy or a consumption tax expressed as a percentage of the border price, this is what is captured in the NRA and CTE at the point in the value chain where the product is first traded. To obtain the NRA for farmers, the authors of the country studies have estimated or guesstimated the extent of pass-through back to the farmgate. Note that the NRA differs from the OECD's producer support estimate in that the latter is expressed as a percentage of the distorted price and, hence, will be lower than the NRA, which is expressed as a percentage of the undistorted price.

We have decided against seeking estimates of the more complex effective rate of assistance even though, as a single partial equilibrium measure of distortions to producer incentives, it is, in principle, better than the nominal rate. To do so requires that one know 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 long time series that is the focus of this study.³ And, in most countries, the distortions in farm inputs are small compared with the distortions to farm output prices. However, where there are significant product-specific distortions in input costs, these are captured by estimating their equivalence in terms of a higher output price and including this in the NRA for individual

agricultural industries wherever data allow. Any non-product-specific distortions in farm input prices are also added into the estimate for the overall sectoral NRA for agriculture.

The targeted degree of coverage of the products for which agricultural NRA estimates are generated has been 70 percent. This is based on the gross value of farm production at undistorted prices. This degree of coverage is similar to the coverage of the OECD's producer support estimate. Unlike the OECD, however, our project has not assumed that the nominal assistance for covered products would apply equally to noncovered farm products. This is because, in developing countries, the agricultural policies affecting noncovered products are often quite different from those on covered products. For example, nontradables among noncovered farm goods (frequently highly perishable or low-valued products relative to the cost of transport) are often not subject to direct distortionary policies. The authors of the country case studies have been asked to provide three sets of guesstimates of the NRAs for noncovered farm products: one each for the import-competing, exportable, and nontradable subsectors. A weighted average for all agricultural products is then generated relying on the gross values of production at unassisted prices as weights. For countries that also provide non-product-specific agricultural subsidies or taxes (assumed to be shared on a pro rata basis between tradables and nontradables), 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 the RRA (which is defined below).

How best to present regional aggregate NRA and RRA estimates depends on the purpose for which the averages are required. We generate a weighted average NRA for covered products for each country because only then are we able to add the NRA for noncovered products to get the NRA for all agriculture. When it comes to averaging across countries, 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 an entire region, a weighted average is needed. The weighted average NRA for covered primary agriculture may be generated by multiplying each primary industry's share of the gross value of production (valued at farmgate-equivalent undistorted prices) by the corresponding NRA and adding across industries.⁴ The overall sectoral rate, which we denote as *NRA_{ag}*, may be obtained by also adding the actual or assumed information for the noncovered farm commodities and, where it exists, the aggregate value of non-product-specific assistance to agriculture.

A weighted average may be similarly generated for the tradables part of agriculture—including those industries producing products such as milk and sugar that require only light processing before they may be traded—by assuming

that the share of non-product-specific assistance to this subsector equals the subsector's weight in the total. Call this $NRAag^t$.

In addition to the mean, it is important also to provide a measure of the dispersion or variability of the NRA estimates across the covered products. The cost of government policy distortions in incentives in terms of resource misallocation tends to be greater, the greater the degree of substitution in production (Lloyd 1974). In the case of agriculture that 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 will be the welfare cost of these market interventions. A simple indicator of dispersion is the standard deviation of the NRAs of the covered industries.

Each industry is classified as import-competing, as a producer of exportables, or as a producer of nontradables (and the status sometimes changes over the years) so that it is possible to generate the weighted average NRAs for the two different groups of tradables for each year. These NRAs are used to generate a trade bias index (TBI), defined in percentage terms as:

$$TBI = 100[(1 + NRAag_x / 100) / (1 + NRAag_m / 100) - 1] \quad (1.1)$$

where $NRAag_m$ and $NRAag_x$ are the average percentage NRAs for the import-competing and exportable parts of the agricultural sector. The TBI indicates in a single number the extent to which the antitrade bias (a negative index) typical in agricultural policies changes over time.

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, relative prices and, hence, relative rates of government assistance affect producer incentives. More than 70 years ago, Lerner (1936) provided his symmetry theorem that proved that, in a two-sector economy, an import tax has an effect on the export sector that is similar to the effect of an export tax. This carries over to a model that also includes a third sector producing only nontradables and to a model that exhibits imperfect competition and that operates regardless of the economy's size (Vousden 1990). 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, then 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:

$$RRA = 100[(1 + NRAag^t / 100) / (1 + NRAnonag^t / 100) - 1] \quad (1.2)$$

where NRA_{ag}^t and NRA_{nonag}^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. And, if both these 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 policy regime has an anti- (pro)agricultural bias.

In calculating the NRA for producers of agricultural and nonagricultural tradables, the methodology outlined in appendix A 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, most authors of the focus country studies have had difficulty finding an appropriate estimate of the extent of this distortion; so, the impact on NRAs has not been included except in the case of 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 book. In the most common cases in earlier decades where, for the farm sector, the estimated NRA for importables is dominated by a negative NRA for exportables, the estimate of the sectoral average NRA for agriculture would be less negative than it should be, and, hence, so would the RRA estimate.⁵

To obtain the values of farmer assistance and consumer taxation, the authors of appendix B have multiplied the NRA estimates of the country authors by the gross value of production at undistorted prices to obtain an estimate in current U.S. dollars of the direct gross subsidy equivalent of assistance to farmers. This is then added up across products for each country and then across countries for any or all products to get regional aggregate transfer estimates for the countries under study. An aggregate estimate for the rest of the region is obtained by assuming that the weighted average NRA for the countries not under study is the same as the weighted average NRA for the countries under 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 gross subsidy equivalent values are also expressed on a per farmworker 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 current U.S. dollars of the tax equivalent to consumers of primary farm products. This, too, is added up across products for a country and across countries for any or all products to obtain regional aggregate transfer estimates for the countries under study. These values are also expressed on a per capita basis.

Estimates of Latin American Policy Indicators

We begin with the NRAs for agriculture. We compare these with the NRAs for nonagriculture and then express this in terms of the U.S. dollar equivalents of assistance or taxation among farmers and of taxation or subsidies among food consumers.

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 (when expressed as a nominal tax equivalent) peaked at more than 20 percent in the 1970s, but was still close to 10 percent in the later 1980s. The only countries in our sample that received positive assistance from farm policies during that period were Chile and (at least from the late 1970s, but only to a minor extent) 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 had 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 North American Free Trade Agreement, 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 *NRA_{ag}* for the region in the 1990s and the first half of the present decade averaged only slightly under 5 percent (table 1.9). Its switch from negative to positive occurred in 1992 (appendix B, table B.9, panel b).

The effect of the policy reforms on NRAs over the past two decades is illustrated in figure 1.1. For all countries, except Chile, the national average NRA was

Table 1.9. NRAs in Agriculture, Latin America, 1965–2004
(percent)

Country	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 ^a	–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	–18.1	–21.2	–30.7	–36.4	–1.0	9.2	2.5
Ecuador ^a	–9.6	–22.4	–15.0	5.9	–1.0	–5.3	–2.0	10.1
Mexico	—	—	—	3.8	3.0	30.8	4.2	11.6
Nicaragua ^a	—	—	—	—	—	–3.2	–11.3	–4.2
Unweighted average ^b	–2.8	–15.6	–14.5	–7.7	–8.3	2.3	3.2	4.9
Weighted average	–7.2	–21.0	–18.0	–12.5	–10.9	4.2	5.5	4.8
Dispersion of country NRAs ^c	13.8	22.2	17.4	18.7	19.1	13.6	8.9	13.1

Sources: Based on estimates reported in chapters 2–9.

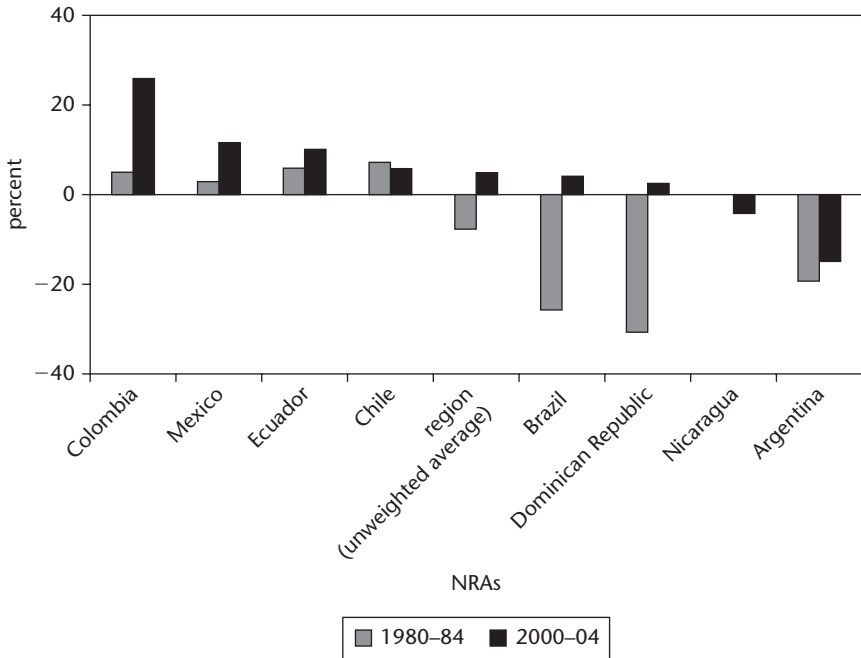
Note: The table shows the weighted average for each country, including product-specific input distortions and non-product-specific assistance, as well as author guesstimates for noncovered farm products, with weights based on the gross value of agricultural production at undistorted prices. — = no data are available.

a. For Brazil and Ecuador: 1965–69 = 1966–69. For Nicaragua: 1990–94 = 1991–94.

b. The unweighted average is the simple average of the national NRA (weighted) averages across the eight countries.

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 1.1. NRAs in Agriculture, Latin America, 1980–84 and 2000–04



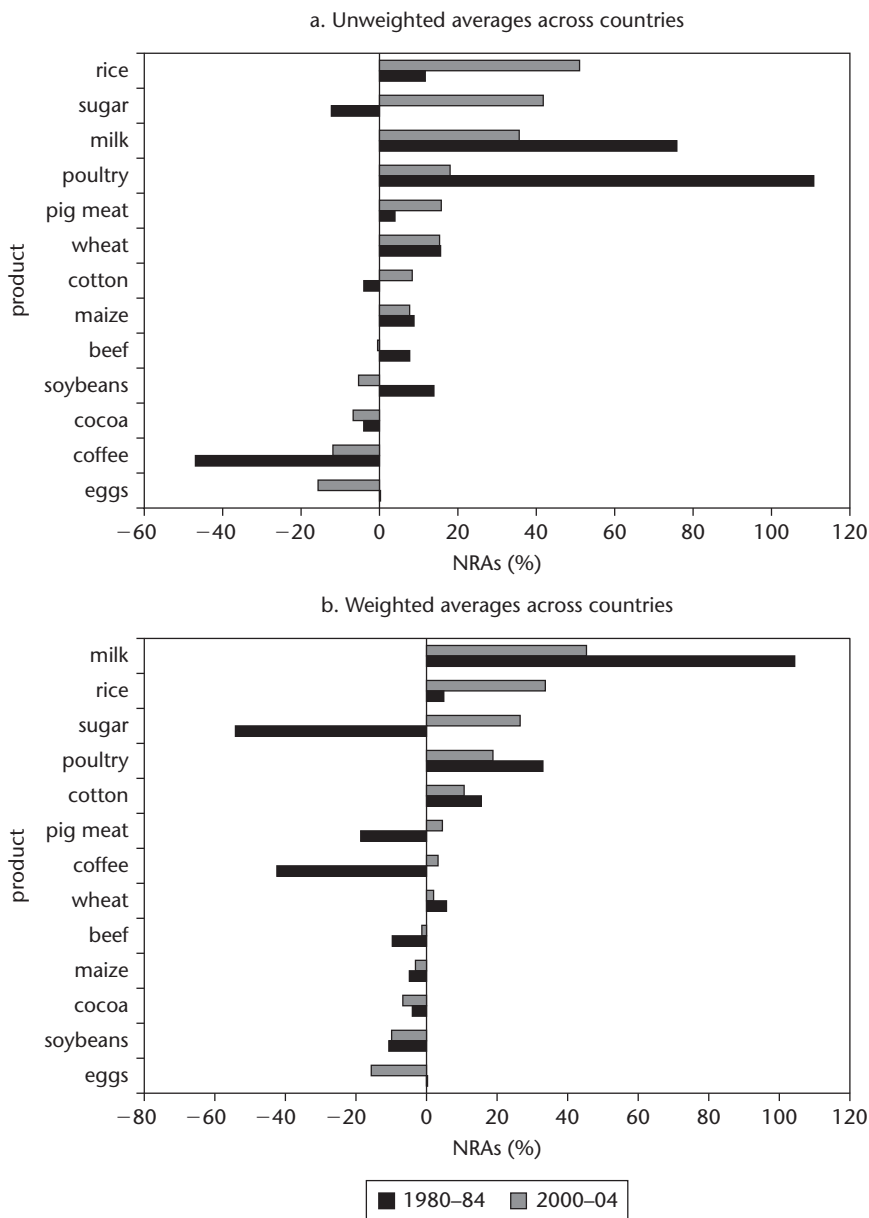
Source: Based on estimates reported in chapters 2–9.

Note: There are no estimates for Nicaragua for 1980–84.

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 1.2, which also illustrates 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, and 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 1.10. 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.

Figure 1.2. NRAs, by Product, Latin America, 1980–84 and 2000–04



Source: Based on estimates reported in chapters 2–9.

Note: The weights in chart b are based on the gross value of agricultural production at undistorted prices. Thus, each NRA (by country, by product) is weighted by the value of production of that commodity in each country in a given year. Products with less than 1 percent of the gross value of regional production are excluded. The latter products include apples, cassava, cocoa, garlic, onions, palm oil, peanuts, and sesame.

Table 1.10. Dispersion of NRAs across Covered Agricultural Products, Latin America, 1965–2004
(percent)

Country	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–04
Argentina	18.5	7.5	10.8	9.2	8.9	7.1	9.4	12.6
Brazil ^a	27.8	43.0	45.0	37.2	27.1	29.6	8.7	8.3
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	64.3	89.3	83.0	102.3	137.1	92.6	132.8
Ecuador ^a	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 ^a	—	—	—	—	—	41.9	38.7	32.0
Unweighted average ^b	49.9	43.6	53.3	52.4	43.9	42.0	31.7	39.5
Product coverage ^c	54	64	68	71	68	65	69	70

Sources: Based on estimates reported in chapters 2–9.

Note: The 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. — = no data are available

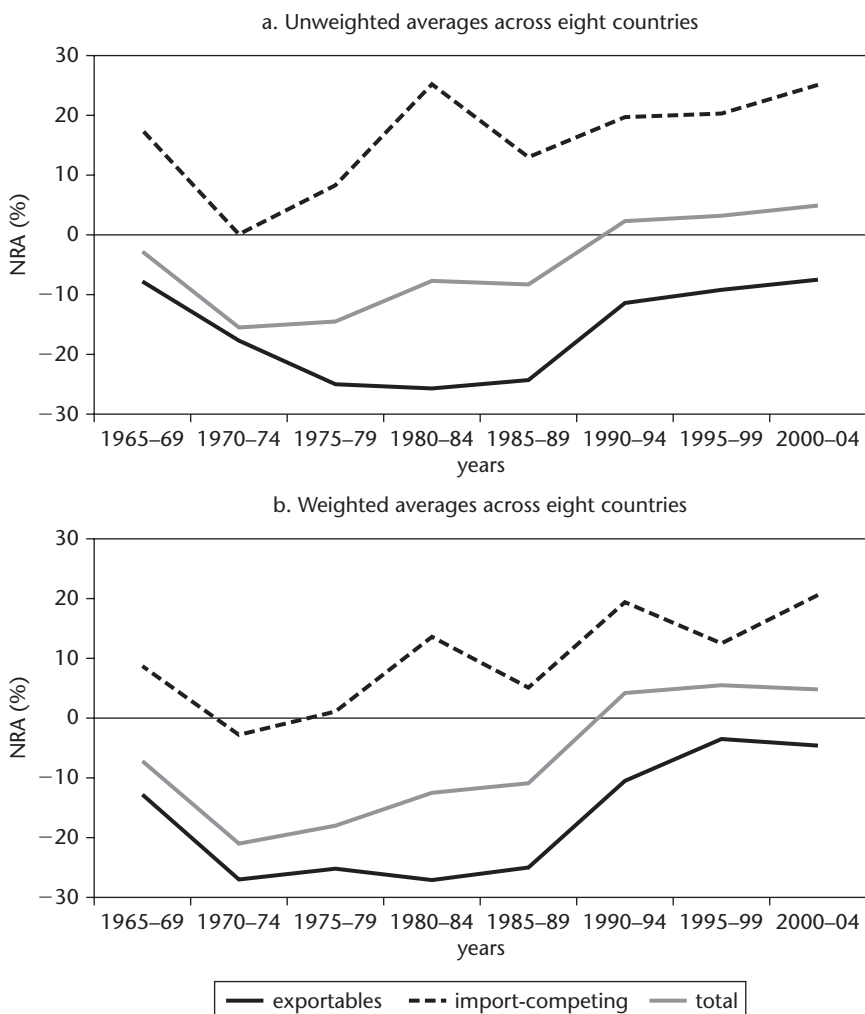
a. For Brazil and Ecuador: 1965–69 = 1966–69. For Nicaragua: 1990–94 = 1991–94.

b. The unweighted average is the simple average across the eight countries of their 5-year simple average dispersion measures.

c. Product coverage represents the percent share of the gross value of total agricultural production at undistorted prices accounted for by covered products.

One striking feature of the distortion pattern within the farm sector is the strong antitrade bias. This is shown for agriculture's import-competing and export subsectors in the region in figure 1.3 and for each country in table 1.11 (along with the TBI). These estimates reveal that there has been little diminution

Figure 1.3. NRAs for Exportable, Import-Competing, and All Agricultural Products, Latin America, 1965–2004



Source: Based on estimates reported in chapters 2–9.

Note: The total NRA may be above or below the averages for exportables and importables because assistance for nontradables and non-product-specific assistance are also included.

Table 1.11. NRAs for Exportable and Import-Competing Products, and the TBI, Latin America, 1965–2004
(percent)

Country, agricultural sector	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–04
<i>Argentina</i>								
NRA exportables	–22.7	–22.9	–20.4	–19.3	–15.8	–7.0	–4.0	–14.9
NRA import-competitors	—	—	—	—	—	—	—	—
TBI	—	—	—	—	—	—	—	—
<i>Brazil^a</i>								
NRA exportables	–8.4	–33.2	–30.0	–31.5	–29.5	–18.9	0.4	1.2
NRA import-competitors	41.4	26.6	–1.9	–6.8	–22.5	–15.6	7.8	11.6
TBI	–0.35	–0.47	–0.27	–0.21	–0.09	–0.04	–0.07	–0.09
<i>Chile</i>								
NRA exportables	21.9	35.2	–1.2	–2.0	–1.2	–0.6	–0.5	–0.3
NRA import-competitors	–5.4	–11.3	3.4	10.1	21.3	13.8	12.5	6.3
TBI	0.31	0.53	–0.04	–0.11	–0.18	–0.12	–0.12	–0.06
<i>Colombia</i>								
NRA exportables	–9.8	–17.7	–17.5	–9.2	–8.8	1.7	–1.7	26.0
NRA import-competitors	8.2	–14.8	–2.8	52.7	26.6	16.7	40.0	46.2
TBI	–0.15	0.00	–0.11	–0.40	–0.27	–0.11	–0.29	–0.13
<i>Dominican Republic</i>								
NRA exportables	–10.9	–28.2	–36.1	–51.7	–61.0	–44.6	–13.4	–29.4
NRA import-competitors	40.8	14.7	15.9	20.2	6.7	69.8	48.5	43.7
TBI	–0.37	–0.36	–0.44	–0.59	–0.61	–0.67	–0.42	–0.51

(Table continues on the following page.)

Table 1.11. NRAs for Exportable and Import-Competing Products, and the TBI, Latin America, 1965–2004 (continued)

Country, agricultural sector	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–04
<i>Ecuador^a</i>								
NRA exportables	–20.6	–40.0	–43.2	–31.1	–26.1	–11.0	–9.3	–3.2
NRA import-competitors	–1.9	–14.5	26.4	53.8	26.7	–1.0	7.8	22.2
TBI	–0.19	–0.28	–0.55	–0.55	–0.38	–0.09	–0.15	–0.20
<i>Mexico</i>								
NRA exportables	—	—	—	–35.1	–27.9	4.7	–16.0	–19.9
NRA import-competitors	—	—	—	21.4	19.2	43.1	8.3	21.4
TBI	—	—	—	–0.47	–0.39	–0.27	–0.23	–0.34
<i>Nicaragua^a</i>								
NRA exportables	—	—	—	—	—	–14.9	–29.1	–18.1
NRA import-competitors	—	—	—	—	—	12.5	17.5	24.9
TBI	—	—	—	—	—	–0.24	–0.39	–0.33
<i>Unweighted average^b</i>								
NRA exportables	–7.8	–17.7	–25.0	–25.7	–24.3	–11.4	–9.2	–7.5
NRA import-competitors	17.5	0.1	8.3	25.2	13.0	19.7	20.3	25.1
TBI	–0.22	–0.18	–0.31	–0.41	–0.33	–0.26	–0.25	–0.26
<i>Weighted average^b</i>								
NRA exportables	–12.8	–27.0	–25.2	–27.1	–25.0	–10.5	–3.5	–4.6
NRA import-competitors	8.7	–2.8	1.1	13.6	5.1	19.4	12.5	20.6
TBI	–0.20	–0.25	–0.26	–0.36	–0.29	–0.25	–0.14	–0.21

Source: Based on estimates reported in chapters 2–9.

Note: — = no data are available.

a. For Brazil: NRA import-competing products in 1970–74 includes rice in 1973–74 only. For Brazil and Ecuador: 1965–69 = 1966–69. For Nicaragua: 1990–94 = 1991–94.

b. The regional averages of the TBI are calculated from the regional averages of the NRAs for the exportable and import-competing segments of the agricultural sector.

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, except Chile (plus Brazil during the past decade and Colombia in the present decade), while the regional average NRA for import-competing farm industries has increased from virtually zero in the 1970s to 20 percent or more in the period since 1990. Thus, 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 under study (table 1.11).

The contributions to the overall NRA for agriculture for the region as a whole provided by covered products, noncovered products, and non-product-specific assistance are summarized in table 1.12. Non-product-specific 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 (figure 1.4). 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 of Argentina since the early 1990s and, to a smaller extent, of 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 (table 1.13).

The dollar value of the positive or negative assistance to farmers arising from agricultural price and trade policies has been nontrivial. The antiagricultural bias peaked for the region in the 1980s at more than US\$10 billion per year in current dollar terms (and, hence, much more than that in 2008 dollars), 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 1.14, panel a). This is equivalent to a gross tax of around US\$250 for each person engaged in agriculture. Nearly two-thirds of this US\$10 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 has not meant that there is no intervention now. Rather, the old policy has been replaced by positive assistance to farmers in the remaining six countries. This assistance has averaged almost US\$6 billion per year, or around US\$150 per farmworker, over the past decade. The US\$150 is small compared with per capita income for the region (about 4 percent), but it ranges from more than US\$500 in Colombia (one-quarter of that country's per capita GDP in 2000–04) to –US\$1,700 in

Table 1.12. NRAs in Agriculture Relative to Nonagricultural Industries, Latin America, 1965–2004
(percent)

a. Unweighted average NRAs across eight countries

Category	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–04
Covered products ^a	–8.6	–21.9	–16.8	–8.8	–8.9	0.9	1.1	4.1
Noncovered products	–0.5	–9.3	–10.0	–6.5	–7.5	1.4	0.9	0.4
All agricultural products ^a	–5.4	–17.1	–15.0	–8.3	–9.3	0.4	0.7	2.7
Total agricultural NRA ^b	–2.8	–15.6	–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
All agricultural tradables ^b	–6.0	–19.2	–16.4	–7.2	–8.2	2.6	3.5	5.7
All nonagricultural tradables	21.5	20.6	15.6	14.3	13.4	7.3	6.5	5.7
RRA	–22.6	–33.0	–27.7	–18.8	–19.1	–4.4	–2.9	0.0

b. Weighted averages across eight countries

Category	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–04
Covered products ^a	–13.0	–25.1	–19.6	–14.6	–14.3	0.9	0.8	2.7
Noncovered products	–3.3	–15.5	–15.0	–10.9	–13.1	0.7	3.8	2.1
All agricultural products ^a	–8.6	–21.7	–18.1	–13.6	–14.0	0.8	1.7	2.5
Total agricultural NRA ^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
All agricultural tradables ^b	–9.3	–23.0	–19.0	–12.9	–11.2	4.4	5.5	4.9
All nonagricultural tradables	31.3	27.8	23.3	18.5	16.8	7.3	6.6	5.4
RRA	–30.9	–39.8	–34.2	–26.6	–24.0	–2.7	–1.0	–0.5

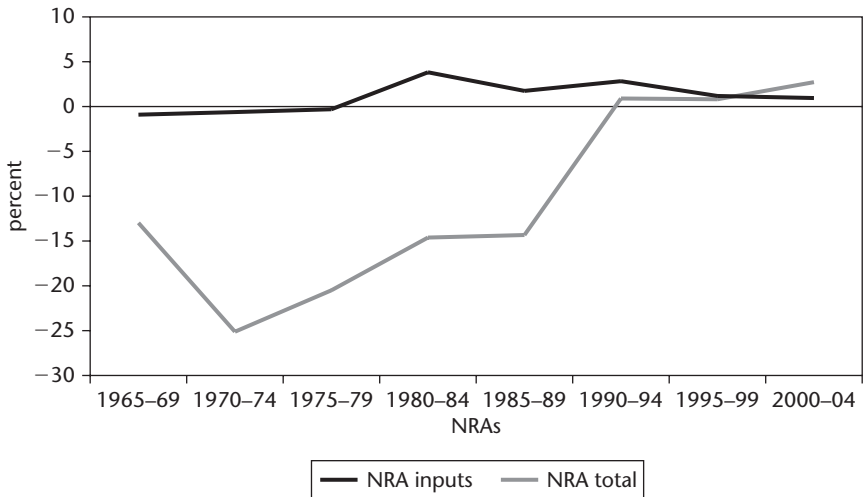
Source: Based on estimates reported in chapters 2–9.

a. NRAs, including product-specific input subsidies.

b. NRAs, including non-product-specific assistance, that is, the assistance for all primary factors and intermediate inputs as a percentage of total primary agricultural production valued at undistorted prices.

c. The regional average TBI is calculated from the regional NRA averages for the exportable and import-competing segments of the agricultural sector.

Figure 1.4. NRAs of Total Covered Farm Products and NRAs from Input Price Distortions, Latin America, 1965–2004



Source: Based on estimates reported in appendix B.

Note: The total NRA for covered products is the sum of the NRA due to output assistance, NRA_o , and the NRA due to measures affecting purchased farm inputs, NRA_i , such that NRA_o is the difference between the two curves shown.

Argentina (a 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 1.5 for the individual countries and in table 1.15 and figure 1.6 for key products. The latter table and figure reveal that, as in most other regions of the world, the lion's share of assistance goes to (so-called) rice pudding (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

Table 1.13. NRAs for Covered Farm Products, by Policy Instrument, Latin America, 1965–2004
(percent)

Country, agricultural sector	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–04
<i>Argentina</i>								
NRA, inputs	0.0	0.1	0.2	0.5	0.1	–1.0	–4.2	–2.8
NRA, domestic market support	–0.6	–0.8	–0.4	–0.7	–1.5	–1.2	–0.4	–1.4
NRA, border market support	–25.7	–27.1	–24.6	–22.0	–17.2	–6.2	–0.5	–11.6
NRA, total	–26.3	–27.9	–24.7	–22.2	–18.6	–8.3	–5.2	–15.8
<i>Brazil</i>								
NRA, inputs	0.0	0.0	0.0	4.4	2.5	4.7	4.2	2.4
NRA, domestic market support	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NRA, border market support	–6.1	–27.3	–23.3	–32.4	–30.1	–22.7	–2.4	–0.4
NRA, total	–6.1	–27.3	–23.3	–28.0	–27.6	–18.0	1.8	2.0
<i>Chile</i>								
NRA, inputs	–3.7	–3.3	–2.8	–4.4	–5.8	–4.0	–2.1	–1.3
NRA, domestic market support	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NRA, border market support	–2.6	–7.3	5.4	8.5	26.4	17.7	13.4	8.0
NRA, total	–6.3	–10.6	2.5	4.2	20.6	13.7	11.2	6.7
<i>Colombia</i>								
NRA, inputs	–2.1	–1.7	–1.1	–1.6	–2.6	–1.8	–1.5	–1.5
NRA, domestic market support	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NRA, border market support	–4.2	–14.6	–13.5	5.5	1.7	7.9	11.4	30.2
NRA, total	–6.3	–16.4	–14.6	3.9	–0.9	6.1	10.0	28.6
<i>Dominican Republic</i>								
NRA, inputs	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NRA, domestic market support	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0
NRA, border market support	5.0	–18.1	–21.2	–30.7	–36.4	–1.0	9.2	2.5
NRA, total	5.0	–18.1	–21.2	–30.7	–36.4	–1.0	9.2	2.5

Table 1.13 (continued)

<i>Ecuador</i>								
NRA, inputs	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NRA, domestic market support	0.0	0.0	0.0	0.0	1.4	0.0	0.0	0.0
NRA, border market support	-14.7	-31.5	-20.8	9.9	-2.2	-6.4	-2.0	12.2
NRA, total	-14.8	-31.5	-20.8	9.9	-0.8	-6.4	-2.0	12.2
<i>Mexico</i>								
NRA, inputs	—	—	—	7.7	5.3	5.2	1.6	2.3
NRA, domestic market support	—	—	—	5.2	2.9	4.4	1.3	2.8
NRA, border market support	—	—	—	-11.4	-7.1	19.2	-2.8	4.0
NRA, total	—	—	—	1.5	1.1	28.8	0.1	9.2
<i>Nicaragua</i>								
NRA, inputs	—	—	—	—	—	-3.2	-2.4	-2.8
NRA, domestic market support	—	—	—	—	—	0.0	0.0	0.0
NRA, border market support	—	—	—	—	—	-3.9	-13.9	-7.1
NRA, total	—	—	—	—	—	-7.1	-16.4	-9.9
<i>Unweighted average</i>								
NRA, inputs	-1.0	-0.8	-0.5	1.0	-0.1	0.1	-0.5	-0.5
NRA, domestic market support	-0.1	-0.1	0.1	0.6	0.4	0.4	0.1	0.2
NRA, border market support	-7.5	-21.0	-16.4	-10.4	-9.2	0.4	1.5	4.4
NRA, total	-8.6	-21.8	-16.8	-8.8	-8.9	0.9	1.1	4.1
<i>Weighted average^a</i>								
NRA, inputs	-0.9	-0.6	0.0	3.8	1.7	2.8	1.2	0.9
NRA, domestic market support	-0.2	-0.2	0.2	1.3	0.7	1.1	0.3	0.6
NRA, border market support	-11.9	-24.3	-19.8	-19.8	-16.8	-3.0	-0.6	1.2
NRA, total	-13.0	-25.1	-19.6	-14.6	-14.3	0.9	0.8	2.7

Source: Information in appendix B.

Note: — = no data are available.

a. The weights are based on the gross value of agricultural production at undistorted prices.

Table 1.14. Gross Subsidy Equivalents of Assistance to Farmers, Latin America, 1965–2004**a. Total***(current US\$, millions)*

Country	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–04
Argentina	–406	–815	–996	–1,777	–1,132	–612	–569	–2,609
Brazil	–189	–2,531	–3,393	–7,700	–6,778	–2,991	2,968	1,576
Chile	114	108	77	163	286	332	443	303
Colombia	–87	–483	–712	378	–7	802	1,488	1,906
Dominican Republic	14	–145	–238	–431	–412	–15	142	37
Ecuador	–47	–146	–187	80	–22	–111	–67	337
Mexico	—	—	—	834	539	6,418	995	2,861
Nicaragua	—	—	—	—	—	–28	–133	–57
Eight-country total	–601	–4,012	–5,639	–8,454	–7,525	3,797	5,267	4,354
Regionwide ^a	–742	–4,954	–6,962	–10,437	–9,290	4,688	6,503	5,376

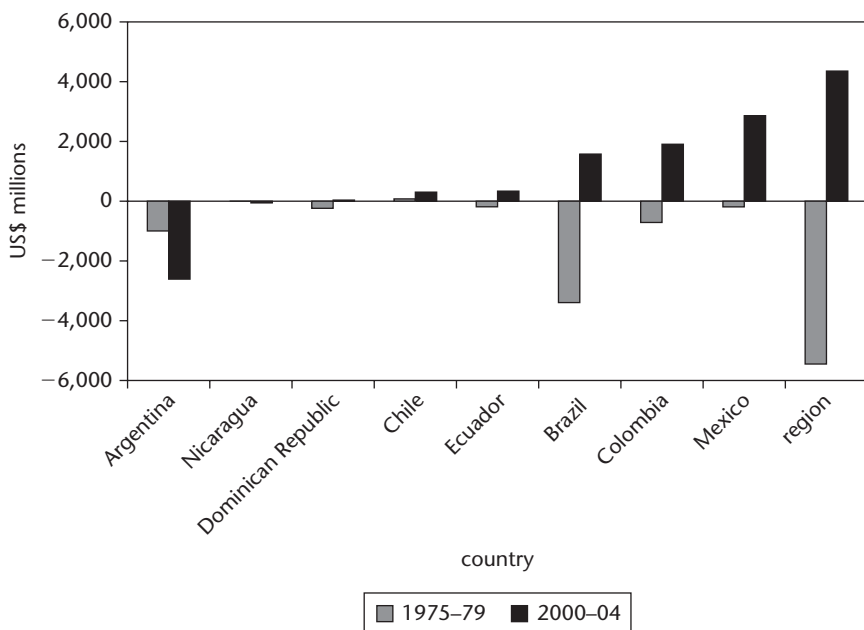
Table 1.14 (continued)
b. Per person engaged in agriculture
(current US\$)

Country	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–04
Argentina	–261	–550	–698	–1,265	–778	–414	–387	–1,786
Brazil	–12	–154	–198	–445	–416	–201	214	123
Chile	154	147	99	198	321	350	456	308
Colombia	–29	–150	–200	99	–2	216	399	515
Dominican Republic	20	–203	–339	–623	–589	–22	225	63
Ecuador	–49	–145	–184	76	–19	–91	–54	270
Mexico	—	—	—	102	64	749	116	336
Nicaragua	—	—	—	—	—	–71	–334	–144
Eight-country total	–21	–130	–173	–251	–227	119	170	147
Regionwide ^a	–20	–123	–165	–238	–211	108	150	126

Source: Information in appendix B.

Note: — = no data are available.

- a. The calculations assume that the rate of assistance in the countries not under study is the same as the average for the countries under study, excluding Mexico, and that the share of the former countries in the value of agricultural production in Latin America and the Caribbean (excluding Mexico) at undistorted prices is the same as the average share of the former in the region's agricultural GDP at distorted prices during 1990–2004, which was 23 percent.

Figure 1.5. Gross Subsidy Equivalents of Assistance to Farmers, Latin America, 1975–79 and 2000–04

Source: Information in appendix B.

Note: For 1975–79: no estimates for Nicaragua; estimates for Mexico refer to 1979 only.

have had to rely on applied trade taxes (for exports, as well as imports) rather than undertaking price comparisons, and, hence, they have not captured the quantitative restrictions on trade that were important in earlier decades, but that have been less important recently.⁶ 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 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 non-agricultural tradables should be considered a lower-bound estimate; this is especially true as we go back in time, so that the decline indicated in the NRA is less rapid than it actually is.⁷

Despite these methodological limitations, the estimated NRAs for nonfarm tradables prior to the 1990s are sizeable. For Latin America as a whole, the average

Table 1.15. Gross Subsidy Equivalents of Assistance to Farmers, by Product and Subsector, Latin America, 1965–2004

a. By product

(at undistorted farmgate prices, \$US millions)

Year	Rice	Wheat	Maize	Other grains	Soybeans	Other oilseeds	Sugar	Cotton	Cocoa
1965–69	24	–17	–92	0	1	0	8	–19	1
1970–74	–40	–216	–162	–1	–55	0	–1,829	–8	–8
1975–79	–230	91	–475	–56	–436	–81	–1,619	–159	–32
1980–84	–55	116	–396	53	–428	–110	–3,260	–156	–8
1985–89	–55	65	–707	10	–1,533	–151	–1,980	–380	–17
1990–94	201	395	–17	–5	–386	–92	–988	–158	–14
1995–99	569	79	–373	–151	–279	–256	233	36	–10
2000–04	614	30	–307	–113	–1,371	–241	970	78	–7
Year	Coffee	Fruits and vegetables	Beef	Pig meat	Poultry	Eggs	Milk	All covered products	
1965–69	–127	–19	–289	1	10	—	2	–516	
1970–74	–169	–41	–440	–4	15	—	–29	–2,987	
1975–79	–815	–163	–404	–53	116	–51	236	–4,030	
1980–84	–3,014	–165	–1,027	–565	423	–14	1,603	–7,003	
1985–89	–1,738	–623	–327	–504	344	–66	944	–6,716	
1990–94	30	–610	188	93	533	19	1,471	661	
1995–99	–536	–977	704	–110	378	–225	1,393	476	
2000–04	76	–750	–264	111	1,048	–285	1,915	1,504	

(Table continues on the following page.)

Table 1.15 (continued)**b. By subsector***(at undistorted farmgate prices, US\$ billions)*

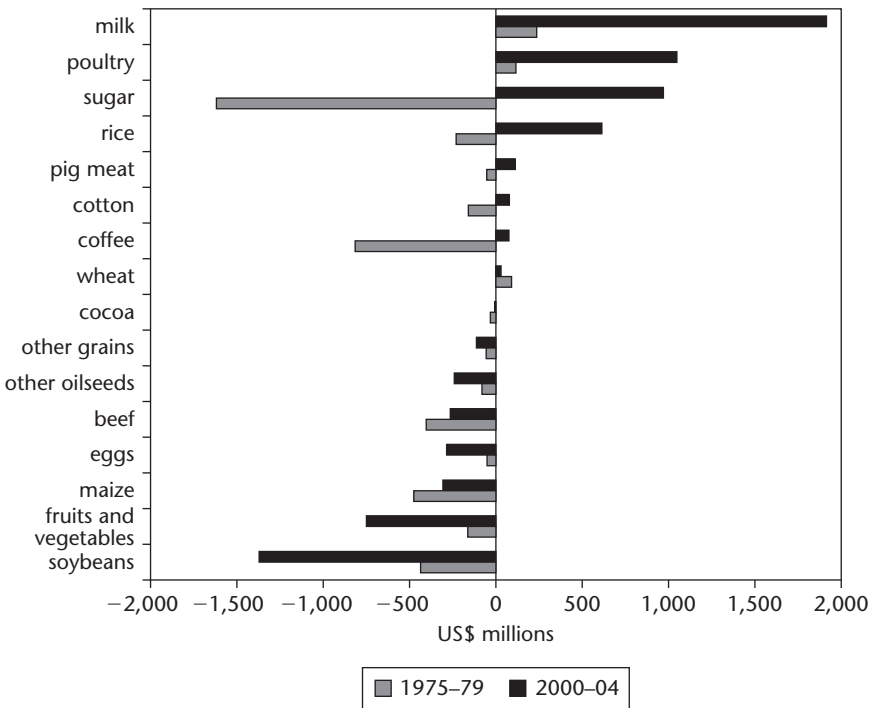
Year	Uncovered farm products ^a	Uncovered farm products	Total, all direct assistance to farmers ^b			
			Total	Exportables	Import-competing	Nontradables
1965–69	–0.5	–0.1	–0.6	–0.7	0.1	0.0
1970–74	–3.0	–1.1	–4.0	–3.9	–0.2	0.0
1975–79	–4.0	–1.5	–5.5	–5.5	0.0	0.0
1980–84	–7.0	–2.2	–8.5	–12.1	2.9	0.0
1985–89	–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: Information in appendix B.

a. Including product-specific input subsidies.

b. Including assistance to nontradables and non-product-specific assistance.

Figure 1.6. Gross Subsidy Equivalents of Assistance to Farmers, by Product, Latin America, 1975–79 and 2000–04

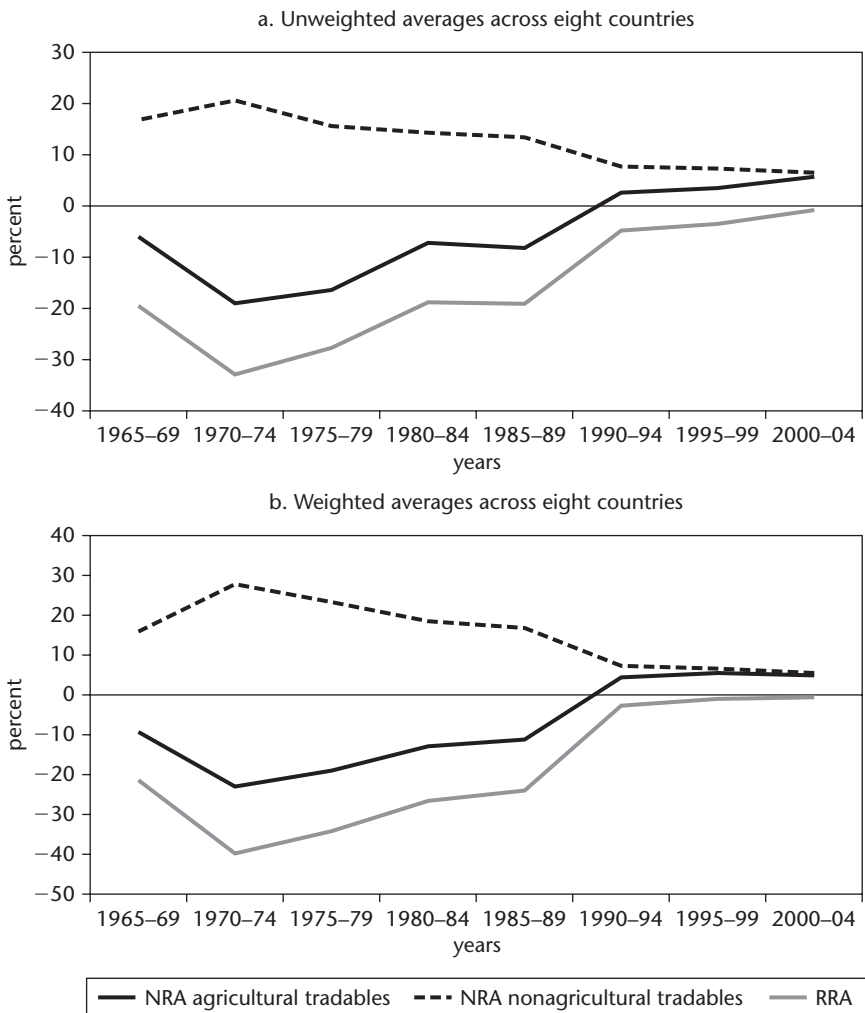


Source: Information in appendix B.

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 more than –30 percent in the 1970s to an average of less than –1 percent in 2000–04 (see table 1.12), and this appears (in figure 1.7) 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 (figure 1.8), particularly in the case of Brazil and the Dominican Republic (the virtual disappearance of negative RRAs) and of Colombia (a switch from negative to positive RRAs). The four-decade trend in RRAs for each country is summarized in table 1.16.

Comparisons with other regions

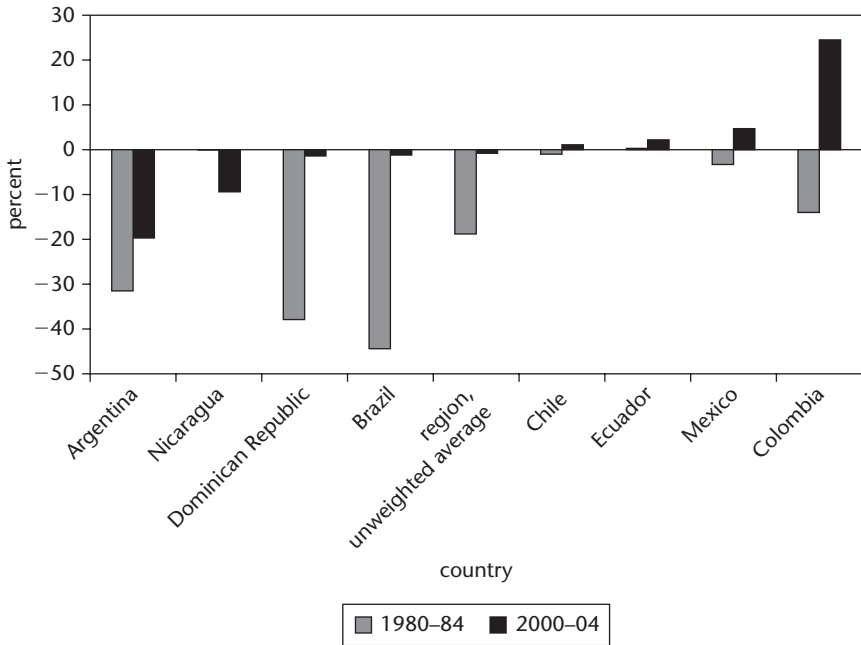
The regional upward shift in agricultural NRAs and in the RRAs toward zero and even the move to a positive NRA during the past decade are not unique to

Figure 1.7. NRAs for Agricultural and Nonagricultural Tradables and the RRA, Latin America, 1965–2004

Source: Based on estimates reported in chapters 2–9.

Latin America. Figure 1.9 shows that even steeper trends have resulted from policy reforms in other developing-country regions over the past four decades, suggesting that similar political economy trends might be at work as economies develop. This is so despite the fact that farm-nonfarm household income inequality is different in Latin America (figure 1.10). In the past, it has been found that agricultural NRAs and RRAs are positively correlated with per capita income and agricultural comparative disadvantage (Anderson 1995). A glance at table 1.17

Figure 1.8. RRAs in Agriculture, Latin America, 1980–84 and 2000–04



Source: Based on estimates reported in chapters 2–9.

Note: For Nicaragua, 1980–84: no data are available.

suggests that Latin American countries have been and continue to be contributors to the trend. This is confirmed statistically in the simple regressions with country fixed effects shown in figure 1.11 (apart from the RRA and the agricultural comparative advantage), and with the multiple regressions with country fixed and time fixed effects shown in table 1.18.

The CTEs of agricultural policies

The extent to which farm policies impact on the retail consumer price of food and on 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. We therefore attempt 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). To obtain weights to make it possible to sum up across commodities and countries, we calculate the volume of apparent consumption simply as production, plus net imports and then value the result at undistorted prices.

Table 1.16. RRAs in Agriculture, Latin America, 1965–2004
(percent)

Country	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–04
<i>Argentina</i>								
NRA, agricultural	–22.7	–22.9	–20.4	–19.3	–15.8	–7.0	–4.0	–14.9
NRA, nonagricultural	52.3	35.1	21.1	17.7	15.8	11.0	10.5	5.7
RRA	–49.2	–43.0	–34.2	–31.5	–27.4	–16.2	–13.1	–19.7
<i>Brazil^a</i>								
NRA, agricultural	–6.1	–27.3	–23.3	–25.7	–21.1	–11.3	8.0	4.1
NRA, nonagricultural	—	34.7	35.7	33.6	29.6	8.3	7.8	5.4
RRA	—	–46.1	–43.5	–44.4	–39.1	–17.9	0.2	–1.2
<i>Chile</i>								
NRA, agricultural	3.1	3.5	1.9	6.1	13.6	8.1	7.4	3.5
NRA, nonagricultural	26.1	32.1	11.2	7.2	9.0	5.9	5.3	2.3
RRA	–18.0	–20.0	–8.0	–1.0	4.2	2.2	2.0	1.1
<i>Colombia</i>								
NRA, agricultural	–5.1	–17.8	–15.2	6.2	0.8	10.6	16.6	33.3
NRA, nonagricultural	28.1	24.4	18.9	23.7	23.5	9.6	7.9	7.1
RRA	–25.6	–34.0	–28.7	–14.0	–18.4	1.3	8.1	24.5
<i>Dominican Republic</i>								
NRA, agricultural	5.3	–18.9	–22.2	–31.4	–37.3	–1.0	9.7	2.8
NRA, nonagricultural	9.1	8.7	10.2	10.4	10.2	9.3	5.8	4.2
RRA	–3.5	–25.4	–29.5	–37.9	–43.0	–9.4	3.6	–1.4

Table 1.16 (continued)

<i>Ecuador^a</i>								
NRA, agricultural	−14.8	−31.5	−20.8	9.9	−0.8	−6.4	−2.6	11.2
NRA, nonagricultural	1.2	−3.2	4.8	9.4	8.6	2.5	5.8	8.5
RRA	−15.8	−29.3	−24.5	0.3	−8.8	−8.8	−8.1	2.2
<i>Mexico</i>								
NRA, agricultural	—	—	—	3.9	3.0	31.2	4.2	11.8
NRA, nonagricultural	—	—	—	7.2	4.0	5.8	3.2	6.8
RRA	—	—	—	−3.3	−1.1	24.1	1.0	4.7
<i>Nicaragua^a</i>								
NRA, agricultural	—	—	—	—	—	−3.2	−11.3	−4.2
NRA, nonagricultural	—	—	—	—	—	7.1	6.1	5.7
RRA	—	—	—	—	—	−9.6	−16.4	−9.4
<i>Unweighted average^b</i>								
NRA, agricultural	−6.0	−19.0	−16.4	−7.2	−8.2	2.6	3.5	5.7
NRA, nonagricultural	21.5	20.6	15.6	14.3	13.4	7.3	6.5	5.7
RRA	−22.6	−33.0	−27.7	−18.8	−19.1	−4.4	−2.9	0.0
<i>Weighted average^c</i>								
NRA, agricultural	−9.3	−23.0	−19.0	−12.9	−11.2	4.4	5.5	4.9
NRA, nonagricultural	31.3	27.8	23.3	18.5	16.8	7.3	6.6	5.4
RRA	−30.9	−39.8	−34.2	−26.6	−24.0	−2.7	−1.0	−0.5
Dispersion ^d	19.4	12.6	16.1	20.6	19.1	13.6	8.9	12.6

Source: Based on estimates reported in chapters 2–9.

Note: — = no data are available.

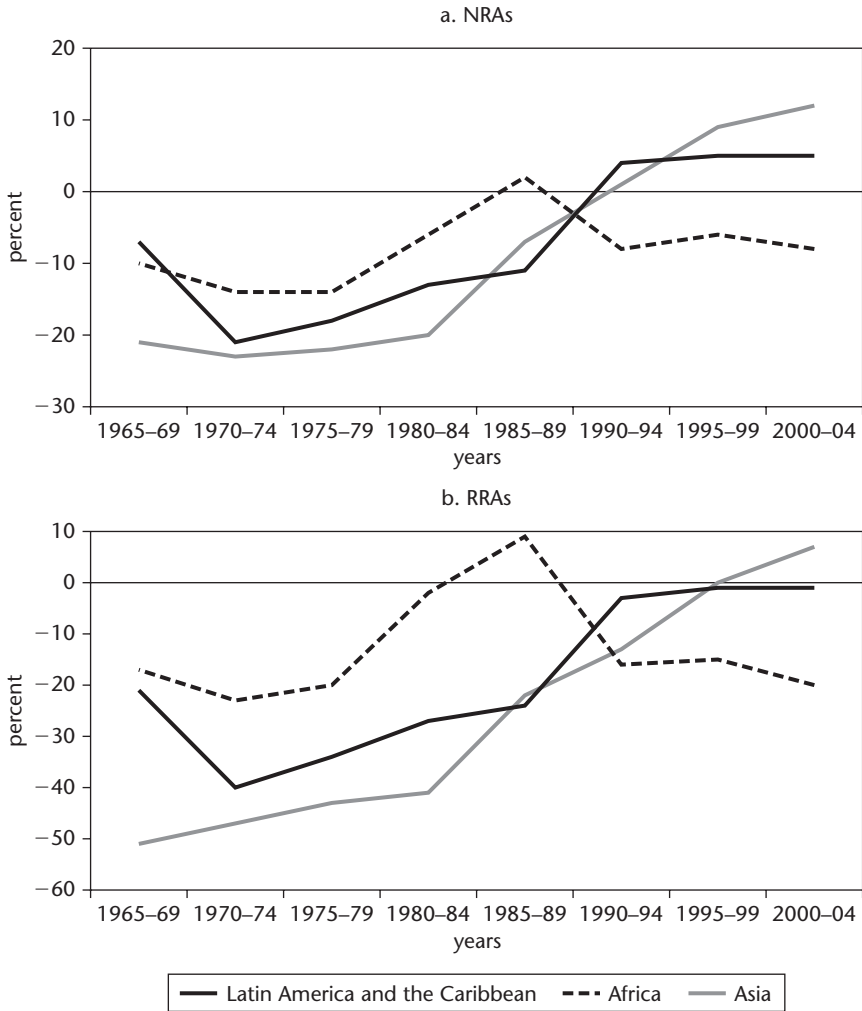
a. For Brazil and Ecuador: 1965–69 = 1966–69. For Nicaragua: 1990–94 = 1991–94.

b. Simple averages of the weighted national averages.

c. Weighted averages of the national averages using weights based on the gross value of national agricultural production at undistorted prices.

d. Dispersion is a simple five-year average of the standard deviation around a weighted mean of the national agricultural sector NRAs each year.

Figure 1.9. NRAs and RRAs, Asia, Africa, and Latin America, 1965–2004

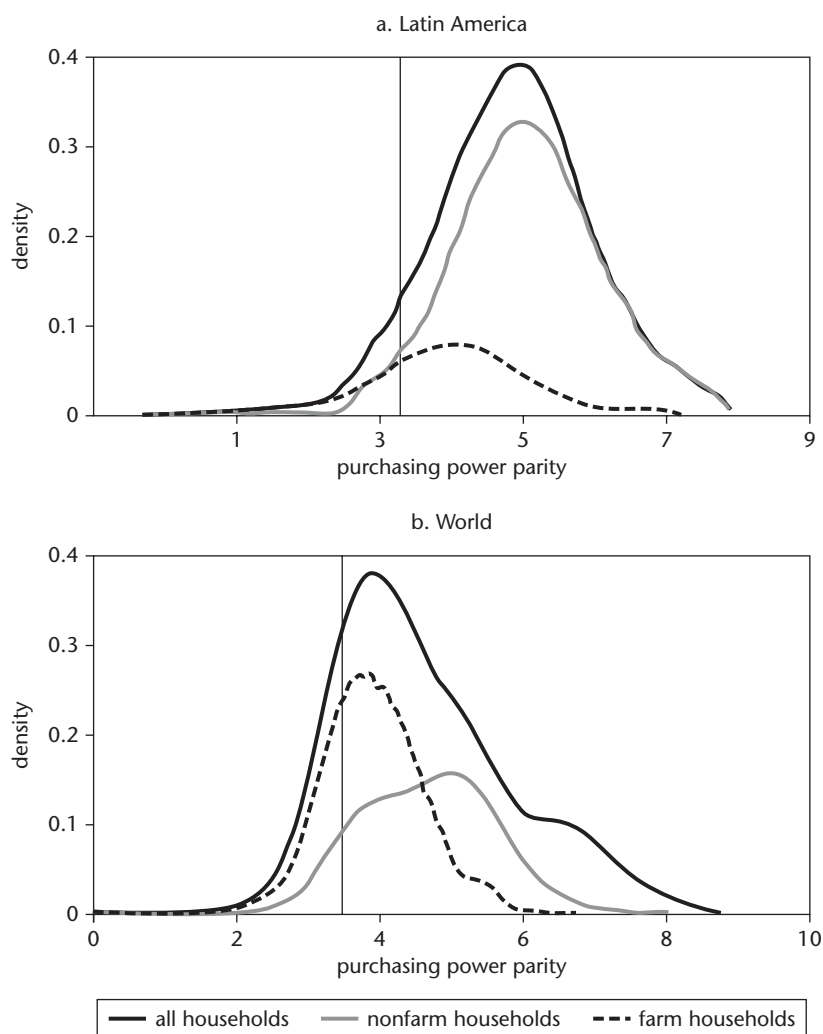


Sources: Based on estimates reported in chapters 2–9; Anderson forthcoming.

Note: The NRAs and RRAs are five-year averages weighted by the value of production at undistorted prices. For China, the NRAs for 1965–80 and the RRAs for 1965–81 have been extrapolated back based on the assumption that they were the same as the average for 1982–89.

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 these distortions are relatively minor in Latin America and because

Figure 1.10. Income Distribution, Latin America and the World, 2000



Source: Bussolo, de Hoyes, and Medledev forthcoming.

Note: The vertical line is at the \$1 a day poverty level.

the NRA tends to be positive for import-competing products and negative for exportables (until recently), then, this is the case for the CTE as well. This is evident in the CTE estimates summarized in table 1.19. The weighted average CTE for the region has thus been negative for most of the period, averaging around -12 percent until the 1990s and marginally above zero thereafter.

Table 1.17. Relative Income, Comparative Advantage, and NRAs and RRAs in Tradable Agriculture, Latin America, 2000–04

Country	Relative per capita income ^a	Agricultural comparative advantage ^b	NRA, %	RRA, %
Argentina	89	541	–14.9	–19.7
Brazil	54	355	4.1	–1.2
Chile	86	386	5.8	1.1
Colombia	35	264	25.9	24.5
Dominican Republic	41	474	2.5	–1.4
Ecuador	33	487	10.1	2.2
Mexico	112	64	11.6	4.7
Nicaragua	14	952	–4.2	–9.4
Unweighted average	69	219	4.8	–0.5

Sources: Two left columns: Sandri, Valenzuela, and Anderson 2007; two right columns: data reported in chapters 2–9.

a. Income per capita relative to the world average, 2000–04 (world = 100).

b. The share of agriculture and food in national exports as a percentage of the share of agriculture and food in global exports, 2000–04.

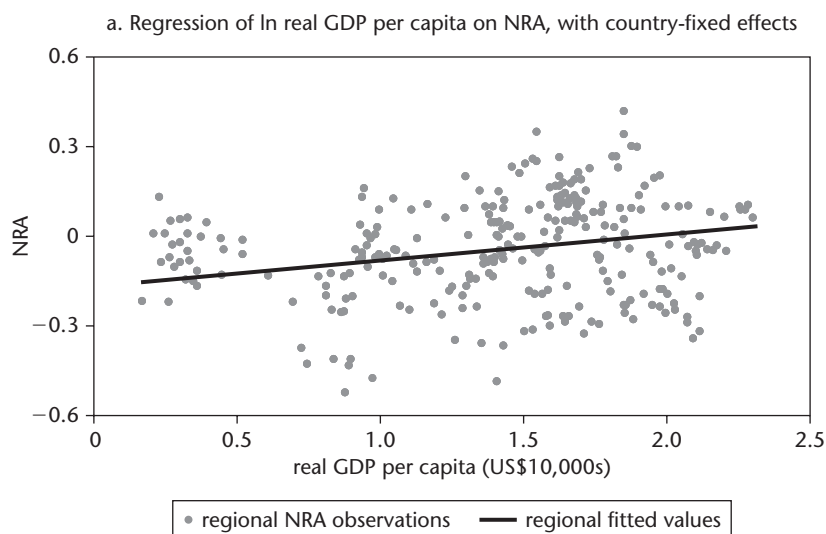
The variance across products is somewhat less now than before the reforms of the past two decades, but still considerable (see the final row of table 1.19).

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\$6 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, to the extent of around US\$5 billion per year (table 1.20). Among the covered products, the biggest transfers are for milk, sugar, and rice. But, even if one were also to take into account the assistance for noncovered products, the total per capita transfer from consumers in recent years would amount to only US\$15.⁸

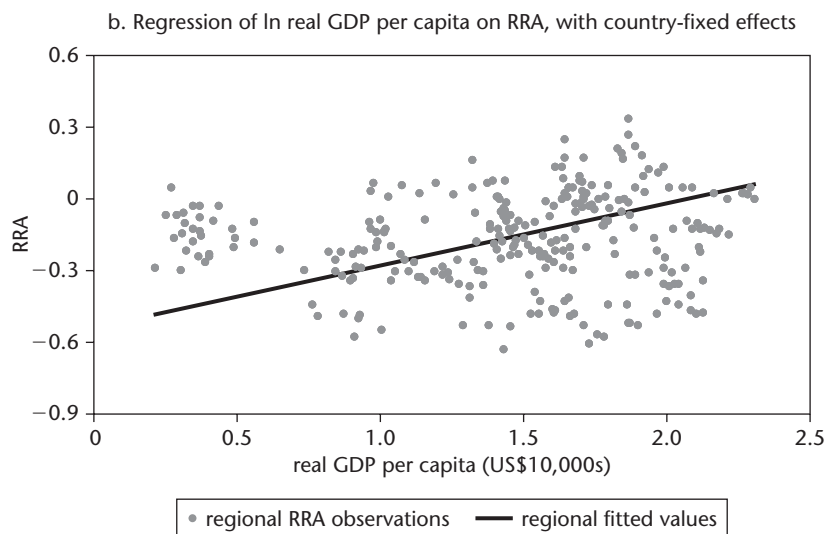
Summary: What Have We Learned?

The most salient feature of price and trade policies in the Latin American region since the 1960s is the major economic reform, including significant trade liberalization, in most countries during the later 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.

Figure 1.11. Real GDP Per Capita, Comparative Advantage, and NRAs and RRAs, Latin America, 1955–2005



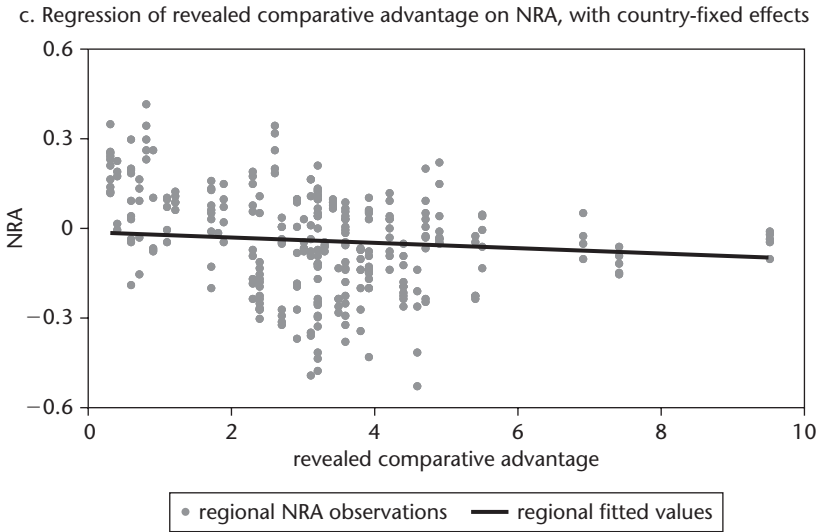
Coefficient: 0.08. Standard error: 0.04. R^2 : 0.03.



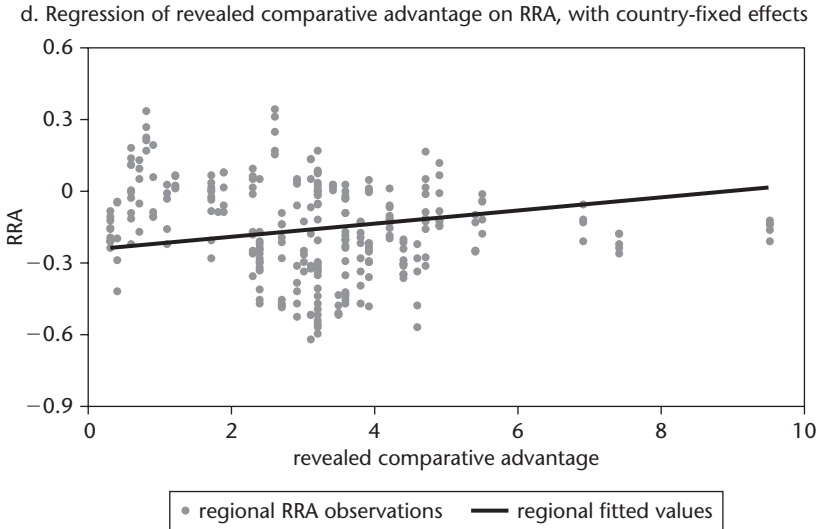
Coefficient: 0.19. Standard error: 0.04. R^2 : 0.01.

(Figure continues on the following page.)

Figure 1.11. Real GDP Per Capita, Comparative Advantage, and NRAs and RRAs, Latin America, 1955–2005 (continued)



Coefficient: -0.19 . Standard error: 0.01 . R^2 : 0.10 .



Coefficient: 0.03 . Standard error: 0.01 . R^2 : 0.04 .

Sources: Based on NRA estimates in spreadsheets prepared by the authors of chapters 2–9; economic data in Sandri, Valenzuela, and Anderson 2007.

Note: The dependent variable for the regressions is the NRA or RRA by country and year expressed as a fraction. The results are ordinary least squares estimates. The revealed comparative advantage is the share of agriculture and processed food in national exports as a ratio of that sector's share in global exports.

Table 1.18. NRAs and Some of Their Determinants, Latin America, 1960–2004

Explanatory variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Ln GDP per capita	−0.23* (0.10)	−0.33* (0.09)	0.11 (0.10)	−0.07 (0.12)	−0.36* (0.14)	−0.36* (0.13)	−0.28 (0.24)	0.06 (0.23)	0.02 (0.20)	0.06 (0.19)	−0.22 (0.31)	0.06 (0.28)
Ln GDP per capita squared	0.02 (0.04)	0.06 (0.04)	−0.07 (0.04)	−0.03 (0.05)	0.16* (0.05)	0.14* (0.05)	0.14 (0.08)	0.03 (0.08)	0.06 (0.06)	0.02 (0.06)	0.14 (0.10)	0.01 (0.09)
Importables		0.45* (0.05)	0.31* (0.05)	0.37* (0.06)		0.51* (0.06)	0.33* (0.06)	0.40* (0.06)		0.52* (0.06)	0.35* (0.05)	0.42* (0.06)
Exportables		−0.01 (0.06)	−0.03 (0.05)	0.00 (0.06)		0.06 (0.06)	−0.00 (0.06)	−0.03 (0.06)		0.07 (0.06)	−0.01 (0.06)	0.04 (0.06)
Revealed comparative advantage ^a				−0.02* (0.01)				−0.05* (0.01)				−0.06* (0.01)
Trade specialization index ^b			−0.04 (0.03)				−0.20* (0.06)				−0.18* (0.06)	
Constant	0.41* (0.06)	0.24* (0.07)	−0.03 (0.08)	0.17 (0.11)	0.29* (0.09)	0.06 (0.10)	0.10 (0.18)	−0.11 (0.17)	0.00 (0.08)	−0.29* (0.09)	−0.15 (0.32)	0.17 (0.17)
R ²	0.02	0.16	0.12	0.13	0.00	0.15	0.09	0.08	0.08	0.19	0.15	0.17
Number of observations	2,564	2,564	2,314	2,314	2,564	2,564	2,314	2,414	2,564	2,564	2,314	2,414
Country-fixed effects	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time-fixed effects	No	No	No	No	No	No	No	No	Yes	Yes	Yes	Yes

Source: Authors' estimates.

Note: The dependent variable for regressions is the NRA by commodity and year. The results are ordinary least squares estimates. The main explanatory variable is Ln GDP per capita in US\$10,000s.

a. The revealed comparative advantage index is the share of agriculture and processed food in national exports as a ratio of the same sector's share of global exports (world = 1).

b. Net exports as a ratio of the sum of the exports and imports of agricultural and processed food products (world = 1).

*Significance at the 99 percent level. Standard errors are shown in parentheses.

Table 1.19. CTEs for Covered Farm Products, Latin America, 1965–2003*(percent, at the primary product level)***a. Aggregate CTEs, by country**

Country	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–03
Argentina	–27.5	–27.3	–24.8	–23.6	–16.7	–5.7	0.0	–9.2
Brazil	0.4	–18.9	–17.0	–24.0	–26.9	–24.5	–0.5	0.2
Chile	–2.6	–10.2	5.0	10.9	28.0	19.9	15.6	11.6
Colombia	6.0	–10.8	–0.9	21.5	14.7	14.3	24.9	33.8
Dominican Republic	14.1	–3.9	–4.7	–10.8	–22.0	20.5	19.3	8.5
Ecuador	–12.2	–27.1	2.9	33.9	17.0	–3.8	4.5	18.7
Mexico	—	—	—	–6.3	–0.2	16.1	–0.7	13.8
Nicaragua	—	—	—	—	—	12.3	10.8	10.1
Unweighted average	–3.0	–16.4	–6.9	0.2	–0.9	4.7	8.0	9.9
Weighted average ^a	–6.7	–19.0	–13.6	–12.4	–11.3	–3.0	2.3	7.4
Dispersion of national CTEs ^b	15.0	10.1	14.1	26.3	24.3	18.0	12.0	13.3

Table 1.19 (continued)*(percent, at the primary product level)***b. CTEs, by product, across eight countries**

Product	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–03
Rice	30	8	–10	0	5	6	19	28
Wheat	13	–3	31	22	–7	1	0	–1
Maize	–9	–5	–13	–11	–19	–2	–7	6
Other grains	0	0	–6	–6	3	10	4	2
Soybeans	4	–11	–20	–14	–19	–18	3	–4
Other oilseeds	0	0	–22	–20	–19	–6	–6	–10
Sugar	25	–59	–40	–51	–39	–10	20	51
Cotton	–6	–1	–14	–24	–23	–23	–7	7
Coffee	–26	–27	–31	–51	–35	–5	–9	–4
Cocoa	6	–16	–13	–4	–16	–16	–12	–7
Fruits and vegetables	–4	–10	–21	3	–9	9	–12	14
Beef	–21	–20	–10	–14	–2	–5	5	2
Pig meat	6	–14	–14	–29	–21	4	–2	10
Poultry	109	144	102	30	–7	–8	1	6
Eggs	—	—	–10	0	–1	3	0	0
Milk	7	–4	19	70	82	14	15	32
Weighted average ^a	–6.7	–19.0	–13.6	–12.4	–11.3	–3.0	2.3	7.4
Dispersion across product CTEs ^c	35.3	46.9	34.3	30.4	27.4	10.6	10.3	16.1

Sources: Authors' estimates based on information in Chapters 2–9 of this volume and Anderson and Valenzuela (2008).

Note: The table panels reflect the assumption that the CTE is the same as the NRA derived from trade measures (that is, not including any input taxes, input subsidies, or domestic producer price subsidies or taxes), except for Mexico post-1985 where CTE estimates are derived from OECD CSE estimates. — = no data are available.

a. Weights are consumption valued at undistorted prices, whereby consumption is derived using the value of production at undistorted prices and the self-sufficiency ratio (derived from the FAOSTAT Database) as production/consumption.

b. A simple five-year average of the annual standard deviation around a weighted mean of the national average CTEs.

c. A simple five-year average of the annual standard deviation around a weighted mean of the product average CTEs.

Table 1.20. Value of CTEs of Policies Assisting the Producers of Covered Farm Products, Latin America, 1965–2003

(US\$ millions, at the primary product level)

a. Aggregate CTEs, by country

Country	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–03
Argentina	–237	–425	–579	–1,056	–671	–261	–3	–787
Brazil	4	–1,115	–1,641	–4,419	–4,311	–4,714	–108	52
Chile	–12	–69	36	110	223	278	289	184
Colombia	44	–189	12	751	456	552	1,161	1,196
Dominican Republic	11	–8	–10	–30	–69	74	91	44
Ecuador	–25	–64	15	194	93	–32	70	362
Mexico	—	—	—	–915	–1	2,774	–145	3,241
Nicaragua	—	—	—	—	—	33	44	46
Total	–210	–1,887	–2,167	–5,366	–4,289	–1,295	1,398	4,337
Regional total ^a	–260	–2,329	–2,675	–6,624	–5,296	–1,599	1,726	5,354

Table 1.20 (continued)*(US\$ millions, at the primary product level)***b. CTEs, by product, across eight countries^b**

Product	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–03
Rice	27	–29	–233	–178	41	130	535	553
Wheat	62	–118	456	658	–203	43	–37	–29
Maize	–65	–84	–459	–820	–1,188	–150	–735	517
Other grains	0	–1	–57	–80	31	137	66	41
Soybeans	1	–55	–436	–517	–891	–860	226	–482
Other oilseeds	0	0	–67	–100	–115	–42	–71	–79
Sugar	7	–1,179	–1,110	–2,333	–1,489	–476	538	1,173
Cotton	–14	–3	–157	–272	–243	–269	–64	59
Coffee	–24	–36	–130	–956	–434	–38	–87	–25
Cocoa	0	–1	–3	–1	–2	–2	–1	–1
Fruits and vegetables	–5	–12	–89	–71	–124	257	–346	318
Beef	–221	–362	–381	–1,512	–196	–479	635	216
Pig meat	1	–4	–80	–946	–585	36	–90	311
Poultry	10	15	109	365	–120	–218	53	329
Eggs	—	—	–52	–14	–7	29	0	0
Milk	12	–19	243	1,405	1,237	585	735	1,406
Total	–211	–1,890	–2,447	–5,370	–4,286	–1,317	1,358	4,308

Source: Table 1.19 and Anderson and Valenzuela 2008.

Note: — = no data are available.

a. Based on the assumption that the rate of assistance for covered products in the countries not under study is the same as the average for the countries under study, excluding Mexico, and that the share of the former in the value of regional agricultural production (excluding Mexican) at undistorted prices is the same as the average share of the former in 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 the last row of table 1.10), nor any markup that might be applied along the value chain.

b. Mexico is included in the five-year product averages for 1975–79: thus, the total is higher in absolute numbers than the total in panel a, which excludes Mexico during this period.

More specifically, the following features of the Latin American experience of the past 40 or more years are worth highlighting by way of summarizing the key findings of this regional study.

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, has not been dissimilar to trends in Africa and Asia, but is nonetheless dramatic. Instead of being effectively taxed more than US\$10 billion per year, as occurred in the 1980s (or US\$250 per person working in agriculture), farmers in the region now enjoy support worth more than US\$5 billion per year, or nearly US\$150 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 that time when the country abandoned the fixed 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.

The dispersion across Latin America in average NRAs and RRAs for farmers has not diminished much despite the reforms in all countries. This means there is still lots of 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. In particular, the econometric results reported here suggest that the *NRA_{ag}* and the RRA are tending to rise with per capita income and that the higher they are the more limited a country's agricultural comparative advantage.

The dispersion in NRAs among farmers within each Latin American country under study 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 *NRA_{ag}* and an RRA close to zero. As in other regions, the products in Latin America showing the highest rates of distortion and gross subsidy equivalent values are rice, sugar, and milk.

In particular, 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. But, since then, it has increased to an average of around 20 percent, while the NRA for agricultural exportables has only become less negative. The fact that the average NRAs for import-competing and exportable agricultural industries have risen almost in parallel means that the TBI 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.

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 non-product-specific assistance have made only minor contributions to the estimates of NRAs for Latin America.

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, but, in recent years, they have been above international levels, on average. It also means there is considerable variation in CTEs across products and across countries in the region. The 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.

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.

The Poverty and Policy Implications

The assistance trends surveyed in this chapter are, in one sense, encouraging for economic policy advisors: the long period of support for import substitution in the industrial sector and of taxation on 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 our findings makes clear, this does not mean that policies are no longer distorting agricultural incentives. And, if Latin America were to follow the policy path chosen by more-advanced economies that involves 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 since then.

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 first-best way to achieve them. On the contrary, food trade taxes may even 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. Nor have there been policies in place to mitigate the human costs of economic adjustment and the aggravation of rural poverty (Spoor 2000; Valdés and Foster 2007). The challenge for the years ahead is to develop more efficient ways to address these policy concerns so that the process of reducing the remaining distortions in agricultural versus nonagricultural incentives may be completed.

Notes

1. The other three regional studies are Anderson and Martin (2008), Anderson and Masters (2008), and Anderson and Swinnen (2008). Together with comparable studies of high-income countries, they form the basis for a global overview volume (Anderson 2008).

2. The biggest increases in the shares of global exports of agriculture and food between 1990–94 and 2000–04 occurred in Argentina (a jump from 1.6 to 2.2 percent), Brazil (2.3 to 3.4 percent), Chile (0.7 to 1.2 percent), the Dominican Republic (0.1 to 0.4 percent), and Mexico (1.0 to 1.5 percent) (see Sandri, Valenzuela, and Anderson 2007).

3. The longest time series we know of is for agricultural effective rates of assistance for eight Latin American countries for 1985 to 1995. These are reported in Valdés (1996).

4. Corden (1971) proposed that free trade volumes 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- and cross-price elasticities of demand and supply are available, a partial equilibrium estimate of the quantity at undistorted prices may be generated, but if the estimated elasticities are unreliable, this may introduce more error than it seeks to correct.

5. 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, in some countries, Brazil in particular, the high instability of the nominal exchange rate because of short-term speculative trading and political uncertainties may influence producer incentives, but, for the purposes of this project and the reasons given in appendix A, they are not considered policy distortions.

6. 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.

7. This bias is accentuated in those cases where 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. The impact of such distortions was greatest in Ecuador, where it caused the RRA to be more negative by about two

percentage points in the 1970s, six percentage points in the 1980s, and three percentage points in the 1990s (see chapter 7, table 7.5).

8. Since the coverage ratio is around two-thirds of production (see the final row of table 1.10), and the guesstimated distortion for noncovered products is less than that for covered products (row 2 of table 1.12), the value of consumer transfers for noncovered products would add just US\$1.8 billion to the US\$4.3 billion regional total each year in recent years (last row of table 1.20).

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ARGENTINA

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Argentina has heavily taxed agricultural producers not only in the more distant past, but also in recent years, making the country an unusual case study. This chapter describes Argentine economic policies that have had an effect on agriculture and reports new estimates of distortions to agricultural incentives and a description of their evolution since 1960 (trends and fluctuations around the trends). It also analyzes the political economy behind the antiagricultural policy bias, including the reactions of rural pressure groups.

The chapter is organized as follows. In the first section, we review the country's macroeconomy and its policies. In the following section, we focus on developments in the agricultural sector in particular, emphasizing the sector's changing importance in gross domestic product (GDP), exports, and employment and describing the major technological and organizational innovations and the impact of the policy reform of the early 1990s. The subsequent sections outline the methodologies we have used to estimate the distortions in incentives and present and discuss our quantitative results. The most distinctive result relates to the extent to which export taxes have played a compensatory and stabilizing role in the wake of changes in the real exchange rate (RER), the relative international prices of agricultural and food products, and relative productivity, with significant consequences for consumer prices and real returns to agricultural land. The political economy of these policy choices is analyzed in the penultimate section, which emphasizes the role of pressure group action by rural and other interests in generating the endogenous tariff. The chapter concludes with a discussion of the prospects for reducing the anti-agricultural policy bias in Argentina.

Growth, Delay, and Instability in the Economy

The Argentine economy experienced rapid growth in the six decades before the Great Depression of the 1930s. The three main sources of growth were labor inputs, supported mainly through large European migration inflows; capital inputs, supported by large inflows of foreign direct investment and investment loans from Europe (mainly from the United Kingdom and the United States); and an increase in total factor productivity, mainly resulting from education, the technological progress embedded in foreign direct investment, and innovations introduced into production, transportation, and the commercialization of agricultural products.

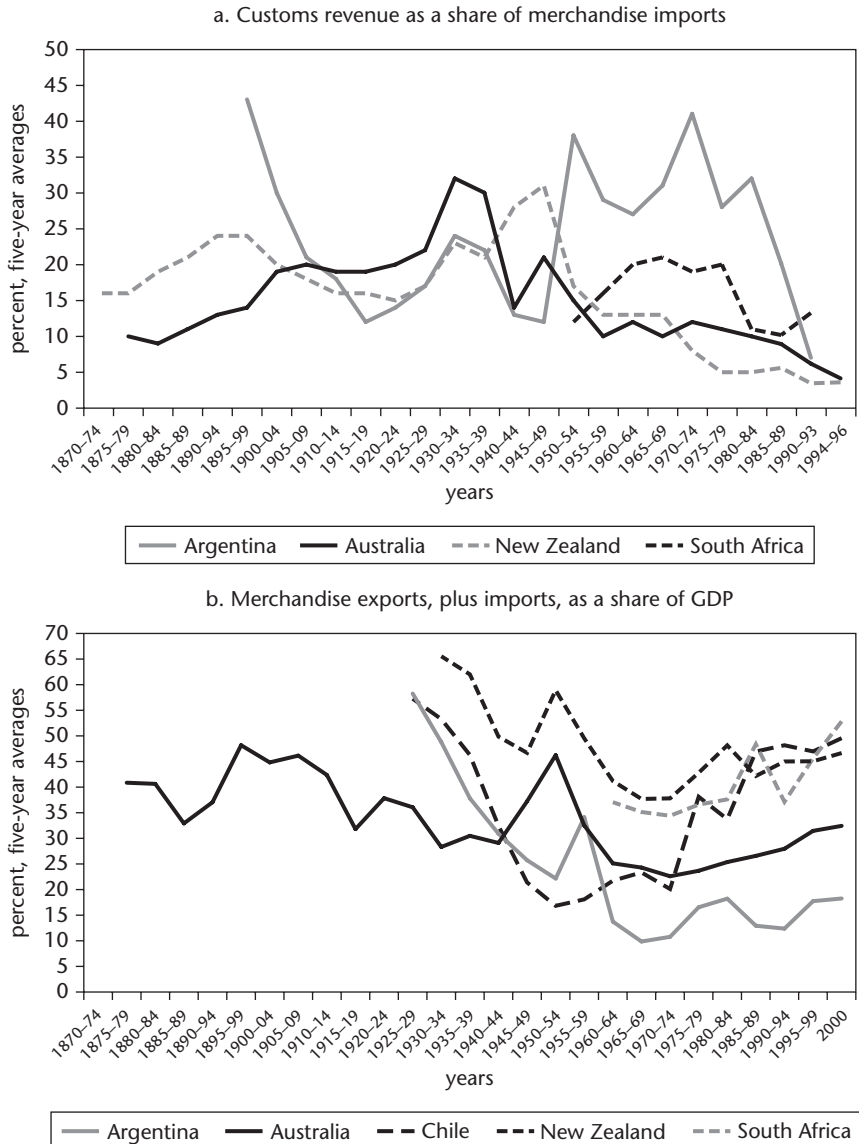
During this period, there was no central bank in Argentina; prices were stable; the public sector was small; and the management of public accounts was, in general, characterized by strong fiscal responsibility. The economy was open; international trade—exports, plus imports—represented more than 60 percent of GDP, while customs revenue was less than 15 percent of the value of imports (figure 2.1). There was no direct taxation on agricultural exports, and rural production only experienced mild indirect negative assistance through tariff protection for industrial importables that was around 20 percent (Díaz Alejandro 1975). Incentives for industrialization were gradually appearing, but at a moderate pace.

The world crisis of the 1930s had a strong negative impact on the economy as a result of two main factors. First, there were large outflows of foreign capital, and, second, the agricultural sector, the most important sector during the period, experienced a sharp decline in relative international prices. Fortunately, the policy reaction was swift. To support the agricultural sector, two regulatory agencies were created: the National Board of Meat and the National Board of Grains. Two major national taxes (a sales tax and the income tax) and the Central Bank were also established.

Industrial incentives were strengthened in the 1930s because of the rise in the relative international prices of manufactured goods and some increases in Argentine tariffs. Foreign exchange controls were introduced in 1931, and importers were required to have permits to buy at the official exchange rate (Berlinski 2003). As a result, the share of GDP traded declined (figure 2.1, chart b), even though export taxes on agricultural products had not yet been introduced.

During World War II, two events occurred that later became strong determinants of postwar economic policy. First, the economy was tightly closed during the war. Imports of industrial goods were not significant, and agricultural exports, because of reduced shipping opportunities, were limited. Because of this, domestic agricultural prices fell by 30 percent relative to domestic industrial prices (Sturzenegger 1991). Second, during the war, Argentina accumulated large physical and external financial assets. The physical assets included great stocks of beef and grain as a result of the limited agricultural exports. External financial assets grew because the economy experienced a large current account surplus given the difficulties of importing.

Figure 2.1. Openness Indicators, Argentina and Selected High-Income Countries, 1870–2000



Sources: Maloney 2002; Mitchell 2003a, 2003b; World Development Indicators Database 2007.

Supported by high relative domestic prices, industrial production expanded substantially during the war. Then, in the early postwar years, relative domestic agricultural prices started to rise, triggered by an increase in the international prices of food and by the reestablishment of industrial imports. To maintain wartime

levels of industrial production, the government introduced export taxes and other measures. Discrimination against wheat, for example, reached the equivalent of more than 50 percent in the early postwar years. This was to block the full transmission of the high levels of the international prices of food to domestic prices and wages. Another reason for the discrimination against exports was the desire to avoid a real appreciation of the peso, which would have reduced incentives for import-competing industries. Industrial support was additionally supplemented by strong tariff and nontariff protection. High direct and indirect discrimination against agricultural production was set in motion in Argentina during these years.

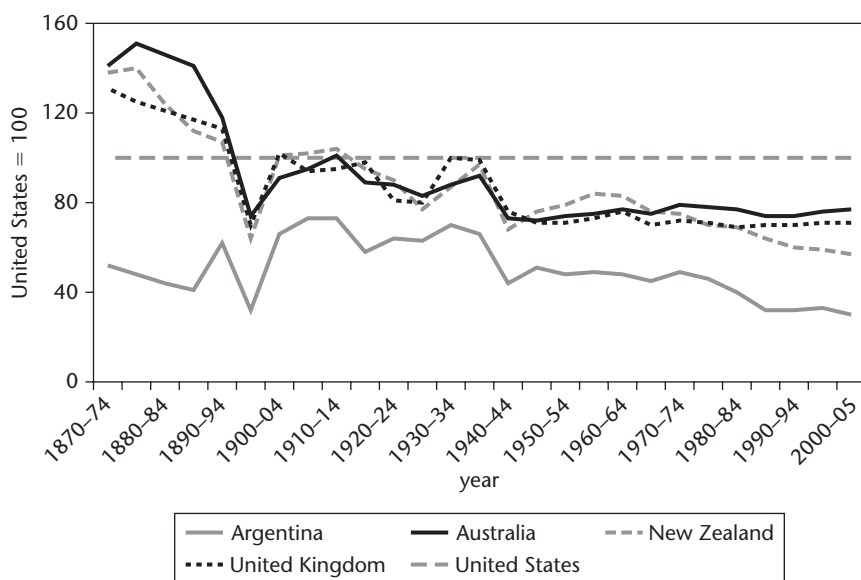
In addition, as a result of the accumulation of external physical and financial assets during the war and the increase in the international prices of food in the early postwar years, the economy and the new government possessed significant resources. The government decided to use these resources to introduce a well-developed welfare state. However, when these transitory resources eventually disappeared, the policy became financially unsustainable. This became the basis of the subsequent chronic fiscal and inflationary difficulties in the country.

On account of the substantial discrimination against exportables and in favor of importables, the share of trade in the economy became quite small. Exports reached low levels, representing less than 10 percent of gross national product, and agricultural production stagnated as import-substitution industrialization took hold. The reduction in international trade, coupled with problems in fiscal and price stability, slowed the country's rate of growth: during the first 30 years after the war (1945–75), the annual real per capita rate of growth was only 1 percent, but, during the next 30 years (1976–2005), it was zero. One of the higher-income countries in the world around 1900, Argentina's position had fallen substantially by the end of the 20th century (figure 2.2).

Mainly on account of fiscal deficits, price instability, and a crisis in confidence, the RER became volatile. This volatility was manifested over both the short and the medium term. There was a real appreciation of the peso between 1976 and 1980, followed by several years of depreciation, and then another real appreciation in 1991–2001. Since a major nominal devaluation of the peso in 2002 (by more than 200 percent), the currency has been experiencing a strong real depreciation. The short- and medium-term RER volatility has had a decisive impact on the level of direct assistance in agriculture. As we show elsewhere below, assistance has been strongly correlated with the observed values of the RER.

Before 1990, the volatility in the RER generally reflected recurrent crises in the balance of payments. With any expansion in economic activity, imports increased, and industrial exports decreased; so, the current account of the balance of payments went into a deficit situation. Because inflows of foreign capital were scarce, foreign reserves were depleted, and a balance of payments

Figure 2.2. Real Per Capita GDP, Argentina and Selected High-Income Countries, 1870–2005



Source: Maddison 2003.

Note: The calculations are based on 1990 Geary-Khamis dollars relative to the United States, which is set as the numeraire at 100.

crisis developed. This was followed by a devaluation of the currency, a recessionary process (since devaluations were usually combined with restrictive monetary and fiscal policies), and, eventually, a correction in the current account deficit. During this period of volatility in the economy and the RER, Argentina was known as a stop-go economy.

In 1991, with the intention of overcoming the stop-go process and of reestablishing price stability in the economy, the government introduced significant changes in economic policy under what was called the convertibility program. A currency board monetary scheme was established that fixed a 1-to-1 nominal relationship between the peso and the U.S. dollar. Under this scheme, money expansion and contraction became completely endogenous, and the Central Bank was prohibited from creating money to finance the public sector.

Together with such macroeconomic schemes, important structural reforms were undertaken. A complete program of privatization was implemented among public enterprises. Ambitious deregulation legislation was approved, which applied to both private and public activities. Important changes were made in social security, including the introduction of a private capitalization system.

Finally, there was a strong impulse to reduce the antitrade bias in external commercial policies by eliminating all export taxes and quantitative restrictions and reducing tariff barriers on imports.

In relation to agriculture, the policies included the elimination of quantitative restrictions; reductions in tariffs on fertilizers, herbicides, pesticides, machinery, and irrigation equipment; the elimination of distorting taxes on fuels and commercial and financial transactions; and the removal of inefficiencies and monopoly profits in trade channels (including grain elevators, transportation, and ports). These steps, together with the elimination of export taxes and the deregulation of economic activities, provided a significant boost for agricultural growth (see World Bank 2006). During the first years of convertibility, such changes helped overcome the reduction in agricultural incentives associated with the real appreciation of the peso that occurred because of convertibility.

Thus, during its first years, the convertibility program triggered an increase in external confidence in the economy, leading to large inflows of foreign savings. This allowed for strong economic growth, but it also resulted in a visible and growing real appreciation of the currency. Then, however, following a long recessionary process that started in July 1998, the convertibility program came to an end in an unprecedented political and economic collapse at the end of 2001. The combination of the overvalued peso, the recession, and the unsustainable dynamics in the country's external and public debt plunged the country into crisis. There was a massive outflow of capital, resulting in a devaluation of the peso by more than 200 percent and a severe default in external and public debt.

Fortunately, in 2003–06, after the collapse, the economy experienced a substantial and unexpectedly rapid recovery. A new macroeconomic scheme was introduced that combined a large and permanent primary fiscal surplus, a slightly expansionary monetary policy, a restructuring of public debt, and a significant intervention by the Central Bank in the foreign exchange market to accumulate international monetary reserves and sustain the real depreciation of the peso. The scheme restored the confidence of economic agents, consumers, and domestic and foreign investors in the economy. Gross national product grew 41 percent in the four years to 2006; unemployment fell from 24 percent in 2002 to 9.7 percent in 2007; and the share of the population living below the poverty line dropped from 52 percent in 2002 to 28 percent at the end of 2006.

Developments in the Agricultural Sector

The contribution of the agricultural sector to the Argentine economy is significant. In 2000–04, it generated 7 percent of GDP and 22 percent of the value added in the goods sector, and it contributed almost 50 percent of the total goods exported,

of which around two-fifths were primary products and the other three-fifths were processed products. Agriculture is also an important source of employment. Data for 2000–04 indicate that direct agricultural employment was 9 percent of total employment. The GDP and employment shares have steadily declined in Argentina, as in most countries. While the export share has also declined (it was above 90 percent in the 1960s), it has fallen much less in Argentina than in the rest of the world: the ratio of the share in Argentina and the corresponding share worldwide—the index of revealed comparative advantage—averaged 3.5 in the 1960s and 1970s, but rose to 4.5 in the 1980s, 4.8 in the 1990s, and 5.4 in 2000–04 (table 2.1).

In descriptions of the Argentine agricultural sector, it has been usual to consider two differentiated types of agricultural production: pampean and regional. The first essentially covers grain crops and cattle raising for the production of beef and milk. The second covers agricultural production in different regions: fruits and sheep raising in Patagonia; grapes and other fruits in Mendoza and San Juan provinces; tobacco leaf, sugarcane, and citrus in the northwest; and cotton, tea, and yerba maté (a species of holly popular as an infusion) in the northeast.

This traditional split between two kinds of production is losing ground mainly on account of the rapid expansion of soybean crops in the northwest and northeast regions. However, the distinction is still valid in some cases. First, pampean production is intensive in the use of equipment and management, and it is also land and labor extensive, while regional production is less intensive in management and capital (with the exception of irrigation development), but more land intensive and, especially, more labor intensive. The employment of labor per hectare and per unit of value added in regional production is several times that in pampean production. Second, the size of farms in hectares, except in Patagonia, is larger in the pampas. In nonpampean production, a high proportion of farms are on a scale well below that needed for adequate technological and economic development. Third, rural poverty is concentrated in regional agriculture. There are 200,000 poor indigenous families in rural Argentina that live largely in the northeast and the northwest. Efforts at rural poverty reduction in Argentina focus on the performance of regional agricultural economies (World Bank 2006). In addition, however, it is important to remember that the vast majority of the poor in Argentina are urban.

The six main primary outputs of Argentine agriculture in 2005, in order of importance, were soybeans, cattle raising, raw milk, corn, wheat, and sunflowers. In current prices, these outputs represent 73 percent of the total value of agricultural production (figure 2.3).

The production trends for our selected products over the period we examine (1960–2005) are shown in figure 2.4. Agricultural pricing policies, technological advances, new forms of farm organization, and the impacts of economic policies in the early 1990s were the main determinants of the trends. The rate of growth in

Table 2.1. Key Economic Indicators, Argentina, 1960–2004

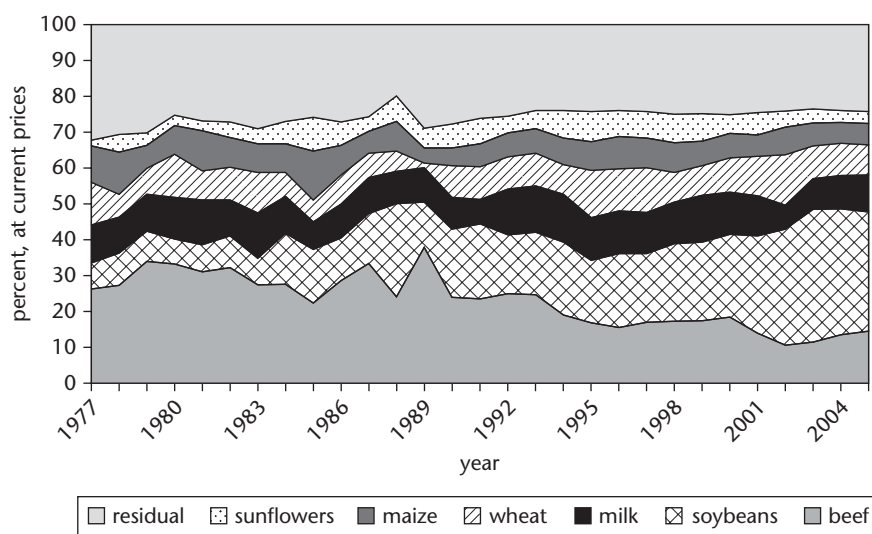
Indicator	1960–64	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–04
Population (millions)	21.3	22.9	24.8	26.9	29.0	31.2	33.5	35.7	37.6
GDP per capita (current US\$)	—	1,211	1,813	2,142	2,921	3,289	6,294	7,879	4,982
Agricultural land per farmworker (hectares)	87	84	87	90	91	88	86	87	88
Share of agriculture in employment (%)	19	17	15	14	13	12	12	10	9
Share of agriculture in GDP (%)	—	10	11	8	8	8	6	5	7
Share of agriculture and food in merchandise exports (%)	93	90	79	74	73	65	60	53	48
Share of agriculture and food in merchandise imports (%)	13	17	14	11	9	9	7	7	6
Net exports as % of exports and imports of agriculture and food	79	73	73	79	81	85	78	76	85
Index of revealed comparative advantage in agriculture and food ^a	3.2	3.5	3.6	3.8	4.4	4.4	4.7	4.9	5.4
Exports of goods and services (% of GDP)	—	—	—	12	12	10	8	10	18

Sources: Sandri, Valenzuela, and Anderson 2007; World Development Indicators Database 2007.

Note: — = no data are available.

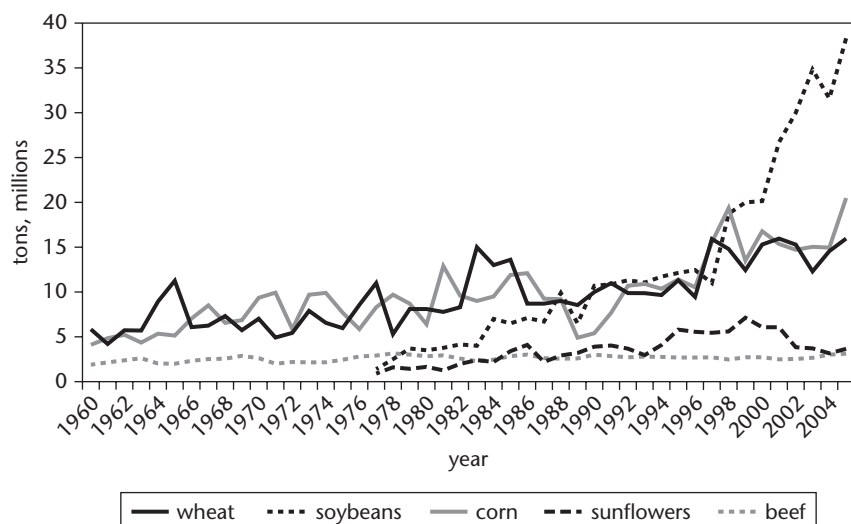
a. The share of agriculture and food in merchandise exports in Argentina as a ratio of the corresponding share worldwide.

Figure 2.3. Shares of the Gross Value of Farm Production at Distorted Prices, Covered Products, Argentina, 1977–2005



Sources: Sturzenegger and Salazni 2007 and data compiled by the authors.

Figure 2.4. Production of Wheat, Corn, Soybeans, Sunflowers, and Beef, Argentina, 1960–2005



Source: Data of the Secretariat of Agriculture, Livestock, Fisheries, and Food.

grain crops was much greater than that in livestock; while the crop output increased almost 300 percent during the period, livestock output increased by around 50 percent. Many pastures were abandoned to allow more land to be used for crops. The principal reason for the relative stagnation of cattle raising was a significantly lower rate of technological improvement in livestock production.

For grain production, two main periods may be identified. The first, from 1960 to 1990, saw a doubling of production. Although high, this growth rate was low relative to that in other countries, such as Brazil and Chile, and relative to the second period. The reason for the high growth in production was not more attractive real crop prices, but the introduction of technical improvements that allowed for increased yields (greater use of better machinery and other equipment and the planting of hybrid corn and sunflowers, for example). The expansion of the land under cultivation beyond the pampas and the intensification of land use in the pampas were not particularly significant drivers of the growth in this period.

The second period, from 1990 to 2005, also saw a doubling of grain production, but in only half the time. The acceleration in the rate of growth of production occurred on account of five main factors (World Bank 2006). First was the expansion of the crop frontier, mainly in the northeast and northwest, where soybeans are the main crop. Around 120,000 hectares were added to agriculture each year in these two regions.

Second, an intensification of land use in the pampas because of shortened crop rotations, the greater application of fertilizers and of the zero tillage planting technique (*labranza cero*), and the elimination of pastures as livestock production was displaced toward more marginal lands.

Third, a substantial rise in yields per hectare followed the introduction of Roundup-resistant herbicide for soybeans, Bt (*Bacillus thuringiensis*) corn seed, and other biotechnology advances.

The fourth factor in inducing higher grain yields was the introduction, mainly in the pampas, of new forms of farm organization in agricultural production. The most significant new form of organization was the planting pool (*pool de siembra*), which joins investors in the financing of grain production. Each pool takes out rent contracts with a large number of landowners, generally located in different regions in order to diversify risks, and the pool assumes the management of the crop production enterprise. Under these production arrangements, the use of the land is determined by highly specialized managers and is based on the best professional advice. At the local or regional level, a similar kind of arrangement is also undertaken whereby contractors rent land to produce grains. The contractors are specialized entrepreneurs able to realize an efficient scale of production. With these types of arrangements, the use of land in the pampas is today efficient, and it is independent of entrepreneurial landowners.

Finally, the fifth factor was the introduction of important economic policy reforms in the early 1990s that favored agricultural production. Although there was significant and increasing real currency appreciation during this period that reduced agricultural incentives through the high prices of nontradables, the reforms favored agriculture because they involved the lifting of export taxes, reductions in tariffs and in quantitative restrictions on industrial imports, and the deregulation of private economic activities that assisted agricultural trade, reduced financial costs, and removed inefficiencies and monopoly profits in trade channels (grain elevators, transportation, and ports).¹

In addition to landowners, contractors, and planting pools, there are other important actors in the Argentine agricultural value chain. One group is the providers of agricultural inputs. Seeds for products such as genetically modified soybeans and corn and for corn and sunflower hybrids are being provided by highly specialized national and international firms (Cargill, Louis Dreyfus, Monsanto, and so on) that incorporate frontier advances in biotechnology research and development into their output. The situation is similar in the provision of agricultural equipment, fertilizers, and agrochemicals. There is also an efficient group of intermediaries involved in trading along the value chain that manage storage, handling, drying, marketing, and transportation.

Another group of actors in the agroindustrial value chain is the light processors of primary products. They exist in all regions where there are significant levels of production. They include slaughterhouses and refrigeration plants for producing beef, crushing mills for processing soybeans and sunflower seeds, and dairy plants for processing milk. Although, in some cases, there are problems because of insufficient scale, processing efficiency is generally quite high.

The final group of actors is associated with commercial distribution. Beef, dairy products, products derived from the processing of wheat, and vegetable oils are the main outputs derived from pampean primary production that reaches consumers through efficient distribution channels.

In all parts of the value chain, there is strong competition among firms. The only exception may be the processing stage, where, in the case of some products, such as sunflower seeds, there is collusion, albeit within narrow limits.

Evidence of Past Direct Price Support and Indirect Assistance to Agriculture

Two studies—the Krueger, Schiff, and Valdés study (1991) and the surveillance study (Valdés and Schaeffer 1995)—have been important for the analysis reflected in this chapter because they provide computations of assistance to agriculture at the farm level for the period 1960 to 1993 for several primary agricultural products.

Argentina in the Krueger, Schiff, and Valdés study

Beginning in the mid-1980s, the World Bank conducted a multivolume study, *The Political Economy of Agricultural Pricing Policy*, under the direction of Anne Krueger, Maurice Schiff, and Alberto Valdés. The study included 18 country cases, one of which was Argentina. The study on Latin America was the first of the three regional volumes to emerge (Krueger, Schiff, and Valdés 1991). The main purpose of the chapter on Argentina in the volume and of the more-detailed background reports (Sturzenegger 1990, 1991) was to measure agricultural distortions in Argentina in 1960–85 and to find a political economy explanation for the existence of these distortions. The products selected—all exportables—were wheat, corn, sorghum, soybeans, sunflower seeds, and beef. The first five were classified as primary products, while beef was classified as a lightly processed product. In the case of soybeans and sunflower seeds, the period covered was 1976–85 because of the unavailability of reliable data before 1976. Both direct and indirect interventions in agriculture were measured. The nominal direct rate of protection, NRP_D , was measured at the farm level by comparing prices after interventions (observed prices) and without interventions (opportunity prices).

The indirect economy-wide distortion had two components in the Argentina chapter of the study. First, it included nominal direct protection for industrial production, which was measured through a combination of price comparisons (between domestic and international prices) and explicit tariffs. Second, it included the impact of economy-wide misalignments in the RER on relative prices between tradables and nontradables. These misalignments were measured by comparing the observed RER, e , and the long-run equilibrium free trade RER, e^* . This last exchange rate was estimated by making three types of adjustments to the observed rate: the disequilibrium effects associated with temporary short-term factors (the long-run adjustment) were eliminated, a correction was made for differences between observed and sustainable trade balances (the equilibrium adjustment), and a correction was made for the impact on the observed RER of external trade policy (the free trade adjustment).

The measurement of the two components of indirect intervention allowed the authors to estimate prices for the nonagricultural sector, including nontradables, and prices for the selected products as if they had been free of the effect of indirect intervention. These calculations produced a nominal indirect rate of protection, NRP_I , for each selected agricultural product. Finally, adding direct and indirect distortions, the authors obtained a nominal total rate of protection, NRP_T , for each selected product. The total effective rate of protection, ERP_T , was also estimated for each product, but, in this case, only total effects were computed, and no distinction was made between direct and indirect effects.

Four main results emerged from the chapter: there were high (in absolute value) negative rates of *total* protection for all selected products, without any significant trend and with low dispersion; high (in absolute value) negative rates of *direct* protection for all selected products, with high dispersion; high (in absolute value) negative rates of *indirect* protection, with high dispersion; and a significant inverse correlation between contemporaneous *direct* and *indirect* rates of protection. The principal explanation of this inverse correlation was that direct nominal disprotection rates changed in a way that compensated for the changes in indirect nominal disprotection, mainly through misalignments in the observed RER.

Argentina in the surveillance study

In 1994, the World Bank financed another research project on trade distortions in agriculture, the Surveillance of Agricultural Price and Trade Policies. This included eight Latin American countries. The *Handbook for Argentina*, which was prepared by Valdés and Schaeffer (1995) with the collaboration of Sturzenegger and Bebczuk, was a continuation of the Argentine chapter in the Krueger, Schiff, and Valdés (1991) study. Seven products were covered, adding cotton to the products examined by Krueger, Schiff, and Valdés. The period studied was 1985 to 1993. Four policy indicators for each product were estimated: the nominal rate of protection, the effective rate of protection, the effective rate of assistance, and the producer support estimate (then called the producer subsidy equivalent). Indirect distortions were not computed. The first of the four indicators is the most relevant for the current study, and we focus on it below.

Nominal rates of protection were estimated using, as the observed prices, prices calculated through explicit export taxes and, as the prices without intervention, the free on board (fob) prices corrected by port (border) costs. The rates were estimated at the wholesale level and at the farm level. Ad valorem rates were larger (in absolute values) at the farm level because of the existence of fixed trading costs. Rates were calculated for each selected product. In aggregate, there were several general results of interest: there was high (in absolute value) negative direct protection in 1985–90 mainly because of high levels of protection in 1989–90 when the observed RER depreciated sharply. There was substantially reduced negative protection beginning in 1991, and the protection even became positive for some products in 1993 when the RER was showing an apparent appreciation. There was also the same profile of relationships between the observed RER and export taxes that had been found in the Krueger, Schiff, and Valdés study.

Our Study's Estimates of Policy Distortion Indicators

The methodology of our study (see appendix A) differs somewhat from the methodology of both the Krueger, Schiff, and Valdés (1991) study and the Valdés and Schaeffer (1995) study, even though the main focus is still on government-imposed distortions that create a gap between domestic prices and the prices under free-market conditions. Since it is not possible to understand the characteristics of agricultural development from a sectoral viewpoint alone, the project methodology not only involves estimates of the effects of direct agricultural policy measures (including distortions in the foreign exchange market), but, for comparative evaluation, it also generates estimates of distortions in nonagricultural sectors.

More specifically, our study computes a nominal rate of assistance (NRA) for farmers that includes an adjustment for direct interventions on inputs. This brings our measure closer to measures of effective assistance. We also generate an NRA for nonagricultural tradables for comparison with the NRA for agricultural tradables through the calculation of a relative rate of assistance (see appendix A). A trade bias index within agriculture is also estimated, as is a consumer tax equivalent for primary agricultural and lightly processed food products that enter into the consumption basket of the urban population, where the consumer tax equivalent is equal to the NRA for those products affected only by trade measures.

The principal distortions in our analysis are those associated with trade policy. They include tariffs on imports, taxes or subsidies on exports, nontariff barriers to trade, state marketing boards for tradable products, and other external trade pricing policies. Domestic taxes or subsidies are also included. Details on the ways in which these measures are quantified to provide the above indicators are supplied in the appendixes, as are the annual estimates for each country over the whole time period. In what follows, we offer only a summary of the results for Argentina.

Additional indirect or economy-wide distortions that may affect relative prices or incentives in agriculture are not measured in this study. Excluded policies include possible macroeconomic misalignments in the RER, distortions in the market for services and other nontradables (simply because of measurement difficulties), and the nonoptimal provision of public goods for agriculture such as infrastructure, research and extension, phytosanitary protection, and food safety (policies that are also difficult to evaluate). But the key indirect distortions are measured, particularly those related to the trade policies associated with the nonagricultural tradables sector of the economy.

Products selected

In our analysis, the selection of products for the estimate of NRAs is practically predetermined because six primary agricultural products dominate Argentine

agriculture: soybeans, beef, raw milk, corn, wheat, and sunflower seeds. In 2005, these products represented 73 and 74 percent of the total gross value of agricultural production and of the total gross value added in agriculture, respectively (in current prices, not including fruits and vegetables). In constant 1993 prices, the shares were both 73 percent.

Four products (wheat, corn, soybeans, and sunflower seeds) are exportable goods. Raw milk and live cattle have an inherent trading status as nontradables because the transport costs per unit of value are high enough to make exports (or imports) infeasible. With light processing, however, these products are highly exportable. As such, we consider raw milk and live cattle as *nontraded exportables*. This is justified since the related prices are not the result of equilibrium in the domestic market, but depend, rather, on the border conditions (fob prices and so on) for the corresponding processed goods. The prices behave, albeit indirectly, as if they were the prices of tradable products. We define raw milk before 1989 as a nontradable because exports of dairy products were low then and the prices depended on domestic conditions.

We examine four lightly processed food products: beef (to measure the distortions on cattle), powdered milk (to measure the distortions on raw milk given that powdered milk exports today represent more than 70 percent of the total exports of dairy products), soybean pellets (the largest soybean by-product), and sunflower vegetable oil (the largest sunflower by-product). Including soybean pellets and sunflower vegetable oil does not imply any improvement in the measurement of the distortions in primary agriculture because, for soybeans and sunflower seeds, we already measure the direct distortions on the primary products. We include these two processed products because they are important in terms of exports and the value of production within the category of lightly processed food goods in Argentina.

We have examined the possibility of selecting several important agricultural importables, especially to obtain better measures of the antitrade bias within agriculture. With the exception of two or three years during the period under analysis, sugarcane, processed sugar, cotton, and cotton fiber were exportables even if they were not traded. Paddy rice and processed rice, wool, other animal products, and other grains such as barley, rye, and oat millet were also exportables.

Time period coverage

The period covered in this study is 1960–2005, although there are exceptions for some products. The measurement of soybeans and sunflower seeds begins in 1976. As noted in Sturzenegger (1990), the production of soybeans was limited before then, and data on sunflower production are difficult to find. The data on the production of soybean pellets and sunflower seeds cover only the last 12 years

Table 2.2. NRAs for Covered Farm Products, Argentina, 1960–2005
(percent)

Product	1960–64	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–05
Beef	–37.4	–35.1	–26.1	–22.0	–25.6	–12.1	–3.5	2.6	–2.8
Corn	–9.1	–11.9	–23.7	–29.0	–14.6	–22.0	–7.3	–5.2	–20.0
Milk	—	—	—	—	—	—	0.9	5.1	–1.4
Soybeans	—	—	—	–14.5	–17.1	–26.6	–13.8	–7.4	–21.5
Sunflower seeds	—	—	—	–27.7	–23.5	–26.2	–16.0	–19.7	–33.3
Wheat	–18.8	–11.6	–32.5	–23.4	–14.9	–17.1	–9.7	–9.4	–18.2
Weighted average ^a	–28.7	–25.5	–24.1	–21.3	–19.5	–17.2	–8.3	–5.2	–17.1
Dispersion ^b	16.8	18.1	13.8	15.9	12.7	11.0	7.1	9.4	12.7
% coverage (at undistorted prices)	76	73	65	67	72	74	76	77	77

Sources: Sturzenegger and Salazni 2007 and data compiled by the authors.

Note: — = no data are available.

a. Including product-specific input subsidies.

b. Dispersion is a simple 5-year average of the annual standard deviation around the weighted mean of the NRAs of the covered products.

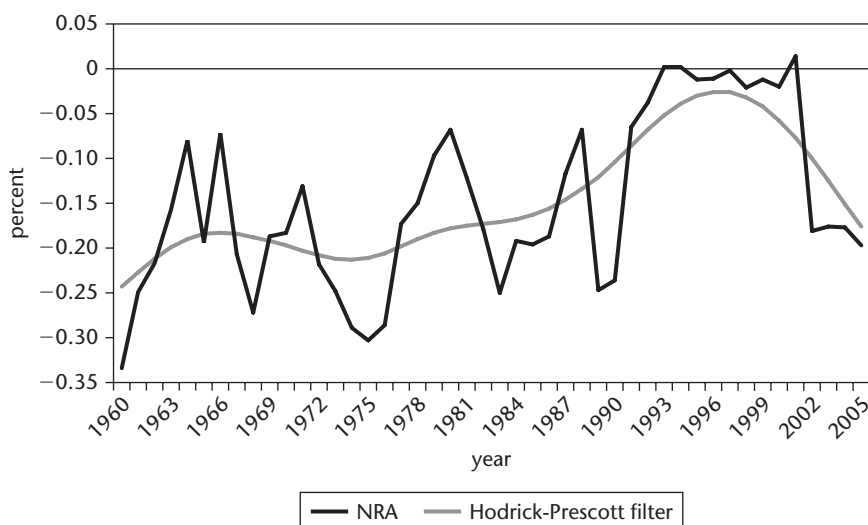
of the period, that is, 1994 to 2005. This does not affect the overall results on primary agriculture because we have measured the direct distortions on the corresponding primary products.

Direct assistance to agriculture

The NRAs at the farm level for the agricultural products we have selected are summarized in table 2.2. (The annual data are shown in appendix B, table B.1.) Generally, the estimates reflect the antiagricultural bias in price and trade policies: the economy's most efficient and competitive tradable sector was strongly discouraged through direct export taxation. Included in these estimates are the support provided for the use of seed inputs, although this added little because the gain from the assistance for seed inputs was largely offset by taxation through the prices for fertilizer and pesticides that were higher than the corresponding free-market prices.

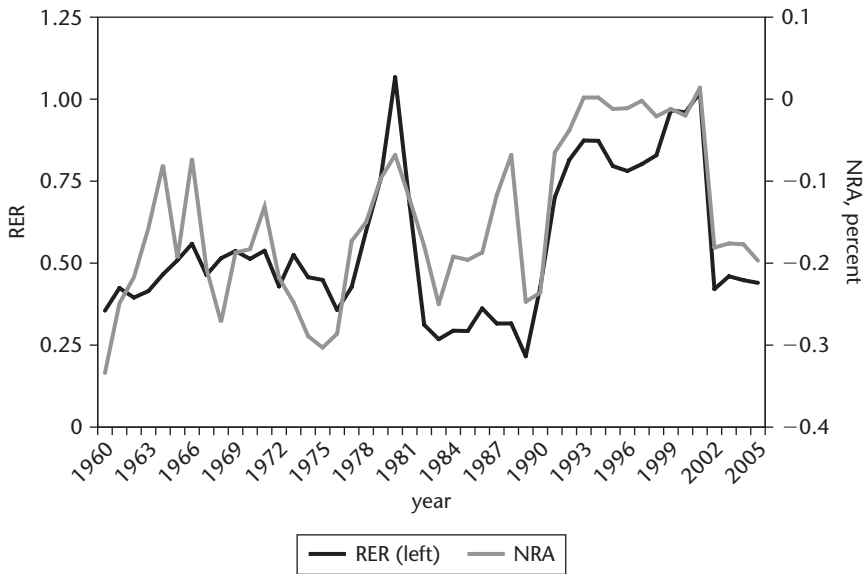
To allow one to gauge the long-run trend, we depict, in figure 2.5, an aggregated measure (a simple average) of NRAs at the farm level for our selected primary products during the whole period, and we have also used a Hodrick-Prescott filter. The trend over time shows a reduction in the rate of nominal direct disprotection for primary agriculture until 2001. The reduction was the steepest for beef, mild

Figure 2.5. NRAs for Covered Products, Argentina, 1960–2005



Sources: Sturzenegger and Salazni 2007 and data compiled by the authors.

Note: The figure shows a simple average of the NRAs for covered products and indicates the results of a Hodrick-Prescott filter.

Figure 2.6. NRAs for Covered Products and the RER, Argentina, 1960–2005

Sources: Sturzenegger and Salazni 2007; data compiled by the authors; data of the Central Bank.

Note: There is no estimation of the multilateral RER from 1960 to 1989. So, for this period, the figure includes the bilateral RER relative to the U.S. dollar.

for wheat, and the least for corn and coincided with the changes in productivity in these subsectors (Sturzenegger 1990; World Bank 2006).

From a short- or medium-term perspective, the NRAs were volatile. The main explanatory factor was the RER. As is clear from figure 2.6, the RER and NRA at the farm level were positively correlated. If the RER was high (following a real appreciation of the peso), the NRA was also high (less negative, or even positive), and, conversely, if the peso was experiencing real depreciation, the NRA fell (for example, in 2002). We return to the relationship between NRAs and the RER below.

Although primary agriculture as a whole experienced strong nominal direct disprotection, there were differences across products. Disprotection has been greatest for soybeans and sunflower seeds over the past 20 years. This is probably explained by two factors: the policy goal of supporting exports of oilseed by-products and the greater scope for productivity gains among these by-products relative to other farm products (including milk, for which the NRA has been close to zero).

In summary, it is clear that NRAs at the farm level played a compensatory role in the case of primary agricultural products. When there were changes in different

exogenous variables that affected agricultural incentives (such as the RER, international relative prices, and the relative productivity growth prospects of each product), the NRAs at the farm level changed, and they did so in a partially compensatory way. For instance, when the RER depreciated, thereby raising the relative prices of tradables and improving agricultural incentives, export taxation rose to absorb part of the incentive improvement. In this sense, taxation acted as a stabilizer of real rural incomes or, more specifically, of real returns to agricultural fixed assets, particularly land.

To quantify the compensatory and stabilizing role of NRAs, we have regressed the log of the RER, the log of the international relative price of each product, and a trend variable on the log of 1 plus the NRAs for wheat, corn, and soybeans. The NRAs are well explained by the three variables, although, in the case of soybeans, the coefficient for international prices is not significant and has the wrong sign. This is because the time period is shorter for soybeans, and, for the last 20 years of our study period, the RER variable was the predominant explanatory element.

The NRAs at the processing level have been estimated for the four lightly processed food products. The NRA estimates for beef are almost identical to the NRA estimates for live cattle. The two transmission factors are close to unity. Powdered milk received some assistance beginning in 1989, although, following the large real depreciation of 2002, it was taxed. Soybean and sunflower by-products experienced negative assistance, albeit less negative than that of their respective primary inputs, soybeans and sunflower seeds, because the aim was to ensure that the two processing activities were not entirely discouraged.

For the six covered farm products as a group, the NRA averaged -27 percent in the 1960s, -23 percent in the 1970s, -18 percent in the 1980s, and -7 percent in the 1990s, before returning to -23 percent again after 2001. The dispersion of rates around the mean value also diminished gradually between the 1960s and 1990s, thereby contributing to the reduction in the welfare cost of the distortions in incentives within the agricultural sector (bottom of table 2.2).

To obtain estimates of the NRA for the whole agricultural sector requires that one also provide a guesstimate of the NRA for noncovered agricultural products, as well as estimates of non-product-specific assistance. To derive the NRA for noncovered products, we assume that the same level of assistance and taxation applied in this case as in the case of similar covered products, and we assume that all the noncovered products are tradable (even if they are not actually traded every year). So, for exportables such as sorghum, we use the rate of assistance estimated for corn, for example. A weighted average of the guesstimates provides an NRA for noncovered products as a whole (the share of which in production varied from one-quarter to one-third over time). These NRAs are shown in row 2 of table 2.3. The table ought to include the NRAs for non-product-specific assistance such as

Table 2.3. NRAs in Agriculture Relative to Nonagricultural Industries, Argentina, 1960–2005
(percent)

Indicator	1960–64	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–05
Covered products ^a	–28.7	–25.5	–24.1	–21.3	–19.5	–17.2	–8.3	–5.2	–17.1
Noncovered products	–14.6	–13.2	–13.4	–11.7	–11.9	–8.1	–3.1	0.0	–13.3
All agricultural products ^a	–25.3	–22.2	–20.8	–18.5	–17.5	–14.9	–7.0	–4.0	–16.2
Total agriculture, including NPS ^b	–25.3	–22.2	–20.8	–18.5	–17.5	–14.9	–7.0	–4.0	–16.2
Trade bias index ^c	–0.25	–0.23	–0.23	–0.20	–0.19	–0.16	–0.07	–0.04	–0.16
<i>Assistance for tradables</i>									
All agricultural tradables	–25.3	–22.7	–22.9	–20.4	–19.3	–15.7	–7.0	–4.0	–16.2
All nonagricultural tradables	61.4	52.3	35.1	21.1	17.7	15.8	11.0	10.5	5.3
Relative rate of assistance ^d	–53.6	–49.2	–43.0	–34.2	–31.5	–27.2	–16.2	–13.1	–20.6

Sources: Sturzenegger and Salazni 2007 and data compiled by the authors.

a. Including product-specific input subsidies.

b. Ratio of total assistance for primary factors and intermediate inputs to the total value of primary agriculture production at undistorted prices. NPS = non-product-specific assistance.

c. The trade bias index = $(1 + NRA_{ag}/100)/(1 + NRA_{agm}/100) - 1$, where NRA_{agm} and NRA_{ag} are the average percentage NRAs for the import-competing and exportable parts of the agricultural sector.

d. The relative rate of assistance = $100 * [(100 + NRA_{ag}^t)/(100 + NRA_{nonag}^t) - 1]$, where NRA_{ag}^t and NRA_{nonag}^t are the percentage NRAs for the tradables part of the agricultural and nonagricultural sectors, respectively.

federal government expenditures on research, extension, rural education, sanitary and phytosanitary inspection, and public stockholding, but the extent of this assistance has been too small to be worthy of inclusion. Hence, row 4 of table 2.3 provides our best estimates of the NRA for the agricultural sector as a whole.

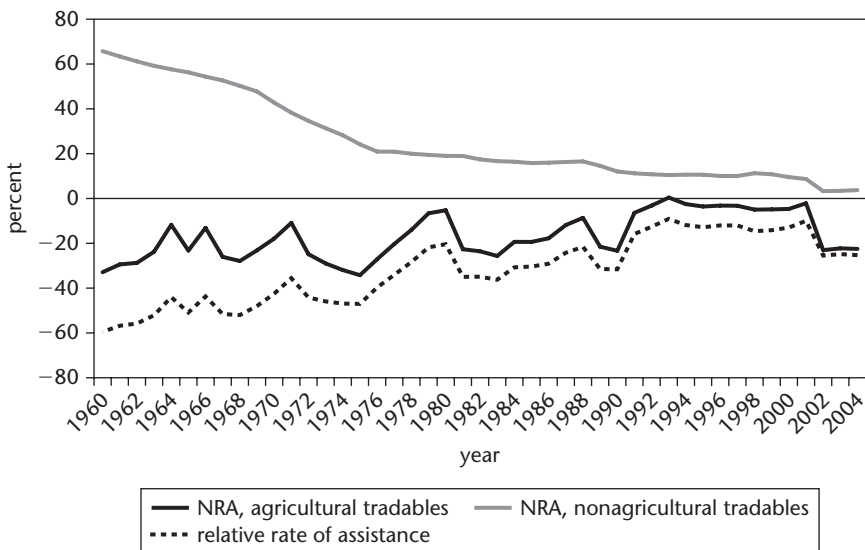
Assistance for nonagricultural tradables and relative rates of assistance

The NRA for tradable agriculture may be compared with the average NRA for nonagricultural industries producing tradables. The latter NRA has been estimated by dividing each of the nonfarm sectors into exportable, nontradable, and import-competing subsectors. The sectors include nonagricultural primary products, highly processed food, nonfood manufactures, and the service sector. Their average NRAs are estimated from information provided in available studies that draw on more than only import tariffs in the case of import-competing tradables (see appendix A). The prices of nontradables, including for the entire service sector, and of most nonfarm exportables are assumed to be undistorted (the exception is the export taxes imposed beginning in late 2001, which averaged 15 percent). The NRAs for nonagricultural tradables are summarized in appendix table B.1, panel b.

The rate of assistance for all nonagricultural tradables averaged more than 50 percent in the 1960s, around 30 percent in the 1970s, slightly more than 15 percent in the 1980s, and below 5 percent at the end of the period. This trend is illustrated in figure 2.7, together with the trend in the average NRA for agricultural tradables and the relative rate of assistance (derived from these two NRAs, as described in table 2.3, note d). It shows that, relative to other tradable sectors, the taxing of agriculture was sustained at more than 50 percent until the late 1970s and at more than 35 percent for the next 10 years, before falling to only 15 percent in the 1990s. It has since risen above 20 percent again following the reintroduction of export taxation at the end of 2001. Prior to this reversal, the reductions in the antiagricultural bias and the antitrade bias in the policy regime had been steady and remarkable, though figure 2.7 suggests that changes in nonagricultural policy played an even more significant role than changes in farm policy.

Consumer tax equivalents

The data do not make it easy to estimate the consumer tax equivalent of the distortions to agricultural incentives. Nonetheless, we have made heroic assumptions to obtain an average consumer tax equivalent for all primary agriculture and lightly processed food. Not surprisingly, given that most of the producer price

Figure 2.7. NRAs for Agricultural and Nonagricultural Tradables and the RRA, Argentina, 1960–2004

Sources: Sturzenegger and Salazni 2007 and data compiled by the authors.

Note: For the calculation of relative rates of assistance, see table 2.3, note d.

depression arose from export taxation that declined over most of the period from 1960 to 2001 (until export taxation was reintroduced), the effective subsidy for food consumption also declined: from 26 percent in the 1960s to 16 percent in the 1970s, 13 percent in the 1980s, and 0 percent in the 1990s.

The Political Economy of Agricultural Distortions

This study confirms empirically the impression that trade policies strongly discriminated against primary agriculture in Argentina for a long time and that the extent of this bias declined steadily until a recent reversal. In this trend, the contribution of the decline in import protection for nonagricultural industries has been substantial. The political economy of agricultural distortions in Argentina has been much discussed in the literature on developing countries as a whole. Hence, in this section, the focus is on seeking to understand the most striking feature of Argentina's policy regime, namely, the substantial use of export taxes on farm products.

What is the explanation for the compensatory and stabilizing role that export taxation has played in agriculture in Argentina over the past five decades? Finding

the answer requires an explanation of why macroeconomic policy makers had such a strong preference for applying export taxes to agriculture. Several reasons have been suggested by previous analysts, including Díaz Alejandro (1975), Mallon and Sourrouille (1975), and Nuñez Miñana (1985). Other explanations may be discovered in explicit statements by ministers of economy when they have sought to justify the existence of the taxes. These reasons may be summarized as follows.

Export taxation was used early on as an instrument for the indirect protection of the industrial development that had received natural protection from import competition during World War II. Macroeconomic policy makers subsequently claimed it served four additional nonagricultural objectives: raising fiscal revenues with few lags and low collection costs; lowering and stabilizing the prices of agricultural staples that are important wage goods; encouraging the domestic processing of farm products; and transferring welfare from landowners to wage earners. Moreover, the policy makers believed that the resource reallocation costs of export taxation were low, partly because most agricultural land has no alternative use and also because farmers were seen as lacking entrepreneurial drive. The latter idea has been completely discredited over the past two decades following important research on Argentine agriculture by, for example, Reca (1974) and Fulginiti (1986). Also, because of the introduction of contractors and planting pools, highly efficient entrepreneurship has developed in the rural sector of Argentina, and the price elasticity of supply of individual products has risen considerably. These developments may help explain the decline in export taxation over the 1980s and 1990s.

Sturzenegger (1990) proposes that the export taxes may have been a result of the functioning of a political market rather than of decisions taken by a fully autonomous policy maker. In other words, pressure group action led to export taxation as an endogenous outcome. He suggests that the political market has two sides: on one side were the policy makers (macroeconomic government teams), who were implicitly supported by industrial interests, and on the other side were the agricultural interests. There was an asymmetry in the degree of influence of the two sides. The protaxation side is monolithic (the macroeconomic team) and rather concentrated (the industrial group). By contrast, the agricultural pressure group is highly dispersed over all Argentina and much more numerous (hundreds of thousands of people), making it costly to act collectively (Olson 1965).

While the protaxation side is always actively seeking to achieve its objectives, the antitaxation group only becomes politically active if the level of taxation becomes intolerably high. Recall that, at any moment, the effective level of real rent per hectare depends on relative international agricultural prices, the RER, and relative agricultural total factor productivity, in addition to the level of export taxation.

This political economy scheme is fully consistent with the compensatory and stabilizing role played by export taxation in Argentina. Consider, for instance, the RER variable. Changes in this variable imply changes in real rent per hectare. More than half of farmer costs at the border point of the value chain are accounted for by nontradable factors. So, if the RER depreciates, the relative prices of nontradables fall and the real rent per hectare rises. In this situation, given the improvement in real rents, the rural pressure group will be inactive, and the pro-taxation side will take advantage of this to raise export taxes, thereby partially reducing the improvement in the rent per hectare. The same compensatory and stabilizing role is then played out through changes in relative international agricultural prices and relative agricultural total factor productivity.

The introduction in 1991 of the convertibility program represents a challenge to our endogenous tariff hypothesis. The policy makers who introduced convertibility had a strong preference for reducing the antitrade bias embedded in external trade policy. This preference implied reducing or eliminating export taxation and reducing the tariff and nontariff protection for importables. The convertibility program also established a prohibition on the Central Bank financing of fiscal deficits through money creation. Money could only be created through the functioning of a currency board scheme and a one-to-one nominal conversion rate with the dollar. Under convertibility, the prospects for price stability were strong. This meant that the urgency for fiscal and price stability was much weaker during convertibility, which also supported the reduction in the taxation of agriculture. It seems that the governmental team that introduced the convertibility program was similar to an autonomous decision maker and that the reduction in agricultural export taxes that took place in the 1990s is more representative of an exogenous tariff. However, because of the strong real appreciation of the currency during the 1990s, the rural rent per hectare, despite the elimination of agricultural export taxes, was not far from the historical threshold that would trigger lobbying by farm interests. This is confirmed by the fact that real prices for pampean land, despite varying rising levels in rural productivity, did not experience major increases during the 1990s.

The political economy model also confirms the reappearance of export taxation since late 2001. This is because of the important real depreciation of the peso, improvements in international agricultural prices, and the emergence of stability and new fiscal problems.

Prospects for Reform

In the near future, the political economy game described above will continue to be played out with no change in the rules, and, presumably, there will be no major change in export taxation. At this moment, fiscal and stabilization pressures are

being exerted on the macroeconomic team to maintain the taxation on agriculture. Although there is a large primary surplus in the public accounts, maintaining or increasing this surplus is the predominant economic objective of the present government. With respect to the objective of stabilization, the economic team applied strong agricultural income and pricing policies to interrupt a worrisome acceleration in inflationary pressures, which originated in increases in the international prices of beef, dairy products, wheat, and corn. On the currency market, the strong intervention of the Central Bank in buying dollars and euros is supporting the real depreciation of the peso, thereby avoiding the possibility of a rapid reduction in real rent per hectare in agriculture. Discrimination against agriculture has increased. In 2006, the government imposed severe quantitative export restraints on beef and wheat and somewhat less severe restraints on maize and oilseeds. For 2007, the average tax equivalent of these quantitative restraints (J. Nogues, personal communication) raised the NRA by an additional 12.5 percentage points for wheat, 2.4 points for coarse grains, 4 points for oilseeds, and 18 points for beef and sheep meat (as well as 20 percentage points for petroleum products).

Over the medium term, reductions in the level of agricultural export taxation appear probable. This result will not be associated with changes in the rules of the political economy game, but will be related to the evolution of economic variables within the game, which will probably move in a way that triggers pressure group action by rural interests. This would eventually lead to a reduction in export taxation in agriculture. The main economic variable that will trigger the rural interests is the RER. Despite the possible continuation by the Central Bank of its policy of accumulating foreign reserves, the most probable evolution of this variable will be in the direction of a real appreciation of the peso. Gradually, this will reduce real rents per hectare. During 2006, there were already some weak signs of pressure group action by rural interests. These signs will strengthen as real depreciation continues unless this is offset by another boost in the international relative prices of agriculture or in farm total factor productivity growth.

In the long run, the possibility of significant changes in the basics of the agricultural political economy game in force over the past 60 years is real. There are two types of future events that may drive such changes. First, the rural pressure group may become permanently active and, unlike the present situation, will no longer be active only in the face of unacceptable reductions in real rent per hectare. Second, the fiscal and stability objectives of policy makers will become more easily satisfied. For the first time in more than half a century, Argentina is experiencing a large fiscal surplus at the national level, and this is supporting promising reductions in public debt. In 2006, the ratio of debt to gross national product was reduced by almost 10 percentage points. Tax evasion on major additional national taxes (the value added tax, the income tax, the social security tax)

is also being reduced. If, additionally, harder monetary policies are applied, inflationary anguishes may evaporate. Moreover, tax measures that are less distortionary than trade taxes may become available. With all these ingredients, it is possible that macroeconomic fiscal and stabilization objectives may become more easily achievable without so much reliance on export taxation in agriculture, replicating the experience of the 1990s (though no longer associated with appreciation in the RER).

Note

1. Apart from the indirect benefit through the reduction in the competition for mobile resources, agriculture also benefited directly from reductions in both tariff and nontariff protection on fertilizers, herbicides, pesticides, machinery, and irrigation equipment. As a result, fertilizer use increased five-fold, and herbicide and pesticide use increased threefold during the period.

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BRAZIL

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Brazilian agricultural policies have been undergoing major changes since 1950. A policy of forced industrialization and import substitution was followed from the 1950s through the 1980s. This included a period of intensive policy interventions to promote industrialization through import substitution, and it also included a period during which the taxation of agriculture was combined with domestic support policies based on subsidized credit and a minimum price policy (the MPP). By contrast, the last 15 years have seen fiscal discipline, strong control over monetary policy so as to contribute to macroeconomic stabilization, substantial trade liberalization, and less government policy intervention in agricultural markets.

In the first part of this overall period, a large number of government interventions were imposed on the agricultural sector, and this resulted in price distortions caused by both direct and indirect forms of taxation (Brandão and Carvalho 1991). One form of indirect taxation was a chronic overvaluation of the exchange rate. Since purchased inputs in agriculture were modest, the effect of the overvalued exchange rate on the price of agricultural outputs tended to dominate and worsen the agricultural terms of trade (Oliveira 1981). A form of direct intervention was export taxation, the so-called *confisco cambial*, which was mainly applied on coffee. In the early 1960s, the taxation reached approximately 50 percent of the value of exports (Veiga 1974).

Brazil's population underwent a marked change in composition during the period under analysis. About 31 percent of the population in 1950 was urban, but 70 percent was urban by 1980. The population reached 189 million in 2006; then, around 85 percent was urban, and only 15 percent was rural. Migration from rural areas was induced in part by the taxation imposed on agriculture.

Brazil experienced continued economic growth after World War II. Industry became the leading sector; the average annual rate of industrial growth was 9 percent from 1950 to 1973. During the period of the economic miracle (1968 to 1973), Brazil enjoyed even higher rates of growth. On average, gross domestic product (GDP) grew at an annual rate of about 10 percent during this period (and 7 percent during the rest of the 1970s), while industry grew at 13 percent. At an average rate of 5.4 percent, agricultural growth lagged.

The strong growth trend was reversed in the early 1980s, when the effects of the second petroleum price shock and a sharp increase in international interest rates led to economic stagnation. For two decades, the Brazilian economy stagnated, experiencing some years of negative or low growth and a sharp decline in per capita incomes. Annual inflation rates rose to 200 percent in the early 1980s and exceeded 1,000 percent in the early 1990s.

Agricultural production in Brazil is geographically concentrated in the central and southern parts of the country, including the South, the Southeast, and the Center-West regions. Three-fourths of agricultural production is generated in these areas.

During the period under analysis, agriculture changed considerably as a share of GDP (table 3.1). In 1950, it contributed 55 percent of GDP. Since the mid-1980s, the share has been less than 10 percent. Agriculture is more important in terms of employment, however, accounting for 37 percent of all jobs. Its share of exports was 50 percent until the late 1970s, but the share declined as the industrial sector took the lead. Nonetheless, agricultural exports are diversified; increasing exports of lightly processed food are supplementing traditional export products such as coffee, sugar, cocoa, and cotton. Soybeans and soybean products have been important exports since 1970. More recently, meat products, orange juice, and sugar have become the most important export products. The agrifood sector, comprising agricultural commodities, lightly processed products, and industrially processed food, accounted for 30 percent of total exports in 2004.

Wheat was by far the single most important agricultural import, although corn, rice, and edible beans were sometimes imported as a result of production shortages resulting from policies that distorted incentives. However, agricultural products have not exceeded 12 percent of total imports since 1970.

Despite much farm labor out-migration during the period under study, there was a wide gap between incomes in the farm and nonfarm sectors. According to the 1980 census, the average monthly income in agriculture was Cr\$6,668 (cruzeiros of August 1980) compared with Cr\$13,913 in the nonfarm sector. The comparable figures for 1970 were Cr\$3,965 and Cr\$10,778 (Denslow and Tyler 1983). These figures indicate a small reduction in the gap between farm and non-farm incomes (from a factor of 2.7 to a factor of 2.1) during the 1970s. The 1980

Table 3.1. Key Economic Indicators, Brazil, 1970–2004

Indicator	1970–75	1976–80	1981–85	1986–93	1994–99	2000–04
Population (millions)	102	116	130	148	165	179
Rural share of population (%)	42	36	31	26	21	18
GDP per capita (current US\$)	740	1,700	1,820	2,570	4,200	3,000
Agricultural share of GDP (%)	12.8	12.3	10.7	8.9	8.5	9.0
Arable land (hectares, millions)	29	44	47	51	57	59
Agricultural value added per worker (US\$)	510	1,240	1,320	1,880	3,550	2,390
Agricultural exports (US\$, millions)	391	441	773	1,049	1,939	2,910
Agricultural imports (US\$, millions)	326	305	372	528	476	337

Source: World Development Indicators Database 2007.

census also showed that income concentration increased more in agriculture than in the urban sector.

After a period of intense industrialization from the mid-1950s until 1989, the policy drive to extract income from agriculture was near exhaustion. Agriculture was no longer capable of sustaining an outstanding performance in either export crops or basic staples. Efforts at retaining the taxation of exports, a policy aimed at keeping food cheap so as to be able to maintain urban and industrial wages relatively low, and interventions in trade to provide the industry with cheap raw materials for industrialization, were near collapse.

Rather than removing price distortions, a new policy was adopted: a rural credit policy designed to induce modernization and technological change in agriculture mainly through subsidies for the purchase of modern inputs (fertilizers and machinery). This policy was adopted in the mid-1960s, and a growing budgetary transfer was channeled to the sector until these expenditures were phased out beginning in the late 1980s. The national system of rural credit was created in the 1960s in response to supply shocks and food shortages. Investments in agricultural research were insignificant at the time, except for the coffee and cotton sectors. During the rest of the decade and for most of the 1970s, the interest rates on loans from the system were independent of the rate of inflation. Real interest rates were negative throughout the 1970s. The nominal rates were adjusted at the end of the decade, but the real rates remained negative until the late 1980s, when the phaseout began. This policy of compensation benefited some products more than others, thus representing uneven income transfers to producers. Farmers who used more purchased inputs and who had easy access to official subsidized agricultural credit were able to offset somewhat the effect of the implicit taxation on products. The majority of farmers, however, experienced net taxation. The credit policy was clearly regressive, thus contributing to the poverty in agriculture.

The policy of compensation, intended to neutralize the negative allocative effects of the taxation on agricultural products, was not entirely successful: supply shocks persisted and had become more frequent by the late 1970s. Severe food shortages triggered more and more government intervention in domestic markets, draining resources that otherwise might have gone to financing the investments needed in agriculture to reduce food shortages.

During the 1980s, supply shocks persisted, inflation accelerated, and new instruments of trade intervention were frequently used, including quantitative controls, licensing, and export quotas and embargoes. The main target of policy intervention was the control of inflation. For import-competing crops, new policy instruments included tariff exemptions on imports, the imposition of ceiling prices at the retail level, and imports of the major staples by state-owned companies. In some cases (for example, cotton and maize), instead of freeing up exports

subject to temporary suspensions, the government took a contrary route by banning exports, while allowing temporary authorizations for the export of surpluses. Domestic production declined or stagnated, and these products became importables during most of the 1980s and 1990s. The disincentives to produce were strengthened by massive purchases of grains under the MPP because the subsequent sales of these government stocks occurred below normal costs, including interest rate charges.

The stock of grains held by the government in the 1980s implied great risk in the market. Processors and traditional buyers reduced their purchases, which left the government as one of the most important buyers during the harvest season. In addition to purchases through the MPP, public stocks were enlarged by government imports of rice, maize, and beef—a policy adopted at the time of the Cruzado Plan (1986)—in an attempt to avoid the price instability arising from crop failures. Government imports thus created uncertainty among commodity markets, and, because of the market instability, price premiums were not sufficient to compensate the private sector for carrying stocks.

The government bore the cost for the storage, transportation, and state taxation of the grain purchased through its interventions in commodity markets. A new policy was introduced to set rules for the sale of government stocks and for other sorts of interventions in agricultural markets. The experience demonstrates that, if a government disrupts commodity markets, it may crowd out private storage agents, and the government has to pay the price of carrying stocks from harvest to off-season. Farmers were also somewhat taxed because they had to sell their produce at harvest time below world market parities at the farmgate. These unintended government stocks under the MPP peaked during the 1980s, prompting supposedly quick action to avoid the continuation of such policies.

As noted by Krueger, Schiff, and Valdés (1988), price policies in Brazil, once in place, have tended to take on a life of their own, and the results have often been quite different from the results that were intended. Thus, agriculture remained more or less closed to trade (both imports and exports) until the mid-1990s.

Economic and Trade Reforms

The restructuring of the economy began in the late 1980s. This was triggered by a financial crisis in the first half of the 1980s. The reform sought to promote a more open economy and greater exposure to foreign competition as a means of controlling hyperinflation.

From 1989 to 1992, Brazil experienced the first major change in trade policy when the main instruments of the import-substitution drive were permanently removed. Among other steps, unilateral trade liberalization was implemented,

tariffs were reduced, and the export control apparatus was eliminated. The extent of the reforms was pervasive: average industrial tariffs were lowered from over 100 percent to 31 percent between 1994 and 1997. Because of the lower protection for industrial goods, the implicit taxation on agricultural exports decreased. But, at the same time, agricultural tariffs were reduced even further, to 10 percent on rice, wheat, and edible beans and 8 percent on maize, cotton, and soybeans. On a few occasions, tariffs on cotton and edible beans were eliminated.

In 1994, after several macroeconomic plans, the government attempted to stabilize key macroeconomic variables such as inflation through the implementation of the Real Plan.¹ (Real, in this case, refers to the Brazilian currency, the *real*.) A fixed exchange rate was the key instrument that was to be used to control inflation. Parity was fixed at R\$1 to US\$1, and, in two years, the exchange rate reached the unprecedented level of R\$0.86 to the dollar (Lopes et al. 2007). In addition, restrictions were imposed on government expenditures. The economy-wide reform was accompanied by a sharp increase in interest rates.

The drive toward trade liberalization was complemented by the Southern Common Market, known more widely by the name in Spanish, Mercosur, which was formed among Argentina, Brazil, Paraguay, and Uruguay through the Treaty of Asunción (Paraguay) in 1991 and the Protocol of Ouro Preto (Brazil) in 1994. Despite the existence of lists of exceptions by each Mercosur member country, tariffs within the countries were otherwise set at zero, and steps were taken to implement a common external tariff (Brandão, Lopes, and Lopes 2001).

Another important change in trade policy that affected the agricultural sector was the elimination of export taxation. In 1996, Congress removed the value added tax of 13 percent that had applied to agricultural exports. Exports in other sectors were already exempt from this tax. This measure was adopted at a time when the exchange rate was overvalued to the extent of 5 or 6 percent. The elimination of export taxation signified a radical shift toward a reduction in intersectoral price distortions and in the antiexport bias that had prevailed in agriculture for decades.

The combination of trade reform and the strong appreciation in the domestic currency introduced by the Real Plan caused the current account in the balance of payments to show a deficit of around US\$18 billion in 1995. As a tradable sector, agriculture was hurt by the deficit. During this period, there was a sharp increase in import flows by the private sector, including feed grains, cereals, food grains, oilseeds, fibers, and other agricultural commodities. Total expenditures on imports of these agricultural commodities reached US\$1.6 billion. Imports of rice, which were around 250,000 tons in the late 1980s, reached around 1.2 million tons (of a total consumption of 10 million tons), and maize reached 1.3 million tons in 1994 (of a total consumption of 22 million tons). For most commodities, the country was dependent on imports to supplement domestic production.

In addition to the deterioration in the external accounts, other indicators suggest that the strong appreciation of the currency following implementation of the Real Plan was causing recurrent trade deficits. In August 1996, the Getúlio Vargas Foundation estimated that the appreciation of the exchange rate relative to the wholesale price index was around 21 percent for the period 1988 to 1996. Another indicator is the evolution of the price indexes of tradables and nontradables. Brandão and Martini (1996) estimate that, since August 1994, the ratio of tradables to nontradables in the consumer price index dropped from 1 to 0.68. These indicators show the extent to which the currency appreciated.

Finally, in January 1999, a major devaluation of the currency was implemented, and a floating exchange rate regime was adopted. The exchange rate was allowed to fluctuate within a band system, and a full floating exchange rate was eventually established.

Agricultural Policy Reforms

Since 1988, because of government financial crises, the MPP has been adjusted depending on the availability of funds. In some years, the reduction in available government funds was so large that the government was unable to defend minimum prices effectively, creating credibility problems for the MPP. Beginning in the 1990s, the MPP was intentionally funded with fewer and fewer resources in a deliberate attempt to place less emphasis on government instruments that were creating instability in markets.

Government purchases of agricultural commodities were eliminated after 1995 because of a growing consensus that this purchasing policy was not consistent with the elimination of tariffs within Mercosur. Policy makers realized that the MPP guaranteed higher prices to producers in the other partner countries in the new customs union. The process of eliminating price supports in Brazil was rapid; the price supports were replaced by other mechanisms that were not broad sector-wide interventions (OECD 2005).

The elimination of marketing boards was another important reform in the agricultural sector; the reform included the elimination of the fiscal funds devoted to marketing activities. From 1988 to 1991, public funding was reduced by 75 percent for coffee, 91 percent for alcohol and sugar, and almost 100 percent for cocoa and wheat (Gasques and Conceição 2000). The deregulation of the domestic markets for these products resulted in the strong participation of the private sector in marketing channels at all levels.

Government expenditures in agriculture were reduced from 4.2 percent of agricultural GDP in 1986 to 1.7 percent in 1991. The total public funds allocated

to agriculture, including credit from official sources and state-owned banks, decreased from US\$12.3 billion to US\$3.4 billion, and the decrease continued thereafter. The agricultural credit provided by private banks under regulated conditions dropped from US\$10.2 billion in 1991 to US\$5 billion in 1995 (Gasques and Conceição 2000).

From 1995 to 2005, price supports were considerably reduced. Budget expenditures of so-called new money (credit granted on top of existing debts) on production credits were considerably constrained. According to Gasques (2004), the annual resources in credit support supplied to the agricultural sector declined from a peak in 1979, when it reached R\$54 billion, to R\$12 billion in 1999 (in constant reais). Part of the decline in the availability of resources for farm credit was caused by the failure of farmers to pay back their loans given the general insolvency (which peaked during the period 1986 to 1994).

Brazil was to experience freer trade within a market environment that was still dominated by strong price distortions. The Uruguay Round achieved much less than expected, according to assessments by policy makers and analysts at the time the negotiations ended. Nevertheless, the round had a positive indirect effect: several countries undertook unilateral reforms of their trade regimes and engaged in regional trade agreements. This was particularly the case in Latin America, where Brazil followed the examples of Argentina, Bolivia, Chile, Colombia, Mexico, and other countries.

The Impact of Policy Reforms on the Agricultural Sector

The main results of the agricultural policy reforms may be broken down according to two periods: a transition period from 1990 to 1999 and a period beginning in 2000. During the transition period of the 1990s, import flows of competing agricultural commodities increased significantly, imposing the need for strong cost adjustments by Brazilian producers. This period was marked by substantial appreciation in the exchange rate that, combined with low international prices for agricultural commodities, resulted in cheap imports. These drastic changes depressed prices in the domestic market and provided adjustment incentives in the agricultural sector that required a strong commitment to higher efficiency, better product quality, and greater productivity.

Because of the tight controls in fiscal policy after the adoption of the Real Plan of 1994, little support was provided to farmers to assist in implementing the necessary adjustments. Outputs that had not previously been linked to international markets (cotton, milk, maize, rice, and wheat) suffered the most from competition with cheap imports during this transition period. In addition to low international

market prices, export subsidies in other countries also had a major impact on the Brazilian agricultural market.

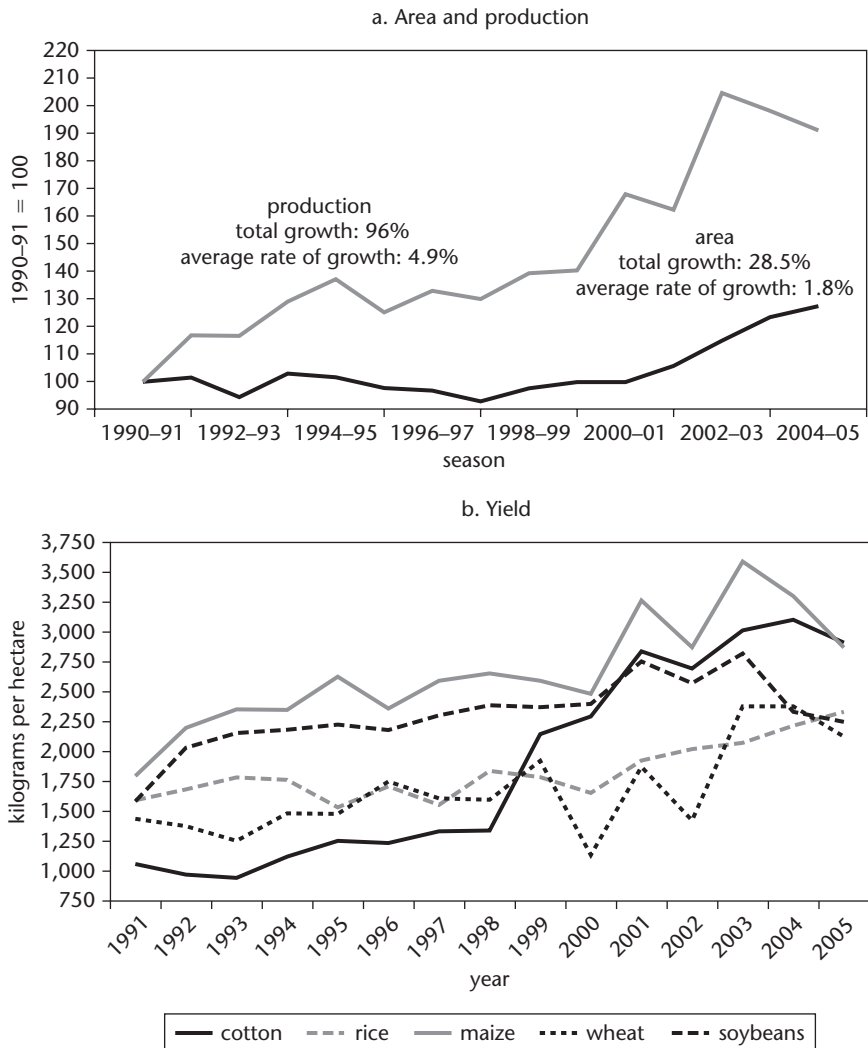
Following on the success in macroeconomic stabilization brought about by the Real Plan, other important policy reforms helped build a more favorable environment for agricultural growth.

The second period of agricultural reform began in 2000 and was marked by a boom in exports. This resulted from the devaluation of the domestic currency because of the introduction of the floating exchange rate regime (1999) and a parallel increase in the international prices of agricultural commodities. The strengthened price incentives enhanced the competitiveness of Brazilian exports, particularly from the Center-West region (the new agricultural frontier), where commercial farmers, who dominate in the use of modern technology, increased significantly the production of soybeans, maize, cotton, cattle, pigs, and chickens. The boom in agricultural production during this period was the result of strong productivity gains rather than an expansion in area planted (figure 3.1). A leading role in the export boom was thus played by efficient producers using modern technology. This new pattern of agricultural production, based on the adoption of modern technology, was a result of public investment in agricultural research through a research network headed by the Brazilian Agricultural Research Corporation.

Two important changes occurred because of the country's recent export growth. First, the Brazilian share of world commodity markets increased given that most of the additional output generated by the improved technology was channeled to exports. Second, exports became more diversified because of the increased exports of lightly processed products, including soybean meal, vegetable oil, chicken meat, bovine meat, pig meat, and fruits. Most of the increase in exports was attributable to soybeans.

Another aspect of the wide-ranging economic reform was the rescheduling of farm debt. The escalation of inflation in the mid-1980s triggered several attempts to bring debt under control through macrostabilization schemes. All these schemes (known as plans) included steps to freeze prices on the consumption basket. This policy mechanism generated a cumulative gap between production costs (relatively higher) and sales revenues (relatively lower). This gap affected farmers relatively more because of the time span between planting and harvesting. The effects of the price freeze mechanism were exacerbated by the Collor Plan, under which the inflation rate reached 70 percent per month, opening a chasm between the interest rates on farm loans and sales revenues. General insolvency resulted, followed by a deep cut in the funds available for farm credit. Negotiations on the farm debt began in 1992, and, in 1995, the first debt rescheduling program was approved. This program represented a strong positive incentive for growth in production because farmers recovered their borrowing capacity.

Figure 3.1. Crop Area, Production, and Yield Growth, Brazil, 1991–2005



Source: Author compilation from official sources.

The 2000s: Increases in Farm Production and Exports

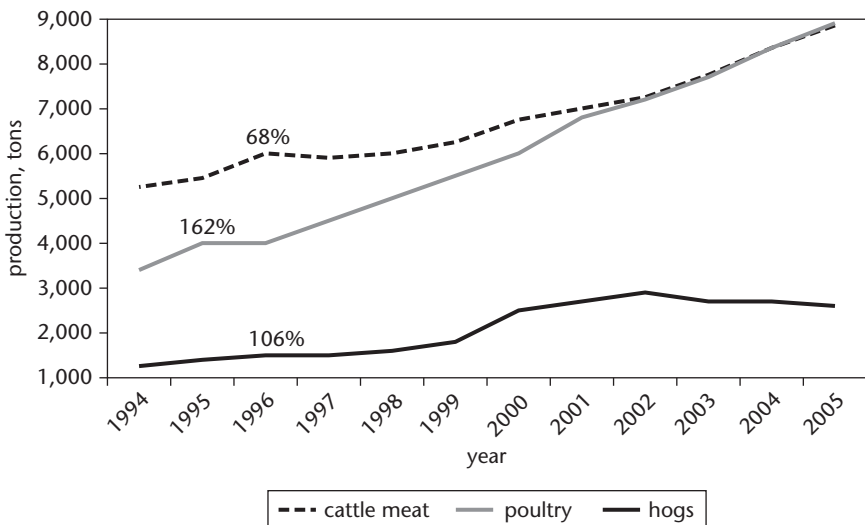
By 2000, a new agriculture was emerging as measures undertaken since the mid-1980s to reform agricultural and other policies matured. The outstanding performance of Brazil's agricultural sector from the mid-1990s to 2004 was a

result of the major reforms in macroeconomic and sectoral policies. Three other developments were also important in the enhanced performance of the sector: fresh investment in agricultural research on crops and livestock (begun in 1974 and reaching fruition in the 1990s), which made available a stock of new productive technology that gave support to output growth; the adoption of new varieties and improved management practices, which made possible increased output per hectare to help the most efficient farmers survive the unfavorable environment caused by the lower domestic prices that prevailed for agricultural products during the 1990s; and cheaper fertilizers and other imported inputs during most of the 1990s that was brought about by the strong appreciation of the currency.

The pattern of agricultural growth changed radically; it now relied mainly on productivity growth. The base area planted increased by an average rate of 1.8 percent a year from 1990 through 2004. Output growth in the same period averaged 4.9 percent a year. This implies that output had doubled since the 1990 crop year, while the area planted increased by slightly less than 30 percent (figure 3.1). Investments in research on livestock, poultry, and hog production also generated outstanding results (figure 3.2).

The combination of macroeconomic reform, agricultural policy reform, and trade liberalization, together with the ability of farmers to implement strong structural adjustment, resulted in unprecedented export-led growth in the

Figure 3.2. Growth in Meat Production, Brazil, 1994–2005



Sources: Data of the Brazilian Confederation of Agriculture, the Brazilian Poultry Producers and Exporters Association, and the Brazilian Pork Producers and Exporters Association.

Note: 2005 is an estimate.

agricultural sector. The sector led in advances in the country's GDP, with an average rate of growth of 5.3 percent a year during 2000 to 2004 when the industrial sector was growing at only 1.7 percent. In 2004, Brazil ranked first in the world in the production of alcohol, sugar, coffee, and orange juice; second in the production of soybeans, soybean by-products, beef, and tobacco; and third in poultry meat, pig meat, fruits, and maize. Brazil also ranked first in the export of alcohol, sugar, coffee, orange juice, soy complex, beef, tobacco, and poultry meat, and third in the export of pig meat. Higher international prices and a booming demand for food abroad contributed to this performance.

How did the income profile of agriculture change during the reform period? Based on the agricultural census data of 1995/96, Lopes (2004) finds that, of a total 4.8 million farms in Brazil, 3.3 million fell within the legal definition of family farming in the National Family Farming Program, which was designed to promote family farms by offering access to subsidized credit. These farms represented 68 percent of all farms, but they generated only 24 percent of the total gross income in agriculture. By contrast, commercial farms of all sizes represented 32 percent of all farms, but generated 76 percent of agricultural income. These commercial farms produced 96 percent of the sugarcane; 86 percent of the oranges; 80 percent of the cotton; 79 percent of the coffee; 78 percent of the grains, cereals, and oilseeds; 76 percent of the potatoes; 58 percent of the horticulture products; 91 percent of the poultry meat; 90 percent of the beef; 83 percent of the eggs; and 72 percent of the pig meat in the country. Family farms dominated mainly in tobacco (86 percent) and manioc and manioc flour (73 percent). Small commercial farms are responsible for much of the intensive production of livestock, but they are heavily dependent on the maize and soybeans produced on large commercial farms, showing a clear complementarity within agriculture among farms of various sizes.

Of the 3.3 million farms that lie within the profile of the National Family Farming Program, approximately 2 million may be considered subsistence family farms. These farms were being run by extremely poor farm families. For this group of farmers, it is unlikely that agriculture is able to satisfy their needs in terms of providing a minimum caloric intake or a minimum income for the subsistence for entire households. The bulk of poverty in Brazil is found in the agricultural sector (World Bank 2001). Such farms are concentrated in the North region and, particularly, in the Northeast region, but the poor in the agricultural sector are scattered across all regions, including the South and the Southeast, which are the wealthier regions.

The 257,000 mid-size commercial farms account for 5.1 percent of all farms and produce 20 percent of the total agricultural output in the country. Performance indicators show that they are economically viable, suggesting that they deserve closer attention from policy makers because of the potential for the application of

mechanisms designed to facilitate the adoption of modern technology. The 375,000 large commercial farms are responsible for 52 percent of total domestic production. In general, the majority of Brazilian farms receive low levels of absolute income. Recent estimates based on the 2000 demographic census show that 61 percent of households in agriculture were living below the poverty line in 2000, while the corresponding share of the urban sector was 25 percent.

Past Evidence of Direct Price Distortions and Indirect Assistance to Agriculture

Krueger, Schiff, and Valdés (1988) identify four policies that affect agriculture in developing countries: (a) developing countries have attempted to encourage the growth of industry through policies focusing on import substitution and protection against imports that compete against domestic products; (b) overvalued exchange rates have often been maintained through exchange-control regimes and import-licensing mechanisms even more restrictive than those that would have been adopted to foster import substitution; (c) developing countries have attempted to suppress producer prices for agricultural commodities through government procurement policies (especially agricultural marketing boards), export taxation, and export quotas; and (d) some governments have attempted to offset part or all of the disincentive effect on producers by subsidizing input prices and investing in irrigation and other capital inputs. These points broadly match with the policy regime in Brazil. The only policies the country did not pursue were government imports of basic staples, direct controls on food prices, and subsidies for the production of imported food items.

Schiff and Valdés (1992) summarize their empirical estimates of the direct and indirect government assistance, net of taxation, to Brazilian agricultural producers. Their direct estimates are expressed as the percentage by which the domestic producer price diverged from what would have prevailed in a well-functioning, free-trading market with the exchange rate and industrial protection regimes in place. This measure is equivalent to the nominal rate of protection. The authors found that the most important importables (such as wheat) tended to be protected, while the most important exportables (such as soybeans) tended to be taxed. Specifically, their estimated nominal rate of protection for importables is 83 percent in 1969–72 and 3 percent in 1976–83; and, for exportables, the rates are –27 percent in 1969–72 and –1 percent in 1976–83. Their total nominal rate of protection for all covered farm products is 46 percent in 1969–72 and 0 percent in 1976–83. Their estimates of the indirect effects of trade and macroeconomic policies on farmer incentives through the real exchange rate and the protection afforded for nonagricultural commodities are negative in both periods (–17 percent in

1969–72 and –19 percent in 1976–83). So, their sum of direct and indirect effects in Brazil is 28 percent in 1969–72 and –19 percent in 1976–83. Schiff and Valdés (1992) also provide estimates of the net income transfers to or from agriculture as a result of direct and indirect price and nonprice interventions. Measured as a percentage of agricultural GDP for 1970–83 and depending on their assumptions, the price transfer estimates range from 6 to 13 percent, and the nonprice transfer is 12 percent; so, the sum of price and nonprice transfers is between 18 and 25 percent. Thus, overall, the price-related income transfers (output and intermediate inputs) to Brazil's farmers were positive during 1970–83, and, despite negative nominal rates of protection for certain agricultural products as a result of direct price interventions, they were more than offset by transfers resulting from price interventions on inputs (including credit subsidies), nonprice transfers (including public investment in agricultural research and extension and land improvement), and the effect of exchange rate misalignment. In a later study, Valdés (1996) finds that the positive picture had vanished during 1985–92 when the price-related transfer as a percentage of agricultural GDP was –4 percent in terms of outputs and 3 percent in terms of inputs, while non-price-related transfers (credit subsidies) represented 1 percent of agricultural GDP, and, hence, there was a net average income transfer in those years of only 0.1 percent.

The Organisation for Economic Co-operation and Development (OECD) published a report on the changing pattern of distortions in the economic incentives in agriculture in Brazil from 1995 to 2004 (OECD 2005). The report shows that broad reforms in macroeconomic, trade, and sectoral policies since the late 1980s resulted in an additional decline in the level of direct support to agriculture. The OECD finds that its aggregate producer support estimate averaged only 3 percent of the gross value of production over the 10-year period. The decline affected most products. The exceptions were import-competing products such as rice and cotton, for which the producer support estimates averaged 12 and 6 percent, respectively, in 2000–04.² The OECD report attributes the decline in support to macroeconomic stabilization in 1994 and to trade reforms beginning in the late 1980s that brought tariffs on agricultural imports into the range of 5 to 10 percent. The deregulation of domestic markets, the elimination of marketing boards (coffee, sugar, wheat), and a restricted role for the MPP through the reduction of minimum price levels relative to market prices also all contributed.

The OECD results highlight that there was closer integration of domestic agricultural markets and world markets. A clear convergence of domestic prices with international prices occurred because policy distortions were considerably reduced. The results show that, despite this relatively clear picture overall, the path of convergence was not smooth and that wheat, rice, maize, and other products faced targeted local and temporary interventions during some years, although

these interventions had only a modest impact on market distortions. Fluctuations in the level of support were caused by underdeveloped infrastructure, excess supply in the new frontier, and sudden declines in external prices.

The OECD study also noted that there had been a slight increase in the preferential credit for the agricultural sector through the allocation of public funds for subsidies on interest rates. This was attributed to the rescheduling of farm debt that originated with the stabilization plans of the late 1980s. As part of the government's attempt to control inflation, monetary correction was introduced in rural credit contracts as a means of restricting the expansion of credit. Farmers began to face increasing costs on their borrowing balances. It took nearly a decade for hyperinflation to be brought under control through the Real Plan. During this decade, several policies contributed to the depression in farm prices: price controls at the retail level, exchange rate overvaluation, the opening of trade, and duty-free imports from other Mercosur countries. As a result, the rising cost of credit, coupled with lower repayment capacity, began to affect commercial farmers, giving rise to a debt crisis. After 1994, the appreciation of the real exchange rate and the extremely high interest rates aggravated the crisis. New bank lending to farmers was virtually nil by 1995. The government was convinced that the farm debt had resulted from extreme economy-wide instability and that this might have broad implications for the rural credit system. A large-scale restructuring program was initiated in late 1995, but the debt negotiations were a long process. According to the OECD (2005, 49), "at the end of 2004, the outstanding restructuring debt stood at BRL 21.8 billion (US\$8.0 billion) with overdue repayments reaching BRL 3.8 billion (US\$1.4 billion)." The restructuring of farm debt reduced the commitments of farmers in the short run. However, the restructuring also crowded out new government lending, with the result that the government funds channeled to the rural credit system were substantially reduced.

Our Study's Estimates of Policy Distortion Indicators

Our study's methodology (see Anderson et al. 2008 and appendix A) differs somewhat from both the Krueger, Schiff, and Valdés (1988) and the OECD (2005) studies even though the main focus is still on government-imposed distortions that create a gap between domestic prices and what these prices would have been under a freer market. Because it is not possible to understand the characteristics of agricultural development through 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 it also generates estimates of distortions in nonagricultural sectors for comparative evaluation.

More specifically, this study computes a nominal rate of assistance (NRA) for farmers that includes an adjustment for direct interventions on tradable inputs (border protection on fertilizers) and on nontradable inputs (credit subsidies to farmers). It also generates an NRA for nonagricultural tradables for comparison with the NRA for agricultural tradables using the calculation of a relative rate of assistance (RRA; see appendix A).

The estimation of the NRAs is difficult in an environment of high inflation rates and major changes in exchange rates during a given year.³ The problem of the high rates of inflation also affects the estimation of nominal values for all non-product-specific subsidies (such as expenditures on research and extension, agricultural training, and inspection services) for periods prior to 1995. The estimates for non-product-specific subsidies are therefore accurate only for recent years.⁴

To compute the NRAs, we compare domestic and border prices at the wholesale level whenever relevant data are available. In a few cases, a wholesale equivalent value is estimated using the margins from farmgate to wholesale prices because, in Brazil, wholesale prices have declined in terms of their relevance as representative prices in the market. Few transparent quotes are now available for the wholesale prices of primary and lightly processed products. For some products, such as maize and soybeans, wholesale prices are inferred from the prices paid by mills and crushing plants closer to the production point, but these businesses are far from the ports and are not entirely representative of the traditional wholesale concept. For earlier years, we draw on estimates from previous empirical analyses of similar indicators and on data in, for example, Brandão and Carvalho (1991) and Schiff and Valdés (1992).

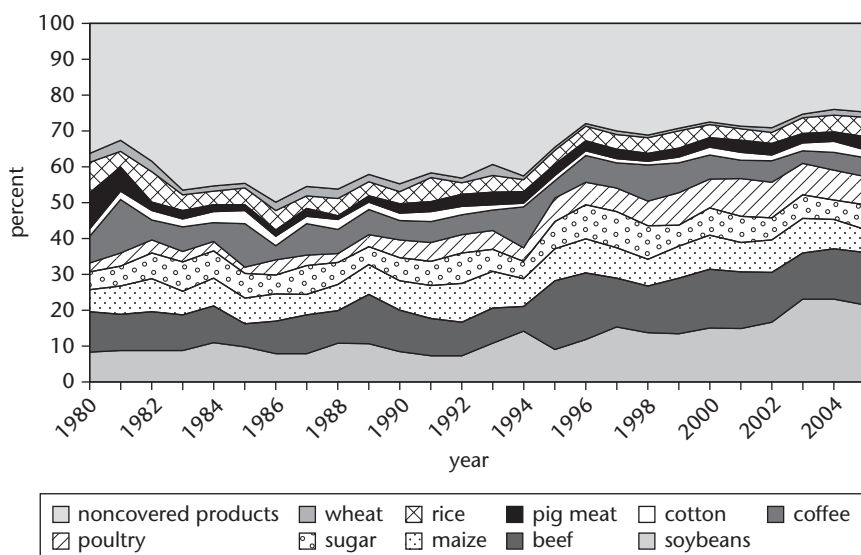
Product selection

The products selected for this study include the following crops: wheat and paddy rice as importables; soybeans, sugarcane, and coffee as exportables; and maize and cotton as products subject to changing trade status. The lightly processed products included are wheat flour, milled rice, and raw sugar, while the livestock included are cattle, poultry, and pigs, as primary products, and beef, broilers, and pig meat, as the lightly processed export counterparts.⁵ Together, the selected products account for between two-thirds and three-quarters of the total value of agricultural production at undistorted prices (see also figure 3.3).

Price comparisons at a particular point in the marketing chain

In the computation of NRAs, the point of comparison of domestic and border prices should be at the wholesale level; one should also bear in mind the domestic transport costs. In this study, we use the cost, insurance, and freight (cif) prices

Figure 3.3. Share of the Gross Value of Farm Production at Distorted Prices, Selected Products, Brazil, 1980–2005



Sources: Lopes et al. 2007 and data compiled by the authors.

and the free on board (fob) prices at the most important Brazilian ports for each product. We make an adjustment for quality (by using the registered prices at export and import agencies, and, where necessary, by using international prices for similar products, in which we make a quality adjustment). We subtract port charges, transportation, and other related expenses for exportables, but add these cost items for importables to generate equivalent cif prices and fob prices at the wholesale point.⁶

We have taken the domestic wholesale price, wherever available, after checking that this price represents actual trade and commercial transactions. In a few cases, a composite of prices has been used to estimate a wholesale price equivalent, adding a margin to the farmgate price to account for transportation and processing costs.⁷

Direct comparisons between border prices and wholesale prices have been possible for some products that were traded as primary products and for which a wholesale price had already been collected or estimated (soybeans, maize, wheat). For other products, the comparisons have been made between the border price and the equivalent price for the lightly processed product at the wholesale level. For example, the price for live cattle was converted into a price for boneless beef, poultry into broilers, pigs into pig meat, wheat into wheat flour, paddy rice into

milled rice, and sugarcane into raw sugar. For all lightly processed products for which prices could be determined, the price comparisons were made between wholesale and border prices.

The transmission elasticity between the wholesale price and the farmgate price is assumed to be the same for each product. This is valid especially during the most recent decade or so because Brazilian agriculture has experienced increasing competition in product markets at the farm level given that international trading companies have been competing with cooperatives for a larger share of the marketed output. Improved information systems among farmer associations, government agencies, and trade boards are playing an important role in the dissemination of market prices to remote farmers. Even small commercial farmers—the main producers of poultry and pigs—are usually well integrated into marketing channels.

NRA estimates for exportable primary products

In earlier periods, the negative NRAs for exportable products reflected high levels of taxation. The highest estimated rates were for sugar, coffee, soybeans, and poultry. Temporary quantitative restrictions on exports, discretionary export prohibitions and embargoes, and export taxes were the main instruments used by the government to keep down prices in domestic markets. Together with the chronic overvaluation of the currency during most of the period under analysis, both implicit and explicit forms of taxation discriminated against export crops until the later 1980s (table 3.2). (The annual data are shown in appendix B, table B.2.)

For sugar, the average rate of taxation (a negative of the NRA) was more than 50 percent until the early 1990s. Regulations under the marketing board for sugar and alcohol (the Institute of Sugar and Alcohol) restricted exports of sugar, making it one of the export commodities most highly discriminated against in Brazil. But, during the past few years, the taxation has disappeared, and the NRA is now close to zero.

For coffee, the NRA estimates show average taxation ranging from 48 percent in 1980–84 to 18 percent in 1985–89, but, since then, the NRA has been slightly positive. Brazil is the largest producer of coffee in the world, and the crop was the single most important export product for a long time. Under the coffee marketing board (the Brazilian Institute of Coffee), the government maintained a strong regulatory regime, retained export proceeds, and implemented a government stock policy aimed at reducing market price fluctuations. This stock policy was continued even following the reform introduced by President Collor that eliminated the marketing board in 1990. In 1992, coffee prices and coffee exports were fully liberalized, and a wide-ranging process of adjustment began. The cost of producing

Table 3.2. NRAs for Covered Farm Products, Brazil, 1966–2005
(percent)

Product	Author results								OECD results ^a	
	1966–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–05	1995–99	2000–04
Exportables	–8.4	–33.2	–30.0	–31.5	–29.5	–18.2	0.4	1.3	—	—
Beef	—	—	—	15.3	2.7	–24.3	4.4	3.1	0.0	0.0
Coffee	—	—	—	–47.6	–25.0	11.2	6.8	6.3	0.1	0.1
Cotton	–8.6	–0.2	–17.2	–20.5	–28.9	n.a.	n.a.	10.4	2.2	5.6
Maize ^b	–9.0	0.2	–2.6	–1.8	n.a.	n.a.	n.a.	1.7	5.1	5.8
Pig meat ^c	—	—	—	n.a.	n.a.	13.2	1.4	1.0	0.0	0.0
Poultry	—	—	—	–8.2	–13.7	–13.2	1.0	2.3	0.0	0.0
Soybeans	0.0	–4.7	–15.6	–11.8	–20.8	–10.5	–1.2	–2.5	0.1	0.0
Sugar	—	–65.8	–52.4	–63.7	–55.3	–42.4	–10.3	1.7	–25.6	0.0

(Table continues on the following page.)

Table 3.2. NRAs for Covered Farm Products, Brazil, 1966–2005 (continued)

Product	Author results								OECD results ^a	
	1966–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–05	1995–99	2000–04
Import-competing products ^b	41.4	26.6	–1.9	–6.8	–22.5	–17.2	8.3	12.0	—	—
Maize ^c	n.a.	n.a.	–26.0	–39.9	–33.9	–22.9	4.0	n.a.	5.1	5.8
Cotton	n.a.	n.a.	n.a.	n.a.	n.a.	–16.6	6.5	n.a.	—	—
Pig meat ^d	—	—	—	0.6	–19.3	n.a.	n.a.	n.a.	0.0	0.0
Rice	—	7.8	–11.1	–0.9	3.8	5.1	17.2	16.6	8.4	3.1
Wheat	41.4	20.0	65.8	41.6	–5.8	5.1	8.2	0.3	3.1	1.4
Total, covered products	–6.1	–27.3	–23.3	–28.0	–27.6	–18.0	1.8	2.1	–2.0	1.2
Dispersion, covered products ^e	28.1	37.2	41.0	35.9	25.5	27.4	8.5	7.6	11.7	5.2
% coverage, at undistorted prices	33	69	69	71	64	64	71	75	73	77

Sources: Lopes et al. 2007; data compiled by the authors; OECD PSE-CSE Database 2007.

Note: — = no data are available. n.a. = not applicable because the data are shown elsewhere in the table where the products are indicated with a different trade status.

a. The NRA is defined as $100 \times (\text{NPC} - 1)$, where NPC is the nominal protection coefficient.

b. The NRAs for import-competing products in 1970–74 include rice only in 1973–74.

c. Maize has been classified as an exportable up to 1977, in 1982–83, and since 2001 and as import-competing in other years.

d. Pig meat has been classified as import-competing in 1982–89 and as exportable in 1990–2005.

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

coffee is very competitive in Brazil, particularly in the southeastern states. Despite all the disincentives created by previous interventionist policies, the country has maintained its leadership in coffee exports.

Taxation is also revealed in our NRA estimates for soybeans, as earlier studies have also found (Santana 1984; Araújo 1997). These NRAs range from -5 to -15 percent up to the mid-1990s, reflecting the government's attempts to stabilize inflation. In addition to quantitative restrictions, exports of beans were also subject to a value added tax of around 13 percent until 1996. Exports of soybean meal and soybean oil were exempt from this tax, thereby providing assistance to processors, but not necessarily farmers. Trade restrictions inhibited growth, and soybean cultivation remained stagnant at around 10 million to 11 million hectares from the 1983/84 to the 1996/97 crop years. The level of taxation of soybeans declined after 1995, allowing domestic prices to converge to international prices. The turning points for soybean growth were the elimination of the value added tax on exports (1996) and the new floating exchange rate policy that followed the sizeable devaluation of the currency in 1999. Between 1996 and 2005, production jumped from 23 million to 55 million tons, allowing exports of soybeans to boom.

The estimated NRAs for poultry also were negative until 1995, as were the NRAs for beef in the first half of the 1990s. Again the change, which began in 1995 when taxation was eliminated, led to a boom in beef and poultry exports so that Brazil is now among the largest exporters of beef and poultry in the world.

Estimates of NRAs for importable primary products

The estimated NRAs for wheat show high levels of protection up to the mid-1980s, which is consistent with regulations that established a state monopoly over production, imports, and marketing (the wheat marketing board). Under the regulated system that lasted from 1967 through the 1980s, prices at the farm level were set well above international prices, and the NRA ranged between 20 and 65 percent. This stimulated domestic production, which reached a record of 6.1 million tons in the late 1980s. The radical deregulation of the wheat sector in 1990 saw all instruments of state control eliminated and the elimination of the wheat marketing board. Private imports of wheat have prevailed since then, and Mercosur (Argentina) has become the main supplier. Domestic prices at the farm level became integrated with world prices in the mid-1990s, and domestic prices dropped considerably. As a result of these reforms, domestic production nearly halved, to 3.3 million tons in 1990/91 and then to 2.1 million tons by 1993/94.

For rice, the estimated NRA was slightly negative during earlier periods, even though rice is an import-competing crop. However, rice is the most important staple in Brazilian food consumption, which means it was subjected to frequent

discretionary interventions by the government to keep down domestic prices. Frequent supply shortages saw the government resort to massive imports of rice through a state agency (the National Commodities Supply Corporation), and the imported product was sometimes sold in the domestic market below cif prices. After 1995, the rice NRA became positive. Rice was one of the crops most affected by the Mercosur regional trade agreement introduced in the mid-1990s. Lower transportation costs and the elimination of tariffs allowed greater imports of milled rice from Argentina and Uruguay at prices that were below the prevailing domestic prices. During 1994/99, the government attempted to offset the trend of declining rice prices by setting high minimum prices to support the incomes of rice producers. But this proved to be inconsistent with free trade regulations within Mercosur and was discontinued. During the past decade, imports of rice have accounted for around 10 percent of domestic consumption. Unlike most other grain crops, there has not been significant productivity growth in the rice sector.

Brazil is now a major world exporter of maize, largely for animal feed. It was an exporter up to the mid-1970s, too; however, when the domestic production of poultry and pigs expanded, maize exports were restricted and later banned to satisfy the domestic supply chain at cheap prices. These government interventions explain the taxation of maize even though it was an importable product in 1984–93. Because of the establishment of Mercosur in the mid-1990s, cheap imports by the private sector in Brazil induced a major adjustment in maize production. Maize farmers were forced to adopt new technologies and reduce costs to remain competitive in domestic markets and abroad. Macroeconomic stabilization policies and fiscal deficit controls after 1994 brought a stop to government interventions. As production increased, the performance of the maize sector was supported mainly by productivity growth. Exports of maize boomed after 2000.

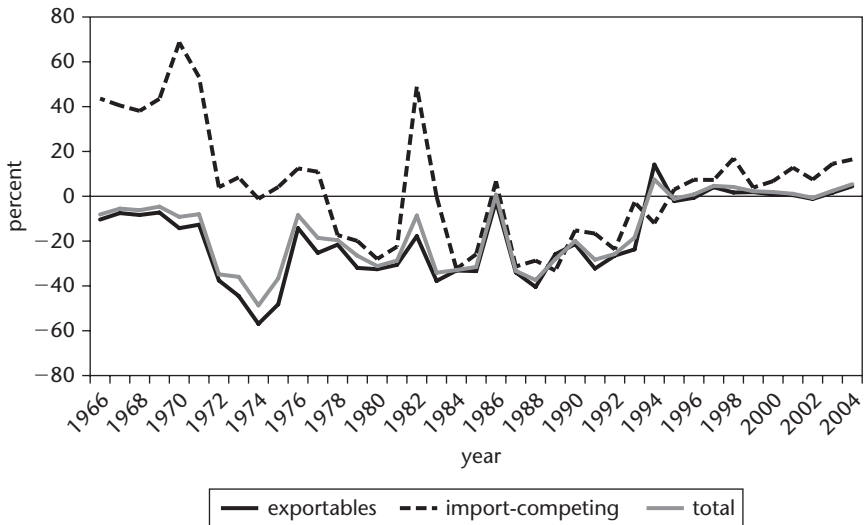
The role of input price distortions

The above NRAs include the product price equivalents of input subsidies and taxes, which took two main forms: first, subsidized interest rates on production and marketing credits channeled toward each product and, second, import tariffs on tradable inputs used by farmers (mainly fertilizers). The first distortion represented a positive transfer to producers, the second a negative transfer.⁸ Empirically, the former outweighed the latter in all periods; so, these input distortions contributed positively to the NRA estimates in table 3.2.

Aggregate NRAs and the RRA

For covered farm products as a whole, the NRA averaged –19 percent in the 30 years to the mid-1990s and since then has averaged 2 percent.⁹ The dispersion of rates

Figure 3.4. NRAs to Exportable, Import-Competing, and All Covered Farm Products, Brazil, 1966–2004



Sources: Lopes et al. 2007 and data compiled by the authors.

around the mean value also has diminished in the past decade, suggesting that there is less welfare loss from the distortions in incentives within the agricultural sector (bottom of table 3.2). For most products during the majority of years, farmers producing exportables faced negative rates of assistance, while farmers involved in import-competing agriculture experienced positive or at least less negative rates of assistance. For the farm sector overall, figure 3.4 shows that the average NRA was negative in most periods though it has become slightly positive in the past decade.

Following the OECD, we assume that the NRA for noncovered products is the same as the average for covered products (row 2 of table 3.3). We then adjust for policies that are not product specific, such as federal government expenditures on research, extension, rural education, sanitary and phytosanitary inspection, and public stockholding. This provides an NRA for all agriculture (row 4 of table 3.3). Because we assume that all farm products are tradable, this is also the average for tradable agriculture (row 6 of table 3.3).

The NRA for tradable agriculture may be compared with the average NRA for the nonagricultural industries producing tradables. The latter has been estimated by dividing up each of the nonfarm sectors into exportable, nontradable, and import-competing subsectors. These sectors include nonagricultural primary products, highly processed food, nonfood manufactures, and the service sector. The average NRA of these sectors is estimated directly from information on

Table 3.3. NRAs in Agriculture Relative to Nonagricultural Industries, Brazil, 1966–2005
(percent)

Indicator	1966–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–05
Covered products ^a	–6.1	–27.3	–23.3	–28.0	–27.6	–18.0	1.8	2.1
Noncovered products	–6.1	–27.3	–23.3	–28.0	–27.6	–18.0	1.8	2.1
Non-product-specific assistance	–6.1	–27.3	–23.3	–28.0	–27.6	–18.0	1.8	2.1
Total agricultural NRA ^b	–6.1	–27.3	–23.3	–25.7	–21.1	–11.3	8.0	4.1
Trade bias index ^c	–0.35	–0.47	–0.27	–0.21	–0.09	–0.01	–0.07	–0.09
All agricultural tradables ^b	–6.1	–27.3	–23.3	–25.7	–21.1	–11.3	8.0	4.1
All nonagricultural tradables	—	34.7	35.7	33.6	29.6	8.3	7.8	5.1
RRA ^d	—	–46.1	–43.5	–44.4	–39.1	–17.9	0.2	–0.9

Sources: Lopes et al. 2007 and data compiled by the authors.

Note: — = no data are available.

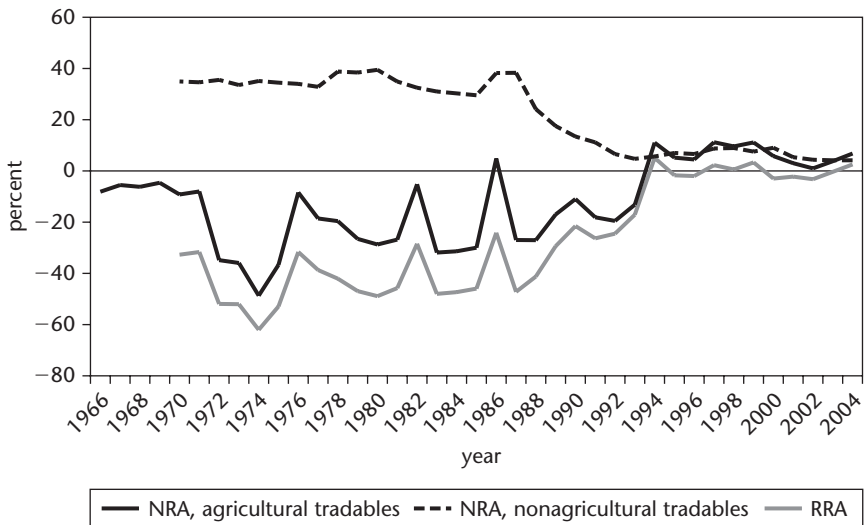
a. Including product-specific input subsidies.

b. Including product-specific input subsidies and non-product-specific assistance; the total assistance for primary factors and intermediate inputs, divided by the total value of primary agriculture production at undistorted prices.

c. Trade bias index = $(1 + NRA_{ag,i}/100)/(1 + NRA_{ag,m}/100) - 1$, where $NRA_{ag,m}$ and $NRA_{ag,i}$ are the average percentage NRAs for the import-competing and exportable parts of the agricultural sector.

d. The RRA is defined as $100 * [(100 + NRA_{ag}^t)/(100 + NRA_{nonag}^t) - 1]$, where NRA_{ag}^t and NRA_{nonag}^t are the percentage NRAs for the tradables part of the agricultural and nonagricultural sectors, respectively.

Figure 3.5. NRAs for Agricultural and Nonagricultural Tradables and the RRA, Brazil, 1966–2004



Sources: Lopes et al. 2007 and data compiled by the authors.

Note: For the definition of the RRA, see table 3.3, note d.

import tariffs in the case of import-competing tradables. The prices of exportables and nontradables in the nonfarm sectors are assumed to be undistorted, including for the whole of the service sector. These NRAs are summarized in row 7 of table 3.3. The rate of assistance to all nonagricultural tradables averaged a little over 30 percent in the 1970s and 1980s, but it has gradually fallen to only 5 percent since the reforms began. This is illustrated in figure 3.5, together with the trend in the average NRA for agricultural tradables and the RRA, which is derived from these two NRAs (as described in table 3.3, note d). This demonstrates that, relative to other sectors, the taxing of agriculture was sustained at more than 40 percent in the 1970s and most of the 1980s. However, during the past two decades, the RRA has gradually become less negative and, in the past few years, has been close to zero given that the NRA for agriculture is now similar to the NRA for nonagricultural tradables, at about 4 or 5 percent.

Consumer tax equivalents

Average levels of taxation among food consumers, as measured by the percentage by which domestic prices exceed border prices (the consumer tax equivalent), are shown on table 3.4. The patterns in the estimates are similar to those for the NRAs. Apart from wheat, these are mostly negative prior to the mid-1990s,

Table 3.4. CTEs for Covered Farm Products, Brazil, 1970–2005*(percent)*

Product	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–05
Rice	—	0	–7	6	–3	9	16
Wheat	20	66	38	1	0	–5	–5
Maize	0	–12	–29	–28	–27	–5	0
Soybeans	–11	–21	–21	–24	–28	3	3
Sugar	–62	–47	–65	–52	–44	–13	3
Beef	—	—	11	11	–29	3	2
Poultry	—	—	–13	–10	–18	0	1
Pig meat	—	—	—	–16	9	0	0

Sources: Lopes et al. 2007 and data compiled by the authors.

Note: — = no data are available.

indicating that consumers were being subsidized. The subsidies were provided mostly at the expense of producers rather than taxpayers. Then, beginning in 1995, the consumer tax equivalents became basically zero, apart from the one for rice (because of the occasional support through import restrictions to encourage domestic production).¹⁰

Conclusions

The results of this study indicate that there has been a rapid decline since the early 1990s in the price distortions that, for so long, had discriminated against Brazilian agriculture and favored the country's net buyers of food. In particular, the estimates of the NRA and the consumer tax equivalent since 1995 have been negligible for most exportables, indicating a high degree of integration of the most competitive parts of the farm sector into world markets. Subsidized credit has also been phased down; credit lines have been rescheduled; and financing in agriculture has gradually shifted toward market rates. Even though import-competing crops are still protected to some degree, the reforms have been dramatic and may be credited with contributing to the recent spectacular boom in farm exports.

In terms of the MPP and the benefits granted through state-owned companies and marketing boards, reduced spending is now part of a new fiscal discipline. Agricultural policy changes have contributed to fiscal discipline and economic stabilization, and the sector has benefited from macroeconomic stability. Even the drop in the level of agricultural tariffs during the unilateral tariff reform period did not damage the agricultural sector, despite the expectations to the contrary. Indeed, it led to a quick response by farmers through greater investments and higher productivity. Together with other reforms, the lower tariffs have boosted agricultural competitiveness.

The reduction in industrial tariffs also had an important impact in terms of the alleviation of the implicit taxation of agriculture. As figure 3.5 shows, the upward convergence of the RRA line toward the zero axis was caused as much by the declines in nonagricultural assistance as by declines in agricultural taxation. The reductions meant that productive factors were reallocated to activities in which Brazil has a stronger comparative advantage. The consequent gains in overall efficiency have placed Brazil among the world's leading exporters of farm products.

In short, as a result of the trade and agricultural policy reforms of the early 1990s, Brazilian agriculture enjoyed a far more favorable environment for growth. Exports and imports were freed from government interventions, as import tariffs were reduced to low levels. Administrative controls on imports and exports were also eliminated. These factors stimulated a major process of adjustment in the agricultural

sector. The new environment of trade liberalization and direct competition from Mercosur member countries forced the farm sector to adopt new technologies, improve management practices, and invest in large-scale operations. Government support for agriculture declined and remains low, although there is selective protection for low-income family farms. With favorable commodity prices on international markets, agriculture has experienced a period of high growth, particularly since 2000. With inflation under control, the government's need to impose restrictions on farm exports has dissolved. The urban bias in sectoral growth is shifting, and, for the first time, agricultural growth has been leading the country's overall growth.

Where to Now?

These changes are establishing a new Brazilian agricultural sector that is quite different. Prices declined in 2005 to levels more in line with long-run trends for soybeans, maize, wheat, and cotton, but they rose again in 2007. Farmers, particularly those located on the new agricultural frontiers, have faced hardships and will face them again when world prices fall.

Brazilian agriculture would become even more competitive on world markets if there were more investments in roads, railways, ports, and logistical infrastructure. Producers in the Center-West frontier are now being pressured to change their crop mix so as to be less handicapped by poor infrastructure.

Stagnant domestic consumption (in the 1980s and 1990s), associated with slow economic growth, channeled most of the increased agricultural output during the period toward foreign markets, producing a sharp rise in agricultural exports. Whether this continues will depend, in part, on domestic income growth among lower-income groups. Recent improvements in income distribution suggest that the prospects for healthier levels of domestic food consumption will be good if government social programs can be sustained.

Future growth also depends on the ability of the government to bring the exchange rate in line with long-run equilibrium rates, given the important role of this variable in the incentives and disincentives to agriculture. After the successful stabilization program undertaken through the Real Plan (1994), inflation was brought under control (to less than 5 percent a year), but the exchange rate varied in a range from R\$0.86 to R\$3.90 per U.S. dollar until 2004. After 2005, the value of the real exchange rate increased, again reaching levels below R\$2.00 per dollar. These wide fluctuations have caused variations in export revenue among the tradable sectors. If agricultural growth is to be consolidated in the future, stable economic fundamentals, particularly the exchange rate, are crucial.

The most important factors limiting the growth of agriculture are the significant real exchange rate, farm debt, the high costs of transportation and lack of

adequate infrastructure, the high cost of inputs (compared with the corresponding costs in neighboring Mercosur member countries) caused by the protection of the domestic input industry, and the relatively high interest rates. The high prevailing interest rates are a result especially of the inadequate control over fiscal spending. They reduce the supply of credit and will represent a substantial constraint on additional investment in the near future.

The so-called low-income problem in agriculture remains a critical issue and may worsen given that the modernization of large-scale agriculture requires capital investments that tend to leave traditional and subsistence farmers out of the loop. To facilitate the process of trade liberalization and to reduce the impact of the income problem in subsistence agriculture, some support targeted at poor rural households may be warranted. Indeed, a substantial share of government spending is now directed toward this area.

Future agricultural growth will be increasingly dependent on the elimination of distortions and trade barriers in international markets, which the Doha Round of multilateral trade negotiations could deliver if the round could be resuscitated.¹¹ Brazil would benefit more than almost any other country if global agricultural trade were liberalized, and the poor in almost every province would be among the winners (Anderson, Martin, and van der Mensbrugghe 2006; Ferreira Filho and Horridge 2006).

Notes

1. The government made four attempts to institute macrostabilization in the 1980s: the Cruzado Plan in 1986, the Bresser Plan in 1987, the Summer Plan in 1989, and the Collor Plan in 1990. None of these plans proved particularly successful. The Real Plan, undertaken in 1994, was more successful.

2. Generating producer support estimates or nominal rates of assistance (NRAs) for cotton is difficult in the case of Brazil because nine types of cotton are identified in the domestic data, and there are significant differences in the prices. Moreover, only some of the types are used in the domestic textile industry. Unfortunately, the Brazilian system of trade statistics (Alice-Web, at <http://aliceweb.desenvolvimento.gov.br/>) does not specify the types of cotton exported or imported, meaning that comparisons of domestic prices with fob and cif prices are subject to greater error for cotton than for more-homogeneous products such as soybeans and maize. The domestic prices we have been able to obtain for the entire period are for types 5 and 6, whereas the border price is only the average fob or cif unit value. During periods of short supply, the trend is toward exporting the low-quality types (7, 8, and 9). When there have been bumper crops, the best types are exported (5 and 6). Hence, the bias in our NRA estimates varies over time, and the same may well be true of the OECD's producer support estimates.

3. The exchange rate changed dramatically in 1989, for example; thus, the annual average rate was not representative. To obtain a more-representative number, the agricultural NRA for that year was assumed to be the average of the NRAs in 1988 and 1990, and the exchange rate used for that year was adjusted to generate this average, taking domestic product prices in local currency and border prices in U.S. dollars as given. This required altering the depreciation that year compared with the previous year such that the local currency fell relative to the U.S. dollar by 84 instead of 77 percent. Sizeable exchange rate shocks occurred in 1994 and 2003, too, but, because they were smaller, we have not adjusted the NRAs; we simply warn the reader to treat the estimates for these years with caution.

4. Brazil experienced inflation of 30 to 40 percent in the early 1970s, 100 to 1,700 percent in the 1980s, and 1,450 to 2,640 percent up to the onset of the stabilization plan in 1994 when monthly inflation rates reached 80 percent. From 1964 to 2004, the currency was changed eight times, and the government tried to control inflation five times through stabilization plans. Only the last plan—the Real Plan—succeeded in bringing inflation down to an average that has been close to 5 percent a year since 1995.

5. Pig meat has historically faced sanitary import barriers abroad, but, because of the easing of these barriers by an increasing number of countries and the improvement in sanitary controls on the part of Brazilian authorities, pig meat exports are growing in importance. The appearance of Bovine spongiform encephalopathy (mad cow disease) elsewhere in the world has provided market opportunities for Brazil's beef, such that the country became the world's largest exporter of beef in 2003.

6. All these expenses in the market for recent years are well known among private agents. Data for earlier years are taken from earlier studies or, where such data are not available, are assumed to be similar to the data for more recent periods.

7. To achieve the most accurate calculations, we have made a careful examination of reported prices for the wholesale market. This is because, in recent years, wholesale prices have not been recorded on a regular monthly basis or have not been representative of actual transactions. The bulk of the supply to buyers (supermarkets, processors, and retailers of all sizes) has come from direct sales by cooperatives, processing and crushing plants, millers, direct importers, and so on. It has therefore been difficult to find reliable prices and to determine how these arose.

8. The rescheduling of farm debt had an especially important impact on the estimated values of credit subsidies. The rise in protection after 2000 may also be explained by the additional rescheduling of the farm debt in 2001. We use the OECD's estimates of credit subsidies for 1995 to 2005 (OECD PSE-CSE Database 2007).

9. This average of almost zero since 1995 is close to the average indicated in the OECD PSE-CSE Database if the OECD's producer support estimate is expressed as an NRA (that is, in terms of the impact as a percentage of production valued at undistorted rather than distorted prices). As the last four columns of table 3.2 show, it is only in beef, coffee, cotton, and rice that our NRAs are a little above those of the OECD. Differences in these estimates may be attributed partly to methodological differences: our study measures prices at the wholesale level, while the OECD measures them at the farm level.

10. The OECD PSE-CSE Database reports consumer tax equivalents at zero during 2000–05 for all of these products except rice, for which the OECD's estimated consumer tax equivalent is 18 percent compared with our 16 percent. Our consumer tax equivalent results for this period need to be interpreted with caution because of the extreme volatility of the exchange rate. The volatility, which peaked in 2003, has been attributed to the economy-wide perceived risk and uncertainty leading up to presidential elections, which were won by a member of the Labor Party, Lula da Silva.

11. For the role of the restrictions on market access faced by Brazilian exporters in foreign markets, see, for example, OECD (2005) and Lopes et al. (2006).

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CHILE

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This chapter presents estimates of indicators of direct and indirect intervention in agriculture by the Chilean government since 1960. It draws on the methodology presented in Anderson et al. (2008) and described in appendix A. To put the indicators in context, we review Chilean policy reforms that began during the 1970s and the effects of these reforms on the agricultural sector. The review emphasizes sectoral and macroeconomic policies and the elements of the institutional framework that have influenced both factor markets and the incentives available to the agricultural sector. The changes in the incentives linked to different products and related to trade and price policy are reflected in the estimates of rates of government assistance. The impacts of the reforms and other changes on production, rural poverty, and rural-urban immigration are also highlighted in the policy discussion. Even though government interventions in agriculture have declined, the growth of the sector has been sustained, and this reform-induced growth has contributed significantly to poverty reduction.

The most dynamic subsectors show the lowest rates of assistance. This is striking given that the output mix of agriculture—specifically, its tendency toward greater export orientation—has made an important contribution to the increase in employment and household incomes and to the reduction in rural-urban migration (Valdés and Foster 2005). The government's overall policy strategy continues to be conducive to the growth of export-oriented sectors and to the modernization of import-competing sectors. Poverty reduction and lower rates of rural-urban migration are strongly linked to export agriculture rather than to agriculture as a whole.

The first two sections of this chapter review the Chilean experience with broad policy reforms and the effects of these reforms on agriculture, especially commercial agriculture. Of particular interest are those policies (sectoral and macroeconomic) and elements of the institutional framework that have influenced factor markets and the incentives encountered in the agriculture sector. Price policies aimed specifically at the agricultural sector have been less influential than economy-wide policies such as macroeconomic policies, deregulation, and privatization. The expansion of the export agricultural sector has been a serendipitous result of economic reforms rather than an explicit proexport policy objective.¹ The subsequent sections briefly describe the method used to calculate distortion indicators. The main contribution of this study is the construction of a series of policy indicators. These indicators are presented and discussed. In the final section, we speculate on the prospects for additional reform.

The Background of Agricultural Policies in Chile

Chile began radical structural and sectoral policy changes oriented toward open trade, privatization, and economic deregulation soon after the end of the Allende regime in 1973.² However, beginning the examination of agricultural policies at an early date is indispensable. The major reforms affecting agriculture during the 1990s and early 2000s were extensions of an earlier and profound shift in the government's approach to the economy generally and to agriculture specifically. To understand the tendencies and motivations behind recent agricultural policy changes, one should appreciate the radical reforms toward open markets that were initiated 30 years ago following an earlier period of interventionism and a drastic restructuring of the agriculture sector during the late 1960s and early 1970s.

Controlled markets, to 1974

Between the late 1950s and the mid-1960s (the government of President Alessandri), the three main goals of economic policy important to agriculture were the control of inflation, the reduction of the budget deficit, and the improvement of net foreign exchange earnings. To stabilize prices, the government had a policy of fixing nominal farm prices for essential products (particularly wage goods such as wheat, bread, beef, milk, rice, sugar, and oilseeds), nominal exchange rates, and wholesale-to-retail marketing margins. There were prohibitions on the export of certain products (wheat, flour, lamb, and others), but promotion of exports of fruit. After a brief attempt at trade liberalization, tariffs were increased and import quotas and licenses were revived at the end of 1961. For agriculture, there were

differentiated tariffs and prior import deposits on commodities, agrochemicals, and machinery. In addition, development programs, particularly for livestock, involved subsidies for milk producers, state aid in the construction of slaughter houses, and other investment incentives. The rationing of beef (the so-called meatless days) and the prohibition of the slaughter of young and pregnant cattle were mandated. Subsidized credit rates and subsidies on railway transportation for wheat, cattle, and forage goods were established. In 1960, a marketing board for purchase and sale was created. The board began with wheat and wheat by-products and later had the authority to extend operations to all products in an attempt to guarantee a normal supply of products. The board also gained a monopoly on imports.

In 1965, during the Frei Montalva administration, a more-explicit agricultural policy was formulated. It was oriented toward self-sufficiency and the coordination of relative prices with the aim of increasing overall production. The interventionist price regime intensified in the direction of influencing production and consumption patterns. There were restrictive tariffs, fixed prices for consumers, minimum prices for producers, fixed marketing margins for the major staple crops, export quotas, licenses, and prohibitions and quotas on wheat, flour, milk, and beef. Prohibitions on slaughter and on the consumption of meat on certain days were intensified. Tax rebates (up to 30 percent of the free on board [fob] price) on certain exports were introduced (fruits and lamb). Interventions in input markets continued, and, to avoid overvaluation of the currency, a crawling peg system for exchange rates was adopted.

In seeking to encourage production, the government recognized the importance of relative prices. The prices of farm products were allowed to rise more quickly than those of nonagricultural goods. To diminish marketing margins, the government intervened in marketing channels, expanded storage and processing facilities, improved transport systems, maintained stocks of staples to enhance food security, and operated marketing boards to support the prices of wage goods. A natural tension emerged between the objective of increased production through higher prices and higher rural wages relative to urban wages on the one hand and, on the other hand, the objective of wage restraint in the nonagricultural sector.

Land reform and the final days of control

The land reform program of the Alessandri years was small in scale, based on voluntary sales at market prices, and oriented toward the promotion of small-scale farms. By contrast, under the Frei Montalva administration, a massive land reform was introduced in 1967 that was based on expropriations, with partial compensation determined by the state, and oriented toward the establishment of large

cooperative farms (*los asentamientos*). There was no policy aimed at dividing up farms or creating small private farms. A private producer with more than 80 hectares of irrigated land (or its equivalent) was subject to expropriation.

During the Allende years (1971–73), the expropriation-based land reform program was strengthened, reaching 40 to 50 percent of farmland resources (as measured according to productive equivalents), and the farm production model was based on large, semicollectivized operations.³ The interventionist economic policy was intensified; inflation accelerated, and, given the logic of the prevailing economic model, the government responded with even more severe price controls. Intense inflation and price controls led to food shortages and the appearance of black markets. The government reacted by attempting to monopolize the markets for fertilizers, wheat, maize, milk, sugar, and other products. In foreign trade, the government expanded the protectionism of the previous administration by fixing the nominal exchange rate, strengthening the state's import monopoly, and imposing stricter export controls.

The shift toward markets

Confronted by hyperinflation and large deficits in internal and external accounts and with a large part of the economy generally (including agriculture) in state hands, the military government in late 1973 began to shift economic and agricultural policies radically to allow more market-based resource allocations. The role of the government in the economy was reduced; trade was liberalized; and private property rights were strengthened. Between 1973 and 1983, during the first phase of the shift, general economic reforms were put into effect quickly, while sector-specific reforms were deferred. Macroeconomic stabilization and the maintenance of the credibility of the reforms were key considerations.

Chile was the earliest country in the developing-country group to adopt market-oriented open-economy reforms. The macroeconomic structural reforms began in earnest in 1975–76 on the heels of the economic crisis generated because of the Allende experiment. Although the bulk of trade reform was implemented between 1976 and 1978, Chile experienced subsequent phases of policy innovation as well. Until 1982, wages in both the private and public sectors were fully linked to the consumer price index. After 1983, there were a number of adjustments aimed at stabilizing farm prices for wheat, sugar, and oilseeds. In 1991, the country expanded credit and extension assistance to small farmers (Hurtado, Valdés, and Muchnik 1990; La Cuadra and Hachette 1991).

In agriculture, the reforms affected land markets, and they reduced government involvement in services. Input and product markets were privatized. Especially important, the new land policy provided unrestricted access to landownership

and protected private property rights. Individual land titles were distributed to the beneficiaries of the land reform program. Relative to the previous decade, government expenditures on agriculture fell dramatically; in real terms, during 1980–83, the government spent only one-third of the amount that was spent annually on the sector during 1965–74 (Valdés, Hurtado, and Muchnik 1991). In 1975, the government entered into a new experiment in trade liberalization, and marketing board and price control agencies were closed. Except for wheat, milk, and oilseeds, most of the price controls that had been established previously were lifted. Legal ceilings on interest rates were raised and then removed, and preferential rates for agriculture were abolished.

As part of the early introduction of a radical trade liberalization program, almost all nontariff barriers were eliminated, and tariffs on most imports were reduced rapidly. A uniform tariff equivalent was introduced, beginning at 90 percent in 1975 and falling to 20 percent in 1977 and to 10 percent in 1979. Export restrictions were eliminated, and the crawling peg system for exchange rates, begun in the Frei Montalva administration (but eliminated by Allende), was put back in place; a fixed exchange rate system was reintroduced in 1979.

There were several delays in the implementation of reforms, and these adversely affected the agricultural sector. The elimination of price controls was slow for some products, and the reform of land and water rights required more time than expected. Labor market reforms (the removal of wage indexation and the introduction of flexibility in the stevedore market) were also postponed. Airlines and telecommunications were privatized and deregulated, which generated significant improvements in the quality of services and reductions in costs. This was particularly important for the agricultural export sector, especially for producers and exporters of perishables.

The steps were evidently insufficient to stimulate private investment and productivity growth. Between 1978 and 1982, farmers were at a disadvantage because of the appreciation of the exchange rate and the reduced world commodity prices. During this period, the question of special treatment for the agricultural sector reemerged, and farm lobbies representing import-competing activities sought selective protection. This suggests that there is a strong correlation between a stronger Chilean peso and political pressures on the part of farm lobbies for greater protection.

The second phase of reform

A second phase of reforms was undertaken in 1984 following a deep recession. The government reversed the currency appreciation with nominal devaluations and restrictions on short-term capital inflows. In addition, a price stabilization

mechanism was established for importables (wheat, sugar, and oilseeds) based on variable levies or import taxes. The purpose of the mechanism is to keep the domestic price between a floor price and a ceiling price that are calculated according to a moving average of international reference prices. A scheme of minimum customs valuations for milk and milk derivatives was introduced. The government's policies succeeded in raising the real exchange rate (RER) between 1984 and 1991, when a new episode of currency appreciation began, again creating political tension in the farm sector. For producers of import-competing products, the decline in profitability became even more pronounced when Chile joined the Southern Common Market—known more widely by the name in Spanish, Mercosur—as an associate member. It was thus obligated to grant trade preferences to Argentina, Brazil, Paraguay, and Uruguay, countries with which it competed in wheat, maize, oilseeds, and beef.

Policies in the 2000s

Specific border price interventions are still in place as price band systems for wheat and sugar. These price bands are due to be phased out around 2010 as part of the United States–Chile Free Trade Agreement. Occasionally, safeguards are applied on a few products; the most recent case involves milk products. Given the low level of tariffs (6 percent across the board for a most favored nation [MFN]), the most influential policy changes in recent years have been the introduction of several free trade agreements (FTAs). The proliferation of FTAs reduced the effective average tariff across all goods to about 2 percent in 2005 (see below).

Chile has been an associate member of Mercosur since 1996. For Chile, Mercosur is the most important trade agreement for import-competing agriculture (although not for exports). The Mercosur agreement was followed by an FTA with Canada in 1997, Mexico in 1999, the European Union in 2003, the Republic of Korea and the United States in 2004, New Zealand and Singapore in 2005, China and Peru in 2006, and Japan in 2007. In addition, there are other agreements by which Chile grants some preferences to Bolivia, Colombia, and countries in Central America.⁴

There is little scope for policy intervention today. There is virtually no trade policy remaining in Chile beyond safeguards and FTA and World Trade Organization negotiations. Current levels of protection are low, with the exception of the protection for sugar beets and, to a lesser extent, wheat. An important element of agricultural policy today is the implementation and monitoring of FTAs. This includes the regulatory framework of sanitary and phytosanitary measures, environmental issues, technology generation, and the special case of small farmers (credit extension and productivity enhancement). The occasional safeguard

remains a possible policy instrument within the World Trade Organization framework. With FTA disciplines and low unilateral border protection, the exchange rate is an issue though: it strongly reemerged in the public discourse in 2006–07 (as it had also in the early 1990s) because of the appreciation of the RER.

Farm Production and Structural Changes over the Last Half Century

The data on agriculture distinguish three subperiods following the years of heavy government intervention. After the Allende government, the agricultural sector and exports grew at a strikingly high rate (table 4.1). This was the result of the end of an exceptionally unstable period characterized by an interventionist economic and political environment, unparalleled outside Cuba and the Sandinista years in Nicaragua. Had the reforms been initiated in 1974, the growth rates (overall and in exports) would have been much higher. The liberalized market regime was implemented beginning only in 1975. Between 1975 and 1983, average overall growth rates in agriculture returned to the average level of the 1960s. The export growth rates increased considerably, however. After 1983, overall sectoral growth increased more rapidly than the growth rate of the general economy, leading to a rising contribution of agriculture to total gross domestic product (GDP).

The main impact on agriculture of liberalization was an alteration in the composition of production and trade. As expected, the exportables subsectors—fruits, vegetables, and forestry—rose in importance, while livestock and field crops (primarily wheat) declined (La Cuadra and Hachette 1991). Following the reforms, there was an increase in export growth rates across the board, although there has been a slowing of growth more recently (table 4.2). Yearly growth rates averaged 10 percent or greater for two decades. Wine production and export growth rates continue to rise, while the expansion of fruits has slowed primarily because of a drop in world prices for the majority of fruit exports. It is likely that fruit production and exports would expand at a more rapid rate if world prices were to recover to former levels.

Factor use and productivity

During the Frei Montalva and Allende years, there were large injections of government funds into the agricultural sector, including a large public investment program and subsidies for credit and input use (Hurtado, Valdés, and Muchnik 1990). This led to an initial gain in production value and labor productivity. However, the sector subsequently began to deteriorate, and production had fallen by 1973 to the levels of 1965. After 1973, the value added per worker in the agricultural sector

Table 4.1. Performance Indicators for Agriculture, Chile, 1960–2004

Indicator	1960–70	1971–73	1974	1975–83 ^a	1984–89	1990–98	1999–01	2002–04
Economy-wide GDP growth rate (%)	4.1	1.1	2.5	1.7	7.5	7.3	2	4
Agricultural production value growth rate (%)	2.4	–5.5	19.2	2.1	4.7	3.9	1.7	4.2
Agricultural GDP growth rate (%)	2.2	–6.5	26.8	2.2	8	2.5	4	1.9
Agriculture share in total GDP ^a	8.2	7.5	5.7	7.2	8.1	8.3	8.6	4.1
Rural population (% of total)	28.4	23.5	22.2	19.5	17.2	15.8	14.2	13.2
Labor force (% of total)	27.2	23.5	22.8	21.3	19.5	18.8	14.4	13.6
Exports index (1961 = 100)	107	126	249	966	2,456	6,622	9,877	12,496
Imports index (1961 = 100)	122	211	540	417	238	701	927	1,366
Agricultural trade (% of agricultural GDP)	10.1	16.9	36.2	33.3	31	59.8	83.6	84.3
Agricultural export growth rate (%)	4.4	–8.9	149.8	23	19.6	12.3	4.8	11.37
Agricultural import growth rate (%)	3.7	23.2	120	4.4	–4.6	18	–6.4	11
Value added per worker (constant 2000 US\$)	2,170	2,154	2,404	2,616	3,211	3,983	—	—

Source: World Development Indicators Database 2007.

Note: — = no data are available.

a. Excludes forestry and fisheries.

Table 4.2. Average Annual Growth in the Value of Exports, Chile, 1960–2005
(percent)

Year	All crops and livestock	Forestry ^a	Fruits ^b	Wine ^c	Fisheries a ^d	Fisheries b ^e
1960–70	4.4	19.7	16.4	25.5	38.9	—
1971–73	–8.9	2.4	13.2	16.6	7.8	—
1974	149.8	247.7	4.9	44.8	159.1	—
1975–83	23	16	41.5	22.9	38.3	23.4
1984–89	19.6	15.9	14.2	25.7	9.9	14
1990–98	12.3	9.3	6.7	35.8	2.9	7.9
1999–2001	4.9	7.4	3.2	8.2	—	—
2002–05	8.7	11.1	6.9	8.1	—	—

Source: Data of the Oficina de Estudios y Políticas Agrarias, Ministry of Agriculture.

Note: — = no data are available.

a. Includes industrial round wood, pulp and particles, sawn wood, wood-based panels, and wood fuel.

b. Includes apples and grapes.

c. Includes all wines.

d. Includes salmon and fish meal.

e. Includes all related products.

showed an immediate recovery. Although the recovery was remarkable considering the initial conditions (for example, 48 percent of the agricultural land as measured in productive-capacity equivalents had been expropriated), the initial response in agricultural growth to the market-oriented reforms has been described as too limited (Barahona and Quiroz 1990) given the increases that followed in the relative prices going to producers.⁵ In 1985, there was a radical expansion in the growth rate in production and labor productivity. This followed declines in production and labor productivity in 1983 and 1984 (associated with the exchange rate increases discussed below). This growth was correlated with a rise in the use of fertilizers per hectare, an expansion in the irrigated land area, greater use of machinery, the introduction of new varieties, and the adoption of nontraditional crops (Foster and Valdés 2006).

The boost in land productivity was also notable. Total land use in agriculture and forestry have declined by nearly 10 percent since 1965. Cropland not only declined in absolute terms, but also in percentage terms. The amount of land in natural prairies and forests rose as a percentage of all land use, but it declined in absolute terms. Despite a fall in the number of hectares of cropland, Chile attained high rates of production growth after the mid-1980s. This was caused by increases in non-land-input use, especially fertilizers. Moreover, as Arnade (1998) and Gardner (1996) suggest, Chile also experienced a postreform gain in overall productivity that was linked to improved varieties, changes in the crop mix toward higher-valued products, better irrigation methods, and other innovations. A simple regression analysis of aggregate production value on input use in 1961–98 indicates that there may have been large gains in overall productivity following the initiation of reforms in 1974–75.⁶ There is less evidence for a shift in the annual rate of overall productivity gain following 1974, and the data suggest that the notable gains in production following the initial phase are explained by increased input use alone.

Changes in the structure of agriculture

Based on the 1997 agricultural census (the most recent census), of an estimated 330,000 farms in Chile, 103,000 are classified as subsistence farms and 175,000 as small farms (less than 12 hectares). These two groups of small farmers contributed about 25 to 30 percent of the agricultural GDP and controlled about 25 percent of the farmland. Medium-size farms numbered about 17,000, and large farms numbered around 9,500 (Muchnik 2003).⁷

The data show a movement toward smaller farms in some regions and larger farms in others between 1976 and 1997. The change in farm size is associated with crop mixes in the various regions. The central regions, which have shown a

decline in farm numbers, are the heart of the fruit and wine export sector. These regions have the most sophisticated agricultural economies and have experienced a decrease in farm numbers and an increase in average farm size. The southern regions, where wheat and other traditional crops and livestock predominate, have seen an increase in the number of farms and a decrease in farm size. Although the farm products of the southern regions—grains, milk, and beef—compete with imports, there have been notable gains in productivity, spurred in part by the market-oriented environment introduced by agricultural reforms. Productivity gains have been especially notable in the case of wheat and milk. The data presented here are consistent with the hypothesis that productivity gains in traditional products have been available to small and large farmers alike. However, without a measure of changes in the shares of total regional production across farm sizes, there is only weak empirical support for this hypothesis.

More-recent evidence suggests that the dairy sector has experienced rapid changes in terms of production levels and the number and size of producers. Anríquez (2003) reports that the number of Chilean dairy producers has been declining at an annual rate of about 3 percent. Only 2,500 milk producers (18 percent of the total) account for 86 percent of the milk received by processing plants, while 800 producers (6 percent) account for 60 percent of the processed milk (Ministry of Agriculture 2001).

In the pork and poultry sector, because of the adoption of new technologies and marketing methods, the number of producers has declined as the scale of production has increased. Beginning in 1978, the number of farms in the pork sector declined by 59 percent, while the number of pigs processed per grower increased by over 1,100 percent (from 472 to 6,046 pigs per grower per year, although there were growers processing more than 100,000 pigs annually). Over the same period, the number of poultry-growing units declined 79 percent, while the number of broilers produced per unit increased by over 260 percent (Foster and Vargas 2001).

There is little detailed information available on buyer concentration in the Chilean agricultural sector. There is, however, some evidence of a high degree of buyer concentration and of increasing vertical coordination through contracts and integration in agroprocessing. This is reinforced by the growing concentration of retail food sales in supermarket chains, which puts pressure on the competitiveness of small producers in terms of sales volume and quality control. Foster and Vargas (2001) report that, of the 16 most important agricultural products, only the market for potatoes corresponds to the stylized model whereby the activities of many market participants are determined by spot prices generated in open markets. All other product markets have a high degree of buyer concentration, are coordinated through marketing or production contracts, or are completely

integrated. The evidence suggests that the degree of industrialization in agriculture is already high and that this process of industrialization is intensifying. Interestingly, the export-oriented sectors of fresh fruit and wine have less processor concentration relative to import-competing sectors.

The effects of agricultural reforms on rural poverty and immigration

The effects of the policy reforms on agriculture derive from five components of reform: macroeconomic stabilization, trade liberalization, deregulation, privatization, and the more explicit commitment to targeting in social policies. Estimating the effects is complicated for several reasons. There was heterogeneity in the implementation of these reform components. Some elements of the reforms were implemented rapidly, most notably macroeconomic stabilization and trade liberalization, while other reforms required more time because of the need to establish new institutions and create new information systems.

A large amount of longitudinal and cross-sectional household data have been collected through the National Characterization Socio-Economic Survey, or *CASEN*, and the questionnaires of the social assistance committees, known as the *ficha CAS*. However, because of the reforms, there are limited microdata prior to 1987 for comparative analysis of the impacts of reform on poverty, for example.⁸ Even with excellent data, it would be difficult to isolate the partial effects of any one of the components of the package of reforms from the net effects of the general shift toward market-oriented policies.

In any case, the national poverty rate in Chile showed a marked reduction between 1987 and 2000. This was because the full impact of policy reforms became obvious with respect to productivity and the composition of agricultural output and trade. The national headcount poverty measure fell from approximately 45 percent in 1987 to 20 percent in 2000, and the rural headcount fell from over 50 to 23 percent over the same period. (By contrast, the Gini coefficient did not change significantly, falling only slightly, from 0.56 in 1987 to 0.55 in 2000.)

There are three avenues through which agricultural growth may affect poverty: the labor income of unskilled workers, who are employed relatively intensively in the agricultural sector; the incomes of poor farmers; and real food prices (mainly nontradables). López and Anríquez (2004) present an econometric analysis of the influence of Chilean agriculture on poverty reduction through the impact of agricultural growth on these three factors. Their most important finding is that there is an asymmetric response of the two types of labor—unskilled workers and skilled workers—to expansion in

the two sectors (agriculture and nonagriculture). Relative to the demand for skilled workers, the demand for unskilled workers is more sensitive to an expansion in agriculture (elasticities of 0.44 and 0.58, respectively). In addition and critically for the results of the study, compared with an expansion in nonagricultural output, an expansion in agriculture leads to a relatively higher increase in unskilled labor demand. In contrast, skilled labor exhibits a greater sensitivity to nonagricultural output growth. Moreover, these results may be extended to the case of increasing only the share of agricultural output (keeping total output constant); thus, an increase in agriculture's GDP by 1 percent (with a corresponding reduction by 0.17 percent in nonagricultural output, that is, a zero-growth scenario) leads to a 0.51 percent expansion in the employment of unskilled workers. In Chile, agriculture-based growth is more favorable for unskilled (usually poor) workers than is total economic growth with a stagnant agricultural sector.

In the study by López and Anríquez (2004), the reduction of nontradable food prices affects poverty in two ways: it increases real household incomes, and the food basket that defines poverty becomes cheaper.⁹ Their analysis simulates the impact on poverty, through reduced food prices, of an expansion in agriculture by 4.5 percent (a historically reasonable rate and approximately the rate experienced during the last two years). They find that there was a reduction in poverty of only 0.73 percent.¹⁰ Thus, the food price effects of agricultural growth are marginal for both the poor and the vulnerable.

The third channel that López and Anríquez (2004) examine is the relationship between agricultural growth and the incomes of poor farmers. Their results suggest that this relationship is negligible. Furthermore, the estimates suggest that, as aggregate agricultural output increases, so does the share of off-farm incomes in the total incomes of poor farmers. The results are consistent with the increasing importance of nonfarm incomes in rural Chile (Berdegue et al. 2001) and the low rates of subsistence farming. The implication is that increases in agricultural growth would have negligible effects on poverty through the incomes of poor farmers.

The estimates indicate that an expansion of 4.5 percent in agricultural GDP would lead to a fall in poverty rates of 7.4 percent.¹¹ This result is based on the uncompensated simulations, which are most relevant because they allow for overall growth in the economy. Labor market effects explain more than 90 percent of the total poverty reduction, while food price effects explain the remaining 10 percent. Agriculture's share in the composition of national output is also important. What drives these results is the fact that, in Chile, the agricultural sector as a whole tends to demand more unskilled labor than the rest of the economy, and thus the strongest poverty effect occurs through the labor market.

Past Evidence of Direct and Indirect Assistance to Agriculture

Two major studies of policy interventions in Chilean agriculture provide background information for our study. The first, covering 1960 to 1985, is part of the larger study by Krueger, Schiff, and Valdés (1988) and summarized in Valdés, Hurtado, and Muchnik (1991).¹² The second is the World Bank research project, the Surveillance of Agricultural Price and Trade Policies, which covered eight countries in Latin America from 1985 to 1993. (For the Chile study, see Valdés 1996.)¹³

The Krueger, Schiff, and Valdés study

The Krueger, Schiff, and Valdés study (1988) differentiated between the direct effects due to sectoral policies (price and border protection and subsidies) and the indirect effects due to economy-wide policies. With respect to sectoral policies, Chile favored two export-oriented crops (apples and grapes) and most import-competing crops (beef, maize, milk, sugar beets, and wheat) prior to 1974. Immediately after this period, the nominal protection for exportables fell to low rates, and these nominal rates of protection have been effectively zero since the beginning of the second phase of reforms in the early 1980s. For import-competing crops, the situation is notably different. The nominal rates of protection for milk and wheat were relatively high in the 1960s. The measurements of nominal rates of protection during the Allende years are not meaningful given the regime of price controls, hyperinflation, shortages, and rampantly expansive black markets. During 1984–89, the rates were relatively high because of the government's response to the strain on the traditional farming sector, which arose from low international prices and a strong appreciation of the currency between 1979 and 1982. The government response included the establishment of price bands for wheat, sugar, and oilseeds and minimum milk import prices. Although the exchange rate depreciated in the late 1980s, the protection remained. During the 1990s, the currency again appreciated, and the existing price bands cushioned traditional producers.¹⁴

Other studies

Extending the analysis in Valdés (1996), Valdés and Foster (2007) analyze the decomposition of changes in real domestic prices for selected agricultural products. For the initial phase of reforms (1975–83), they find that there were, on average, significant decreases in the real border prices for most products, except fruits. Real domestic prices increased for fruits and wheat and decreased for milk and beef. For example, the 0.2 percent average decline in the real price of milk was the result

of a 2.4 percent decrease in the real border price, a 46 percent increase in the RER, and a 44 percent decrease in price supports. This example demonstrates that producers benefited from an increase in the RER on average. There was, however, notable volatility and a decline in the RER in 1979–81, when the nominal rate was fixed at Ch\$39 per U.S. dollar as part of the government's stabilization program.

In December 1977, a uniform 10 percent tariff was established as a goal to be reached by June 1979 for all importables (La Cuadra and Hachette 1991). On average, except for wheat, producers faced falling tariffs soon after the effort to reach the tariff goal began to be implemented. A general conclusion is that producers, facing lower real border prices and lower tariffs, nevertheless benefited, on average, until 1979 from the support provided by a favorable movement in the exchange rate.

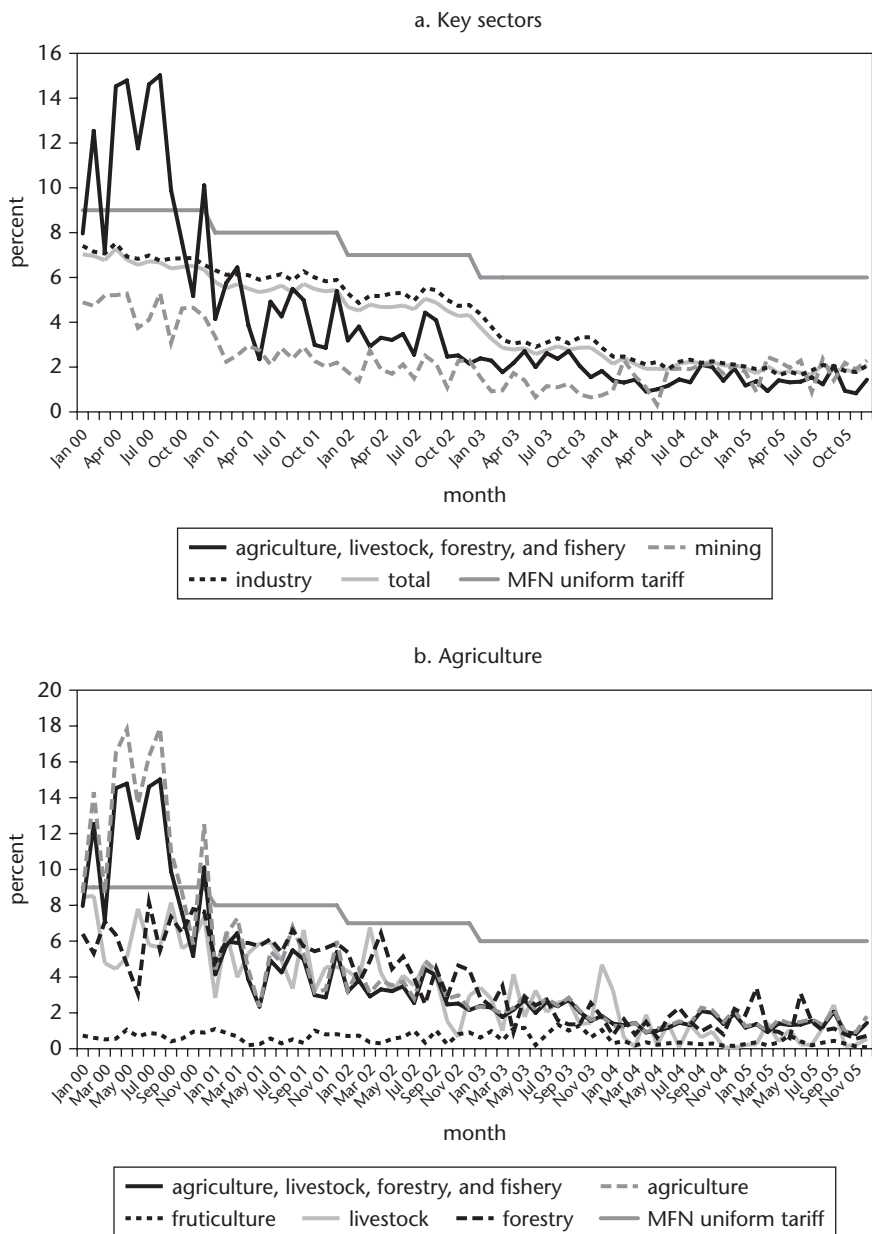
During the second phase of the reform, 1984–89, real domestic prices declined for all products considered in Krueger, Schiff, and Valdés (1988), except for apples and beef. The declines in real domestic prices for wheat, maize, and fruits occurred despite a steady rise in the RER and were caused by a decline in border prices. The large increase in domestic beef prices was generated principally by the restrictions on imports of live cattle and meat on the bone from traditional suppliers, such as Argentina and Uruguay, during 1984–89; the restrictions were related to efforts to control the spread of foot-and-mouth disease. After 1990, there was a cumulative decline in all real domestic farm prices, except for grapes, because of an appreciation in the currency and, for four of the selected products, because of a decrease in real border prices.

To the extent that the reform-induced changes in the real domestic prices of these selected products approximated the changes in the returns to farming, one may say that the main forces behind the price incentives in agriculture were beyond the control of sectoral policy.¹⁵ The main factors were exchange rates and international prices.

Tariff rates

The level of applied tariffs in 2000 was low by world standards for all products, including agriculture (figure 4.1, chart a). Nonagriculture tariffs were below 8 percent. This was primarily because of a low statutory MFN tariff. By 2006, although the uniform tariff had fallen to 6 percent, the effective applied tariffs for all goods hovered around 2 percent or less (Valdés and Jara 2007). This is a reflection of the fact that the coverage of new FTAs was being extended more broadly across imported products and importing countries. In the absence of quantitative restrictions and nontariff barriers, aside from sanitary and phytosanitary restrictions, there is little scope for trade policy interventions in Chile. Chile is an active

Figure 4.1. Applied Tariffs, Adjusted for Trade Preferences, Chile, 2000–05



Sources: Banco Central Statistical Database 2007; Becerra 2006.

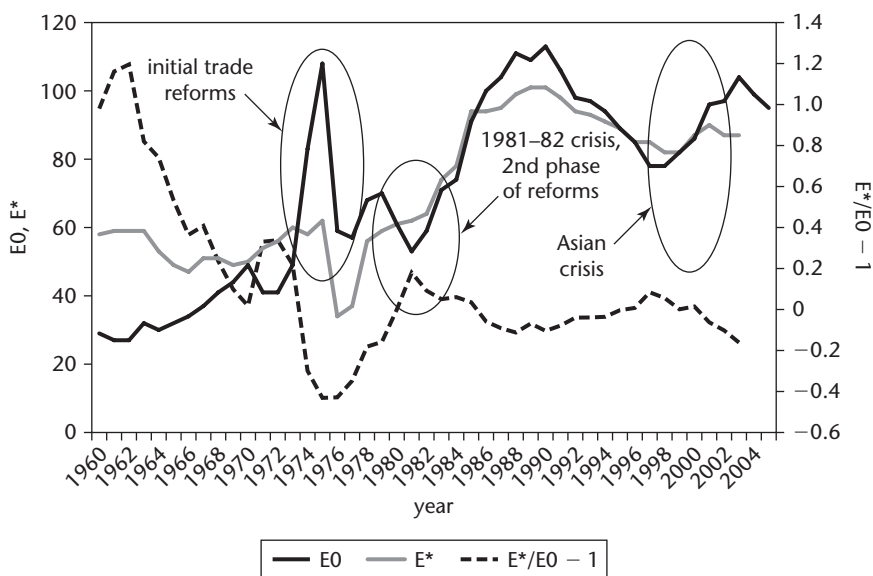
Note: The charts include ad valorem and specific duties.

member of the World Trade Organization, and it is negotiating new FTAs with the remaining countries that are significant importers of its products and on which MFN tariffs apply. (Agreements with China, Japan, New Zealand, and Peru have already been signed, and negotiations with India are ongoing.) Trade policy is transitioning toward the implementation of FTAs on both imports and exports, the related monitoring, and continued participation in the World Trade Organization. The only exception being retained on the price bands on sugar and wheat will, according to bilateral agreements, not be renewed. This is a notable feature of the FTA with the United States, for example. Within agriculture, there are no policy interventions on exports, except for limited promotional funding provided through ProChile, the entity within the Ministry of Foreign Affairs that is charged with promoting exports. The principal agricultural trade policy is restricted to wheat and sugar (and their derivatives, such as flour and fructose). This is because of the persistence of the price band system, which will end in approximately 10 years. Nonetheless, even with the price bands, the effective applied tariff averaged across agricultural goods is 2 percent or less (figure 4.1, chart b).

Effective rates of protection

Effective rates of protection at official exchange rates may serve as another revealing indicator of the impact of trade policies on producer returns (value added). The advantage of these rates is that they incorporate the effects of intermediate input policies, which are reflected across activities according to their cost shares in tradable inputs. Estimates of the rates confirm a consistent pattern of protection for importables relative to exportables, particularly during 1974–93 (Valdés and Jara 2007). Before 1974, there were negative effective rates of protection for the importables beef and milk, and wage goods were also subject to internal price controls. Wheat, however, had high positive effective rates of protection. Coincidentally, there were also positive rates for exportables owing to tax rebates and other export subsidies. After 1974, the rates changed significantly. Where positive, the rates fell for importables; beef and milk went from negative to positive rates; and exportables went from positive to negative rates. Exports were no longer subsidized, and, moreover, tradable inputs (such as agrochemicals and machinery) were subject to tariffs.

The RER has become a much more influential variable affecting agriculture, and its future evolution is a major issue and source of tension in the current agricultural policy debate. The exchange rate issue is not new, and, over the last 30 years, tradable agriculture has been exposed to large swings in the RER (figure 4.2). This remains the main challenge in the farm sector. However, the political awareness of the importance of exchange rates was low prior to the late 1970s; it has grown

Figure 4.2. Real and Equilibrium Exchange Rates, Chile, 1960–2003

Sources: Author compilation; Banco Central Statistical Database 2007.

Note: The RER is E_0 (1986 = 100). The equilibrium rate is E^* .

as other buffers on sectoral profitability have diminished. Agriculture's exposure to world market conditions is indicated by the evolution of the index of tradability (agricultural exports and imports relative to sectoral GDP). Tradability has increased eightfold since the 1960s (table 4.1).

Direct price-related interventions affect only a small number of activities, principally the application of price bands to sugar beets and wheat (and wheat flour). There are a few generally available productivity-related subsidies, mainly for pasture improvement and some types of small-scale irrigation. Beyond border measures, there is also a policy of direct assistance to small farmers not through price-related policy, but through government transfers by way of the Agricultural Development Institute, a government agency focusing on small farmers and providing subsidies for credit, crop insurance, and extension.¹⁶ In effect, subsidies are more a social policy than a production policy, and the small-farm sector, while large in terms of the number of farmers, represents only 25 to 30 percent of agricultural GDP (although small farmers are significant in the case of some vegetable and pulse production). The analysis of direct government assistance in this study does not include these transfers targeted on small farmers.

For importables other than wheat and sugar beets, such as milk, a policy was previously in place to maintain a minimum import price. This was dismantled in compliance with the Uruguay Round agreement. The only other direct intervention for imports beyond the MFN tariff is the application of safeguards, which have occasionally been used (most recently on wheat flour from Argentina). However, applied tariff rates have fallen to about 2 percent or less (excluding wheat and sugar, to which a specific tariff applies as part of the price band policy). Moreover, there are no interventions for exportables beyond small amounts for export promotion that are generic for all sectors.

Our Study's Estimates of Policy Distortion Indicators

The methodology of the our study (Anderson et al. 2008; see appendix A) differs somewhat from that of the Krueger, Schiff, and Valdés study (1988), even though the main focus is still on government-imposed distortions that create a gap between domestic prices and the prices under a free market. Since it is not possible to understand the characteristics of agricultural development from a sectoral perspective alone, the project 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.

More specifically, this study computes a nominal rate of assistance (NRA) for farmers that includes an adjustment for direct interventions on inputs. This brings our measure close to an effective assistance measure. We also generate an NRA for nonagricultural tradables, for comparison with the NRA for agricultural tradables, through the calculation of a relative rate of assistance (RRA; see appendix A). A trade bias index within agriculture is also estimated, as is a consumer tax equivalent (CTE) for agricultural products, where the CTE is equal to the NRA for those products affected only by trade measures.

Our NRA estimates cover wheat, sugar beets, maize, beef, and milk (importables) and apples and table grapes (representative of exportables). We have selected these products because of their importance in the agricultural sector and because the selected importables have been subjected to frequent price interventions given their nature as wage goods. Furthermore, since the early 1980s, the only products that have been the focus of direct domestic market interventions beyond the uniform MFN tariff have been wheat, sugar, and edible oils (for a short period); there have also been occasional safeguards for milk products.

The weight that these seven products represent in total farm output value at market prices has varied from 50 percent in earlier years to around 30 percent

more recently.¹⁷ Although this coverage appears to be low, wheat, sugar, and milk are the only agricultural goods subject to specific price-related policies since the early 1980s beyond the uniform tariff and preferential tariffs under FTAs.¹⁸ The remaining products are covered by broader policy instruments. Agriculture has become increasingly more diversified, and the weight in total production value of principal staples has declined.

Distortion indicators are estimated for three sectors: importables (M_s), exportables (X_s), and nontradables (H_s). In the NRA measures for Chile, direct input subsidies (such as credit) are ignored because they are largely nonexistent except as social programs aimed at small farmers. There are five domestic support programs (treated as non-product-specific transfers) included in the sectoral NRA: small-scale irrigation, pasture development, export promotion, research and development, and sanitary and phytosanitary expenditures. These support programs represent a small fraction of farm output value, and we distinguish between support for commercial farms and support for small farmers. Subsidies aimed exclusively at small farmers through credit and technical assistance are not included in the NRAs.

Classifying the tradability of products and estimates of price pass-through

In many cases, the classification of products according to their trade status (M_s , X_s , and H_s) is straightforward because, in any given year, they appear in the trade value data as net imported or net exported at significant levels. Trade status is not straightforward, however, for products that are traded in small amounts or not traded at all. The approach adopted here is to consider goods as nontradable if the domestic prices for these goods are insensitive to international price changes; thus, we do not use this classification only according to whether or not a good appears in trade statistics.¹⁹ In some studies, nontradability refers to those activities in which the primary product is not traded internationally. For Chile, sugar beets, raw milk, and beef (live cattle) fit this definition, and they have no border price. However, during most of the period under analysis, these primary production activities were effectively import-competing (milk and beef have marginally become exportables). The level of production of such goods has been significantly influenced by changes in border prices and tariffs. Moreover, the policy debate between farm groups and the government regarding interventions in these activities is almost exclusively focused on tariffs and, occasionally, safeguards. For example, to protect raw milk (a product not traded) from Argentine milk product imports entering at a 1 percent tariff (or less), farmers recently demanded safeguards on processed milk products.

To illustrate the importance of the definitions we have adopted, if one were to use official trade statistics to classify primary products, approximately 48 percent of agriculture would be nontradable. The NRAs for nontradables would be quite high in activities that enjoy practically no support. Someone knowledgeable about Chile would ask the obvious questions: Why such protection estimates for nontradables? Through which policy instruments are they protected? As computed, following a definition of tradability based on trade statistics, the category of nontradables includes sugar beets, raw milk, and beef cattle (live animals), which are relatively large sectors and are all connected intimately with the category of lightly processed tradable products.²⁰ In an economic sense, these three primary activities are tradables; no Chilean policy maker would think otherwise.

There are two options for computing the price pass-through from a tradable good to the primary product. This computation is relevant for raw milk, sugar beets, and live cattle, and we may illustrate this with the case of powdered milk and raw milk prices. One option is to assume full (or some partial) price transmission using a technical conversion coefficient (liquid to powder). A second option is to make use of a regression model to simulate the prices for fluid milk that would have prevailed assuming that there were free trade in powdered milk. This study adopts the second strategy. We apply a simple regression model linking raw and powdered milk prices, where these prices are observed in local markets (at the plant gate). An adjustment is sometimes required depending on the differing units and characteristics of the local and international products. For example, wholesale powdered milk has different specifications than imported powdered milk; these differences arise from volume and fat content.²¹ For beef cattle, a conversion is made from imported boneless meats, and, for sugar beets, a conversion is made from refined sugar.

The classification scheme adopted here is not associated with problems of trade reversal over time. We classify producer-level milk, beef, and sugar as tradable, and, although we do not have border price observations of these primary products, we have been able to estimate a border price equivalent.

Direct price comparisons for seven selected primary products

Direct price comparisons depend on the calculation of the tariff equivalent of border and producer price interventions. We use cost, insurance, and freight (cif) prices or fob prices at Chilean ports for products that are similar in quality to the seven goods of interest and identify a point in the marketing channel where the border and producer prices may be compared. In most studies and for most products, the point comparison is close to, but not strictly at the farmgate because statistics are reported at the processing plant, flour mill, and auction fair. The border price

in domestic currency is adjusted for customs charges, transport and handling costs, storage, and marketing. A preliminary effort was made to adjust for product characteristics (for example, hard and soft wheat, the fat content of powdered milk, and export-quality fruits and nonexportable fruits).

Domestic and border prices are derived from the Krueger, Schiff, and Valdés study (1988) on the period 1960–83 and from the study of Valdés and Schaeffer (1995) on the period 1985–93. Producer and border prices since 1994 have been taken from the Web site of Odepa, the Oficina de Estudios y Políticas Agrarias (<http://www.odepa.cl/>). Farmgate and producer prices are assumed to be equal to the observed domestic prices, which are reported at the *mayorista* (wholesale) level. In some cases, the wholesale price is the bulk price at the processing plant; Odepa wholesale statistics are at the miller level for wheat, at the dairy plant for milk, and at the refinery for sugar beets. Auction fair prices are used for beef cattle. For maize, apples, and table grapes, the Odepa wholesale price corresponds to the price at the Santiago central market, where farmers and others make bulk transactions. The prices for exported fruits are determined on foreign markets (for farmers selling almost all their output on consignment). The source of price information for fruits consumed domestically is the main wholesale market in Santiago. Although average domestic and export prices vary because of quality differences, they are highly correlated if one compares fruit of similar quality. Because wheat is a storable and import-competing product, wheat prices are a special case. They are observed monthly and require a seasonal adjustment; the price received at harvest is not directly comparable with annual average border prices because the domestic consumption equivalent of production determines the time of year when imports occur. Thus, the observed border price at the time of import must be discounted to adjust for storage costs, of which the interest rate is the main determinant.

For an illustration of the direct-price-comparison methodology for primary products, see Valdés and Jara (2007), who provide details on the calculation of producer prices for wheat. In the calculation of the miller price for imported wheat, the principle inflation adjustments to the cif price for wheat (US\$127.70 per ton in 2000) are import-credit documents (2.23 percent of cif prices), loading and transport costs (US\$10.50 per ton), and other costs (US\$1.60 per ton). These cost adjustments raise the cif price to US\$144 per ton. This price must be adjusted downward because of storage costs (financial and physical) to obtain the producer price at harvest. This yields a producer price such that the buyer-miller is indifferent between farm purchases at harvest or imports later. This is an arbitrage argument. Thus, the farmer has the option of postponing delivery and assuming storage costs (although one possible advantage for the miller is access to scale economies and lower costs for capital). The formula for this adjustment factor is presented in

Valdés and Jara (2007), who estimate the adjustment at 88.5 percent. The adjustment factor, used only for wheat (and not applicable to imported, continuously produced goods, such as milk and beef), is sensitive to interest rates, which fluctuated over the years covered in the study. Adjusting the mill-level cif price of US\$144 downward by the adjustment factor yields a producer price equivalent of US\$127.44. Given the observed harvest average price of US\$171.10, the resulting NRA is 34 percent.

A note on lightly processed products

From a given raw product, several intermediate and final consumer goods might be produced. We therefore want to take a representative good in the first stages of processing. For the primary products examined in this study that are not directly consumed, the lightly processed products are wheat flour, powdered milk, boneless beef (the imported form in Chile), and refined sugar. Maize, fruits, and vegetables are sold as primary products. The lightly processed products considered here represent a share in all lightly processed products that is lower than the share of the selected primary products in all primary agricultural goods. The level of support for wheat, milk, beef, and sugar is determined by direct price comparisons, as discussed above. The level of support for other lightly processed products is determined in a straightforward manner through MFN tariffs.

NRAs in agriculture

Table 4.3 shows the profile of nominal rates of assistance for producers of primary agricultural tradables in 1960–2005. These estimates are based on official exchange rates and include the output subsidy equivalents of input subsidies. (For the annual estimates and the NRAs without input subsidies, see appendix B, table B.3.) The weighted NRAs for importables averaged 4 percent in the 1970s, but 21 percent in the 1980s, before falling gradually to less than 8 percent (table 4.3). For exportables, by contrast, the NRAs have averaged slightly below zero since the mid-1970s. These slightly negative numbers have been generated because of the nominal tariff protection afforded tradable inputs, such as machinery and equipment, agrochemicals, fertilizers, and fuel, that have a relatively high cost share in the production of exportables. With the steady decline in the uniform MFN tariff and the application of FTAs, however, the imposition on farmers has fallen over the past two decades. The difference between the annual average NRAs for import-competing agriculture and for export agriculture is shown in figure 4.3.

Table 4.3. NRAs for Covered Farm Products, Chile, 1960–2005
(percent)

Indicator	1960–64	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–05
Exportables ^a	10.8	21.9	35.2	–1.2	–2.0	–1.2	–0.6	–0.5	–0.3
Apples	10.5	22.5	35.9	–1.5	–2.2	–1.1	–0.4	–0.2	–0.2
Grapes	11.5	19.8	32.8	–0.4	–1.7	–1.3	–0.8	–0.7	–0.4
Import-competing products ^a	10.7	–8.2	–14.5	3.0	4.8	23.9	17.4	14.8	7.6
Sugar	—	—	—	39.2	28.2	49.2	21.0	22.4	31.3
Maize	–19.4	–6.7	–10.2	–18.8	–10.7	–10.5	–6.8	2.2	0.6
Beef	–8.9	–26.0	–24.6	4.2	6.9	33.0	16.5	12.5	3.3
Wheat	10.2	7.1	–19.1	5.5	7.8	14.0	27.6	25.2	10.4
Milk	201.4	30.0	12.5	22.2	6.7	45.2	22.2	15.6	5.6
Total, covered products ^a	10.6	–6.3	–10.6	2.5	4.2	20.6	13.7	11.2	5.7
Dispersion, covered products ^b	87.9	33.0	37.2	30.4	17.0	26.1	16.5	14.7	12.1
% coverage (at undistorted prices)	58	48	47	46	37	38	34	32	29

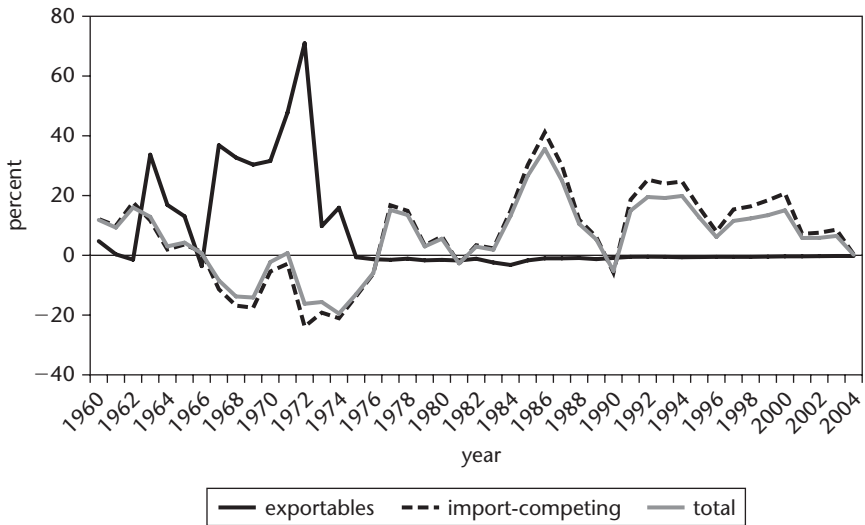
Sources: Valdés and Jara 2007 and data compiled by the authors.

Note: — = no data are available.

a. Including product-specific input taxes and subsidies.

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

Figure 4.3. NRAs for Exportable, Import-Competing, and All Covered Farm Products, Chile, 1960–2004



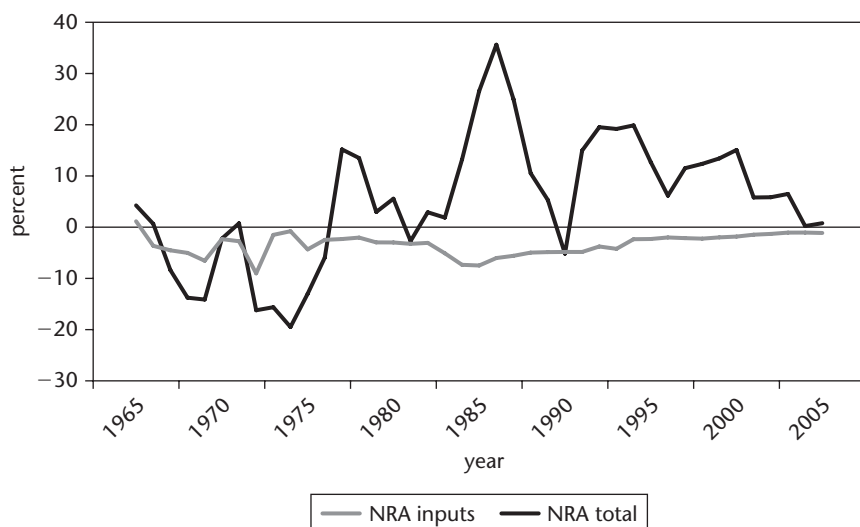
Sources: Valdés and Jara 2007 and data compiled by the authors.

Note: The total NRA may be above or below the exportable and import-competing averages because assistance for nontradables and non-product-specific assistance are also included.

Since the economic reforms of the mid-1970s, the most dynamic growth has occurred among the producers of exports, who have also been assisted the least. And it is they, not import-competing producers, who have been linked with the bulk of rural employment generation, poverty reduction, and the drop in rural-urban migration rates related to agricultural growth. Exportables are difficult to assist except through export subsidies, which are unavailable in Chile because of World Trade Organization commitments.

The weighted average NRA for all covered products changed from -8 percent in the 10 years from 1965 to 3 percent in the next 10 years, and to 17 percent during 1985–94, but to only 6 percent in the following decade. Importantly, the dispersion of industry rates around this mean also fell (see second last row in table 4.3), which means there was less intrasectoral misallocation of resources, particularly of land. Some of the assistance to farmers was offset by the tariff-inflated prices of imported and import-competing farm inputs, as illustrated in figure 4.4.

Because of the increasing product diversity in Chilean agriculture, our covered products account for a falling share of the total value of agricultural production. At undistorted prices, this share had dropped from more than half in the 1960s

Figure 4.4. NRAs for All Covered Farm Products in Total and from Input Price Distortions, Chile, 1965–2005

Sources: Valdés and Jara 2007 and data compiled by the authors.

to less than one-third by around 2000. To get a sense of the level of assistance in the rest of the agricultural sector, we have used data of the Banco Central to determine the shares of noncovered farm production in import-competing, exportable, and nontradable products. We have then assumed that the average NRA for noncovered nontradables was zero, and that the NRA for noncovered exportables was the simple average of the estimates for the covered exportables. For noncovered import-competing products, we have assumed that the NRAs were half the tariffs reported in Hurtado, Valdés, and Muchnik (1990) for the period to 1984, while, for later years, we have used the tariffs reported in Becerra (2006), which consist of MFN tariffs for 1985–99 and applied tariffs for the current decade. The resulting average NRA for all noncovered products, shown in row 2 of table 4.4, is somewhat less than the average NRA for covered products.

The commodity-specific NRAs do not cover assistance that is not specific to products. In the case of Chile, this takes the form of direct government support for small-scale irrigation, research, market promotion, and pasture improvement. Leaving aside programs restricted to small farmers, data of the Agricultural Development Institute provide the basis for the estimates in row 4 of table 4.4. They suggest that this additional support adds about four percentage points to the NRA for total agriculture, shown in row 5 of the table.

Table 4.4. NRAs for Agriculture Relative to Nonagricultural Industries, Chile, 1960–2005
(percent)

Indicator	1960–64	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–05
Covered products	10.6	–6.3	–10.6	2.5	4.2	20.6	13.7	11.2	5.7
Noncovered products	10.3	10.8	14.8	2.1	6.1	7.4	4.6	4.5	1.5
All agricultural products ^a	10.1	2.6	2.9	1.7	5.5	12.2	7.3	6.6	2.7
Non-product-specific assistance ^b	15.3	13.5	9.1	2.7	1.7	0.8	0.6	1.6	2.7
Total agricultural NRA (including NPS)	25.4	16.2	12.0	4.5	7.2	13.0	7.9	8.2	5.3
Trade bias index ^c	–0.01	0.31	0.53	–0.04	–0.11	–0.18	–0.12	–0.12	–0.05
All agricultural tradables	11.8	3.1	3.5	1.9	6.1	13.6	8.1	7.4	3.0
All nonagricultural tradables	33.8	26.1	32.1	11.2	7.2	9.0	5.9	5.3	2.1
RRAs ^d	–16.1	–18.0	–20.0	–8.0	–1.0	4.2	2.2	2.0	0.9

Sources: Valdés and Jara 2007; data compiled by the authors; data of the Agricultural Development Institute.

a. Not including non-product-specific assistance (NPS).

b. Total assistance for primary factors and intermediate inputs, divided by the total value of primary agricultural production at undistorted prices.

c. The trade bias index = $(1 + NRA_{ag,i}/100)/(1 + NRA_{ag,m}/100) - 1$, where $NRA_{ag,m}$ and $NRA_{ag,i}$ are the average percentage NRAs for the import-competing and exportable parts of the agricultural sector.

d. The RRA is defined as $100 * [(100 + NRA_{ag}^i)/(100 + NRA_{nonag}^i) - 1]$, where NRA_{ag}^i and NRA_{nonag}^i are the percentage NRAs for the tradable parts of the agricultural and nonagricultural sectors, respectively.

Assistance to nonagricultural tradable sectors and RRAs

The assistance for agricultural producers relative to the assistance for nonagricultural producers of tradable products is important in intersectoral resource allocations. The NRAs for nonagriculture have been disaggregated into import-competing, exportable, and nontradable products. These indicators are provided in Valdés and Jara (2007).²² Tariffs have been the basis for estimating these NRAs given that there were no export taxes in Chile during the period under consideration, and the NRAs for nontradables (and any tradable services) have been assumed to be zero. The aggregate NRAs for the tradable parts of the nonagricultural sector are summarized in row 8 of table 4.4. This suggests that the NRAs for these industries fell from an average of more than 30 percent prior to the reforms in the mid-1970s to less than 10 percent in the 1980s and to only 2 percent more recently.

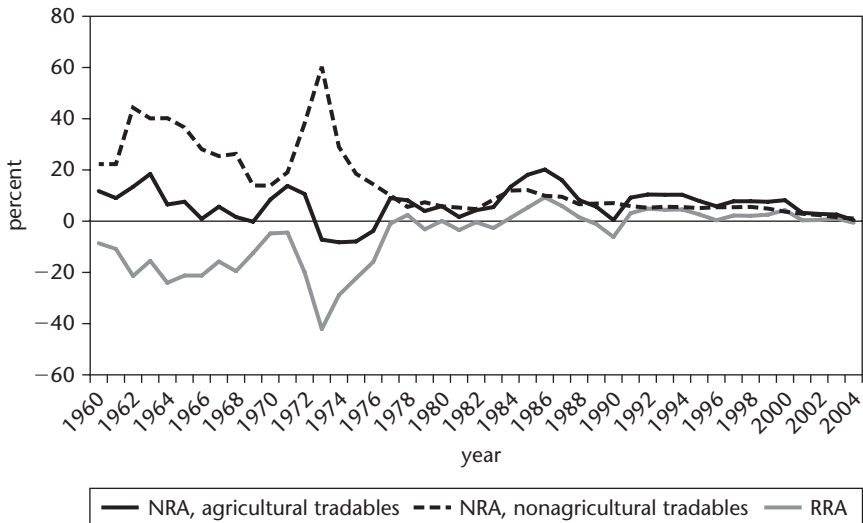
The extent to which farm prices have been distorted relative to the prices of other producers of tradables is captured in the RRA measure. This is reported in the final row of table 4.4. This suggests that farmers were discriminated against prior to the mid-1970s reforms even though they received positive direct assistance. The RRAs for farmers became slightly positive only in the later 1980s when general tariffs were increased in response to the macroeconomic crisis. Since 1985, the assistance for both agricultural and nonfarm activities has all but disappeared. This drift from negative to slightly positive and then to zero RRA estimates is illustrated in figure 4.5, where it is clear that the antiagricultural bias of policies prior to the reforms was generated entirely by nonfarm policies.

A caveat is in order. In the analysis of relative incentives in Chile, economists often include the price of home goods in the price index of agricultural and nonagricultural sectors. This approach differs from the one followed in our study, where relative incentives are restricted to tradables only. This difference in the concept of relative incentives affects the estimates, particularly for 1960–80, when the tariffs on manufactured goods were extremely high. The values for the RRA reported in table 4.4 are negative, while the RRA would become positive during those years if nontradables had been included in the nonagricultural prices. The reader should recall that our study has assumed that there were no distortions in the nontradables sector.

Accounting for exchange rate misalignment

The Krueger, Schiff, and Valdés study (1988) found that misalignments in the exchange rate help explain agricultural incentives during 1960–83. More recently, the exchange rate phenomenon has taken on an even more prominent role in policy debates on the prospects for the country's agriculture. Exchange rates are

Figure 4.5. NRAs for Agricultural and Nonagricultural Tradables and the RRA, Chile, 1960–2004



Sources: Valdés and Jara 2007 and data compiled by the authors.

Note: See table 4.4, note d for the definition of the RRA.

far more influential than trade policy today because of the low levels of current tariffs (except for the tariffs on sugar and wheat).

Hurtado, Valdés, and Muchnik (1990) note that, during the 1960s and 1970s, there was a multiple exchange rate system and a foreign currency retention scheme. But defining and estimating the distortion is a complex problem, especially considering that there are still major gaps in the understanding of economists about the long-run behavior of the RER. Economists have used an array of approaches to estimate misalignment, from the crude application of purchasing power parity doctrines through the econometric estimation of single equation misalignment models (the most common approach) to the simulation of large macroeconomic models.²³ A parallel market rate is proposed in our project methodology as an alternative for some countries, but there has been no parallel or black market rate in Chile for at least a decade.²⁴

The basic discussion in Chile since the late 1970s has revolved around whether the actual RER differs significantly from the long-run equilibrium value of the RER or, in other words, whether the RER is sustainable given the existence of a targeted current account deficit. The concern arises because of the risk of the overvaluation (or appreciation) of the peso. The appreciation in recent years has been a consequence of high world prices for minerals, which, in Chile, are

produced by a large sector operating in competitive international markets. The strength of the peso decreases the profitability of nonmineral exports and import-competing activities. Automatic adjustments (declines) in the nominal price of home goods is unlikely, at least in the short and medium term, given (downward) rigidities and adjustment costs. For several years, Chile has had a freely floating rate; so, responding to the peso appreciation has nothing to do with any question about whether the Banco Central is forcing nominal devaluations. Even so, the domestic currency might still be considered wrongly priced if the country's balance of payments surplus or deficit is unsustainable in the longer run. Although not the official view of the Banco Central, estimates by academics suggest that the actual RER has been below a long-run equilibrium value in recent years. Such an RER misalignment is a policy choice that has clear intertemporal consequences since future generations will have to repay any foreign debt that is accumulated.

CTEs

In the estimation of a CTE of the effects of trade policy, plus sales taxes, one may be tempted to assume that there is a constant markup or proportional pass-through of wholesale agricultural product prices to retail prices. An alternative might involve the assumption that changes in the unit prices of retail goods would change for the consumer in proportion to the cost share of the primary farm product in the value of the processed product. The constant markup assumption overestimates (perhaps significantly) the impact of changes in farm-price policies on retail food prices. For example, if wheat represents 10 percent of the final retail price of pasta and bread, a 10 percent increase in wheat prices because of a tariff increase might translate into an increase of as little as 1 percent in the retail price.

The price band for sugar and the impact of this band on the retail prices for sugar and sugar derivatives (directly as sugar and indirectly through the effect on the prices of beverages and other consumer goods) have generated an intense policy debate in Chile. Sugar represents, perhaps, the only product chain that is well documented. In their study on sugar in 1986–2003, Galetovic and Venturelli (2005) conclude that the surcharge (specific tax) generated on the cif price by the price band ranged from 0 to 60 percent (over 40 percent in 1986, 1999, and 2000) depending on fluctuations in the border price. Only in 3 of 17 years did consumers benefit, while, during all other years, consumers were taxed, and the income transfers were particularly high after 1997 (a total of US\$523 million between 1986 and 2003). As an illustration, in 2000, consumers spent an extra US\$81 million for sugar because of the price bands. How was this transfer distributed? Of this amount, the sugar monopsony (Empresas Iansa) captured approximately 47 percent; the government received 32 percent in import duties; and farmers

captured the remaining 21 percent. Small farmers (less than 10 hectares) captured only 3 percent of the total transfer. This is ironic in that the price band was promoted as a price stabilization scheme and, to a lesser degree, to help small farmers.²⁵ On average, it was supposed to be price neutral with respect to consumer prices.

Our CTE estimates should be interpreted as the consumer cost of trade policies *per unit of the primary good* used in producing the processed final product that is retailed. Table 4.5 shows the CTEs for the individual products and the weighted average for Chile. Note that this does not include the value added tax (currently 19 percent) because this tax applies not only to food, but to all products and, so, does not represent a distortion in the sense of our project. These numbers suggest that the CTE has declined from 28 percent in the later 1980s to less than 12 percent now. However, care is needed in interpreting the CTE results in the context of the political economy of price interventions during periods of high inflation. During the 1960s and 1970s, perhaps the main argument for imposing price controls and export restrictions on farm products was the so-called wage-good character of food and, related to this, the implications for inflation. The concern revolved around the prices of such goods at the retail level; thus, the issue of the measurement and interpretation of the impact of interventions on primary products on the prices of food at retail was important.

Summary of Findings and the Prospects for Chilean Agricultural Policy

In this final section, after summarizing the key findings derived from the NRA analysis, we present two broad policy lessons from the Chilean experience before looking ahead at potential risks that agricultural policy makers may face during the next decade.

Four findings are worth stressing. First, price interventions since the implementation of the economic reforms in the mid-1970s have assisted producers of importables; this contrasts with the zero or slightly negative assistance to producers of exportables. Second, direct price-related interventions affect only a small number of politically sensitive import-competing activities, principally through price bands for sugar and wheat and wheat flour and the occasional use of safeguards (most notably for dairy products). Third, the magnitude of the antitrade bias in agriculture has declined as a result of the falling level of support for the production of importables. Fourth, the low NRAs since the late 1990s, despite a MFN tariff of 6 percent, are attributable primarily to the implementation of preferential trade agreements with Canada, China, the European Union, Japan, Mercosur, Mexico, the United States, and other countries. Chile is now open and has reached the point

Table 4.5. CTEs for Covered Farm Products, Chile, 1960–2004
(percent)

Product	1960–64	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–04
Apples	11.0	27.4	42.0	0.0	0.0	0.0	0.0	0.0	0.0
Beef	–9.8	–25.7	–24.3	4.8	8.1	46.6	25.9	14.5	5.3
Table grapes	12.2	27.6	44.2	0.8	0.0	0.0	0.0	0.0	0.0
Maize	–15.0	–2.3	–5.9	–14.4	–6.4	–6.3	–4.1	6.9	4.4
Milk	186.0	39.0	16.0	28.2	15.8	48.3	23.5	17.1	8.0
Sugar	0.0	0.0	0.0	45.1	34.4	54.4	24.2	28.8	39.0
Wheat	5.2	12.6	–10.6	9.0	15.2	17.1	30.0	27.6	12.9
Weighted average	9.2	–2.6	–10.2	5.0	10.9	28.0	19.9	15.6	11.6

Sources: Valdés and Jara 2007 and data compiled by the authors.

where policy makers have little scope for trade and price interventions. The low uniform tariff of 6 percent (wheat and sugar excepted) is a deceptive indicator because, if adjustments are made for trade preferences, the effective rate falls to less than 2 percent for farm products and lower still for nonagricultural products, and there are no export taxes (or subsidies) or other restrictions on exports.

Two broad policy questions

The Chilean experience invites two broad policy questions: To what extent has the expansion of the export sector in agriculture been the unintended result of economic reforms? And have price policies aimed specifically at the agricultural sector been less influential than economy-wide policies, such as macroeconomic policies, deregulation, and privatization?

Regarding the first question, economists involved in the reforms anticipated that the trade liberalization program would significantly reduce the antitrade bias implicit in the government's policies of substantial industrial protection, import substitution, exchange rate management, export licenses, and other measures that inhibited the production of exportables. This was probably not perceived in this way by the farm lobbies and government officials dealing directly with the agricultural sector, given their microfocus and their sectoral viewpoint instead of an economy-wide outlook.

Certainly, the impacts on poverty of this change were not well understood. There was a general belief that the production of exportables tended to be relatively more labor intensive compared with import-competing products. Although some agronomists might have anticipated the potential of some fruit products, one of the interesting features of the situation in Chile is that there has been substantial development of nontraditional products, some of which had never before been produced in the country on a commercial scale (kiwis, berries, seeds for export, avocados, olive oil, aquaculture, large-scale forest plantations, and others).

With regard to the second question, the effect of the indirect interventions (exchange rates and industrial protection) overwhelmed direct (sectoral) policies. Other nonsectoral factors—all related to the service sector—were also influential in agriculture, particularly deregulation and privatization in the larger economy as these affected infrastructure, ports, telecommunications, energy, and banking.

Perhaps the strongest conclusion that may arise from a review of the impacts of the growth of agriculture following the economic reforms of the last three decades is that the growth in the sector made a significant contribution to poverty reduction. A second conclusion is that the output mix of agriculture and, specifically, the

tendency toward greater export orientation had a particularly important effect in increasing employment and household incomes and lowering rural-urban migration. The overall policy strategy continues to support the growth of export-oriented sectors and the modernization of import-competing sectors, but poverty reduction is most notably linked to export agriculture rather than to agriculture as a whole.

Paradoxically, because the evidence points so strongly to the importance of the product mix rather than to the farm sector per se, the protection of the import-competing sector might reduce these positive externalities. Most of the current protection of agriculture has been the result of trade-related border measures. Such protection only benefits the import-competing sector. It also represents an implicit tax on the production of exportables, which appears from the analyses elsewhere to be generating most of the positive externalities. The downside to this message is that certain subsectors have had difficulty adapting to the open-market policy regime, especially small-scale farming.

With respect to generalizing the results of the Chilean case, it is relevant to ask: is it the export nature of agricultural activity that matters, or is it the relative labor intensity of the primary and related activities (such as processing)? The answer is that it is the nature of the activity that matters. For Chile, the export sector coincides with higher labor intensity, but this coincidence is unlikely to occur everywhere. An example might be the pampean region in Argentina, where the export sector is less labor intensive (the case of grains and beef, for example). Similarly, a sector oriented toward the production of import-competing crops might also be associated with strong forward links in agroprocessing (and, so, become a source of significant employment effects). But, in the Chilean import-competing sector, this appears not to have been the case.

Another important aspect of the Chilean case that would argue against generalizing these findings is the counterseasonal nature and low storability of a significant proportion of the country's agricultural exports. Chilean export agriculture has been able to take advantage of both these characteristics, which tend to be associated with lower trade barriers in northern export markets. A contrasting example of a country that might potentially expand the production of horticultural products is Morocco. Exports of Moroccan horticultural products to Europe coincide with the harvest of competing products in the European Union. And, although Morocco has a trade agreement with the European Union, it faces relatively greater restrictions on exports than Chile, hampering the expansion of the sector.

Reflections on two possible policy risks

Although the export mix in Chilean agriculture is becoming increasingly diversified, agricultural exports (leaving aside the important forestry products subsector) are

strongly concentrated on fruits and vegetables, wine, poultry and pork, and agroprocessed products. These are all differentiated goods for which quality and sanitary conditions are crucial in terms of market access and in which an isolated quality problem associated with a small fraction of exports may damage the reputation of an entire subsector. So far, Chile has succeeded without encountering major problems. However, given the increasing demands in terms of quality standards in import markets and the increasing competition from other exporters, Chilean agriculture depends on its capacity to adjust rapidly to these increasing demands and take every precaution against the risk of major outbreaks of plant or animal diseases.

Another issue is the conditions that represent a risk for the competitiveness of agriculture. We have mentioned that exchange rate appreciation worries farm groups. The rising labor costs in the production of export products, which, by nature, are quite labor intensive, are also a concern. Labor costs often account for 60 percent of operational costs in fruits and vegetables and in activities for which seasonal employment is important in a sector subject to significant fluctuations in yields and export prices. A trend toward increasing rigidity in the labor demand associated with the labor code might represent a risk to the survival of important activities such as berries, seeds, and fruits.

Notes

1. The special case of small farmers is not covered in this study. It merits analysis. The analysis should focus not on price incentives per se, which apply to all producers, but on government subsidies targeted at small farmers through a special government agency (the Agricultural Development Institute).

2. Agricultural policies in 1960–84 are well documented in Hurtado, Valdés, and Muchnik (1990), a synthesis of which appears in Valdés, Hurtado, and Muchnik (1991). For land policies during 1973–80, see Jarvis (1985). See Ministry of Agriculture (2001) for the current government strategy toward agriculture. A comprehensive historical overview of the political economy of changes in trade policy since the 19th century is available in Lederman (2005). Lederman's major study examines the influence of shifting economic conditions and the role of interest groups, domestic institutions, and economic ideology in shaping trade policy. He also presents a detailed description of the trade and exchange rate regime between 1974 and 2000, when Chile went through a period of intense liberalization. This is particularly relevant for our study.

3. The approach to farm production under the agrarian reform began by relying on a Yugoslav model and then focused on the centralized model applied in the Soviet Union. For a discussion of the details of the agrarian reform, see Jarvis (1985) and the citations therein.

4. For a thorough discussion of Latin America's recent experience with FTAs, including Chile, see Kjölleström (2006).

5. For more on the issue of the aggregate agricultural supply response to incentives, see the comments by Jarvis (1990) on Barahona and Quiroz (1990) and the follow-up discussion in Quiroz, Barahona, and Valdés (1990).

6. The point estimate for a positive productivity shift post-1974 is 0.157 (16 percent), with a standard error of 0.072 (a p-value of 0.036). This is a shift upward in the productivity trend measured by a simple year index over the entire period and estimated at 2.3 percent per year.

7. For government programs, Chile officially defines small farmers as those with less than 12 irrigation-equivalent hectares and with a net worth of less than UF 3,500 (*unidad de fomento*, a unit of account indexed on inflation, consumer prices, and currency fluctuations), equivalent to approximately US\$110,000. The number of hectares observed among small farmers might therefore vary by climate and topography.

8. Systematic efforts to compile a large nationwide biannual representative household survey began in 1985 with the first CASEN. Reliable data, however, were not available until the 1987 survey. Comparisons of poverty measures using prereform and postreform data are difficult given the dubious nationwide representation of the pre-1985 data.

9. The nontradable share of the total food budget ($0.20/0.27 = 0.74$) might appear too high in the case of Chile, but this share includes marketing margins, determined in large part by nontradable services.

10. López and Anríquez (2003) estimate the long-run elasticity of nontradable food prices with respect to agricultural output at approximately -0.6 . Thus, a 4.5 percent expansion in output would result in a decline of 2.7 percent in the price of nontradable food, which, in turn, leads to a 0.5 percent decline in the food budget. One would not expect that such a small decline would lead to an outward shift in the supply of unskilled labor that might offset the effect of a labor demand increase on wages.

11. From a headcount of 20.6 percent in 2000 to an estimated 19.2 percent because of a wage and employment effect, plus an additional decline in the poverty rate of 0.15 because of the output price effect of agricultural growth.

12. We wish to acknowledge here the significant contribution of Jorge Quiroz during the construction and analysis of the data set in Hurtado, Valdés, and Muchnik (1990).

13. Also available, *A Handbook for Chile* (Valdés and Schaeffer 1995) covers the details of the calculations of the various protection indicators and includes the database on Chile.

14. One source of confusion in reading the calculation of nominal rates of protection for 1984–89 is the restrictions on imports of live cattle, primarily from Argentina, following the declaration in the early 1980s that Chile was free of foot-and-mouth disease. High estimates of nominal rates of protection for beef may be attributed to these import restrictions on countries where the disease was present. Assuming that the restrictions are not a trade distortion with respect to the World Trade Organization, the nominal rates of protection for beef would be at the level of the uniform MFN tariff, which is considerably lower.

15. See Valdés (1996), who reports on a decomposition approach to quantify the relative influence of changes in the exchange rate, border prices, and trade policy on changes in real farm prices for 1985–2005.

16. The Agricultural Development Institute, which deals exclusively with small farmers, has a current annual budget of approximately US\$200 million.

17. Total farm output value is the value of output at current prices obtained from the Banco Central Statistical Database, which classifies agricultural output into crops, fruits, and the rest, where the rest includes forestry products. In our estimates for agriculture, we have deducted the forestry sector.

18. For some years, the price band included oilseeds as crops, but, when importers began bringing in blends that contained edible oils, the band was perforated and had little effect on domestic prices thereafter. However, the government did not respond by adjusting the policy, but eventually no longer exercised the policy. Oilseeds were officially removed from the price band system in 2002.

19. The project methodology proposes a criterion for cases where import and export values are small shares (less than 2.5 percent) of consumption or production (see appendix 1).

20. In the project methodology, we have adopted the hierarchy of processing in the GTAP Database: primary agriculture, lightly processed food (for example, meat, dairy, and sugar), and highly processed food.

21. Computing the NRA for milk at the farm level has turned out to be complex. The price per liter paid to farmers by milk plants changes according to various indicators, including the cif price for

powdered milk, the butter fat content, a seasonal incentive (typically, prices are 14 percent higher in winter relative to summer), refrigeration at the farm level, and other less influential adjustments. Quiroz and Fernández (2001) provide a useful study on the price transmission for milk. They develop an econometric model that emphasizes the difference in price determination between summer and winter. In their analysis of the prices paid to farmers for fluid milk, the border prices of powdered milk are most relevant in the summer, the period of more abundant supply, but less influential for winter production when milk plants need more fluid milk for their production of yogurt and other dairy products. Another relevant study on the criteria for the determination of prices at milk-production plants is the report to the Sociedad de Productores de Leche by Valdés Prieto (2001). In our study, in the case of powdered milk, instead of a direct price comparison, we have used the MFN tariff information adjusted for safeguards and for trade preferences in FTAs, and, up to 1995, adjusted also for the minimum import price policy prevailing during the late 1980s and early 1990s. Until the late 1990s, New Zealand was an important supplier of powdered milk to Chile, but, since then, Argentina and Uruguay have become the dominant suppliers by benefiting from the lower tariffs under Mercosur and from lower transport costs.

22. The weights for each category changed over the periods. They are based on the best judgment of the authors, bearing in mind the historical evolution of the composition of trade. The authors have been unable to find reliable official sources for these shares through time; so, the NRAs by category and for nonagriculture as an aggregate are tentative.

23. There is a rich literature on the economics of RERs for developing countries that reports estimates for Chile and includes Edwards (1989), Edwards and Savastano (1999), and Hinckle and Montiel (1999).

24. The incidence of parallel markets greatly declined after the late 1970s and disappeared in the early 1990s when exchange controls were dismantled and exchange markets were unified. During the 1980s, there was a small quasi-legal parallel market, with a modest premium (except for occasional spikes during temporary macroeconomic crises), that was essentially the result of exchange controls on capital account transactions and represented an attempt to provide insulation from temporary capital outflows; it was not relevant for trade transactions.

25. As originally designed, the price band system might have been relatively neutral, but farm lobbies succeeded in obtaining adjustments in the rules whenever border prices became too unfavorable. Moreover, the prevailing assumption at the time the system was designed was that the stochastic process of world prices was stationary, and ups and downs would thus be neutralized to some extent because, if the price hit the ceiling price, the government would not subsidize consumers beyond the removal of the tariff. More recent analysis has shown that the world prices for most commodities show strong signs of persistence whenever prices are low, while price spikes are usually short term.

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COLOMBIA

Lia Guterman

The population of Colombia was around 41 million in 2005. The annual rate of population growth accelerated from 2 percent in the 1940s to almost 3.4 percent in the 1950s. It fell to 2.8 percent between 1964 and 1985, and it fell sharply to 1.3 percent in 1985–2005. This development was accompanied by a rapid increase in the urban population because of rural-urban migration, increasing the urban share in the total population from around 30 percent in the late 1930s to 73 percent in 2005.

Poverty indicators on Colombia show variability. The headcount measure of poverty decreased from 52 to 50 percent between 1990 and 1994, but this was followed by a sharp rise to a peak of 57 percent in 2002. Poverty decreased again during 2003–05, to 49 percent. Rural poverty is still significant: 68 percent of the rural population is living below the poverty line, and 15 percent are extremely poor (Montenegro 2006).

Between 1950 and 2005, employment grew steadily. According to the household survey, the level of total employment in 2005 reached 18 million. Rural employment accounted for 4.7 million in this total.

Gross domestic product expanded at an average of 3.9 percent per year between 1965 and 2005, while per capita income increased 1.7 percent per year during the same period. There were, however, important sectoral variations. The highest rate of growth was reported in the mining sector, an average annual growth of 6.9 percent, followed by the service sector, at 4.2 percent. The industrial and agricultural sectors grew more slowly, at annual rates of 3.0 percent and 3.1 percent, respectively.

Meanwhile, the share of agriculture in total gross domestic product fell from an average 28 percent during 1965–70 to 13 percent during 2000–05. The share of

manufacturing also decreased, from 18 to 16 percent over the period. By contrast, the share of the service sector increased from 51 to 65 percent, and the mining sector increased from 2.8 to 6.0 percent over the same period.

From 1965 to 2005, the real value of total exports increased at an annual average rate of 5.3 percent, while imports grew 6.4 percent per year. In general, foreign trade increased in relation to the value of domestic production and consumption: the ratio of total exports to production increased from 8.4 percent in 1965–75 to 11 percent in 2000–05, and the share of total imports to consumption grew from 8.7 to 12.2 percent. There were important differences among sectors: exports from the agricultural sector increased at a rate of 3.7 percent, while manufacturing exports grew at 7.5 percent per year. In the case of imports, the growth rates were 6.3 and 6.7 percent, respectively.

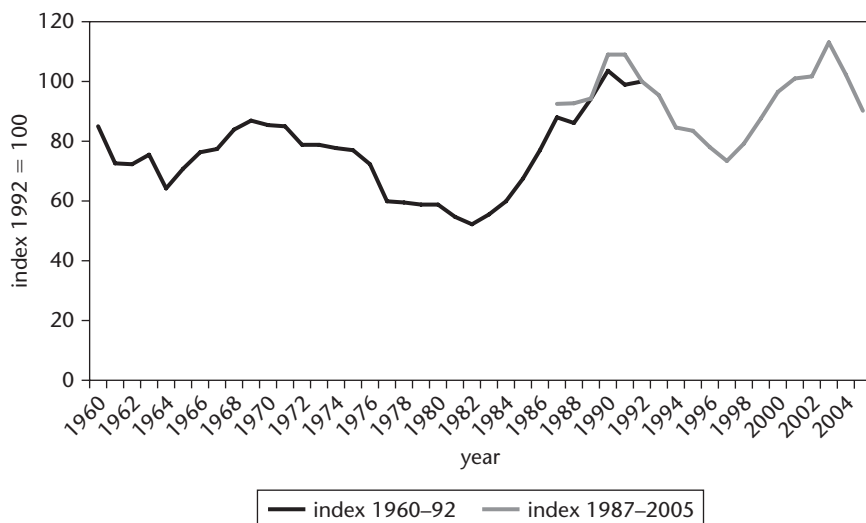
In trade policy making, several periods may be identified. The 1950–66 period was characterized by the dominance of import-substitution policies through which the government sought to protect domestic production and achieve self-sufficiency. The 1967–89 period was characterized by an open economy approach to market policy, under which the government reduced the antiexport bias with the aim of promoting exports and the growth of the manufacturing sector. The magnitude of foreign trade began to increase steadily during this period. Trade liberalization was adopted during 1990–92, generating a rapid increase in imports. Initially, exports maintained their trend, but, beginning in 1996, exports grew more rapidly than imports.

A policy of fixed exchange rates and sporadic devaluations prevailed before 1967. This included multiple exchange rates, especially for coffee exports, and resulted in chronic overvaluation of the peso that discriminated against exports.

In 1967, a crawling peg system was adopted, and the exchange rate was unified. This led to depreciation in the peso and the promotion of exports (García 1981; Thomas 1985; Krueger, Schiff, and Valdés 1991). The peg fluctuated according to changes in domestic and external circumstances. There were periods of rapid devaluation (for example, 1972–73, 1984–86) and periods of revaluation (such as the coffee boom of 1975–82).

In general, the years 1967–90, despite the exchange rate policy, were characterized by overvaluation of the peso. Between 1991 and 1993, as part of the process of liberalization, a free market for foreign currency was implemented progressively. The control by the Central Bank (Banco de la República) over the currency market was abolished as was the crawling peg system. However, the overvaluation of the peso continued to be a key characteristic after the liberalization. The changes in the real exchange rate are shown in figure 5.1.

Although a parallel market for foreign exchange existed next to the official market, the level of the exchange rate in the parallel market was lower than the

Figure 5.1. Real Exchange Rates, Colombia, 1960–2005

Sources: 1960–92: Duarte Guterman & Cia Ltda 1994; 1987–2005: Banco de la República 2007.

official rate in 19 of the 27 years for which data are available (table 5.1). An exception is the 1980s, when the average exchange rate in the parallel market was around 1.2 percent higher than the average official rate. This trend was reversed beginning in 1991, mainly because of the large inflow of foreign exchange arising through the illegal drug market. Since then, the parallel exchange rate has averaged 6 percent less than the average official rate.

The Agricultural Sector in Colombia's Development

Agriculture has been the single most important sector in the Colombian economy. Nonetheless, its contribution to total gross domestic product has been declining steadily, from an average 27 percent in 1965–79 to 20 percent in the 1980s, 16 percent in the 1990s, and only 13 percent in 2000–05.

Agricultural exports were the main source of foreign exchange until the mid-1980s, accounting for 54 percent of the total value of the exports of goods and services. The share declined to 31 percent in 1987–99 and 20 percent in 2000–05. Until 1987, coffee was the most important export product, accounting for 44 percent of total exports; thereafter, however, the share declined and averaged only 7 percent in 2000–05. Thus, coffee's share in agricultural exports has fallen from around 80 percent to around 35 percent over the past four decades. Meanwhile,

Table 5.1. Official and Parallel Market Exchange Rates, Columbia, 1979–2005*(Col\$/US\$)*

Year	Official (a)	Parallel (b)	Ratio (b/a)
1979	43	39	0.92
1980	47	45	0.94
1981	55	52	0.95
1982	64	62	0.97
1983	79	81	1.02
1984	101	116	1.15
1985	142	149	1.05
1986	194	196	1.01
1987	243	244	1.01
1988	299	302	1.01
1989	383	387	1.01
1990	502	504	1.00
1991	633	595	0.94
1992	680	645	0.95
1993	787	759	0.97
1994	827	806	0.98
1995	913	883	0.97
1996	1,037	1,020	0.98
1997	1,141	1,096	0.96
1998	1,427	1,363	0.96
1999	1,758	1,684	0.96
2000	2,087	1,958	0.94
2001	2,300	2,137	0.93
2002	2,505	2,368	0.95
2003	2,878	2,695	0.94
2004	2,626	2,451	0.93
2005	2,321	2,195	0.95

Source: Banco de la República 2007.

noncoffee agricultural exports averaged 10 percent of total exports in 1965–89, and the share increased to an average 15 percent during 1991–2005. Noncoffee exports that have increased in importance include cut flowers, accounting for around 25 percent of agricultural export earnings in recent years; fruits, mainly bananas, with a 15 percent share; and sugar, with a 12 percent share.

Agricultural imports were relatively limited from 1965 to 2005, accounting for a low of 4 percent and a high of 7 percent in the total value of the imports of goods and services. Four groups of products accounted for 66 percent of the total value of agricultural imports: cereals (mainly maize and wheat), 43 percent;

oilseeds, 11 percent; and fruits and vegetables, each 6 percent. These shares remained reasonably stable. According to recent estimates of the Ministry of Agriculture, around 61 percent of agricultural output, excluding livestock, is exportable; 6 percent is import-competing; and 33 percent is nontraded.

The share of crop production in the value of total agricultural production declined from 70 percent in the late 1960s to 56 percent in 2000–04. Meanwhile, the corresponding share of animal production rose to 44 percent. Among crops, coffee was the single most important product, accounting for an average 12 percent of the total value of agricultural production, a share that was relatively stable over the period. The average share of noncoffee crops declined from 53 percent in 1970–92 to 46 percent in 1993–2005. Perennial crops were the most important commodities, accounting for 28 percent of total agricultural production; the most important of these crops were plantains, sugarcane, and flowers. Annual crops accounted for the other 18 percent, among which rice, potatoes, and maize were the principal products. The share of beef and milk accounted for an average 26 percent of the total value of agricultural production. The remaining 14 percent was mainly the rapidly growing share of poultry meat production.

Colombia has 114 million hectares of land; around 12 percent of the land (14 million hectares) contains soils with arable potential. In 2004, the country used 38 million hectares for cattle raising and 4 million hectares for the cultivation of crops, of which 53 percent was used for perennial crops. The country has significant coastline and a range of climates, allowing a wide variety of crops to be grown. Cereals such as corn, wheat, and barley, together with coffee and sugarcane, are grown in highland areas; rice, bananas, cotton, palm oil, and tobacco are grown in the Caribbean coastal area. Cattle raising is the main form of agriculture on the eastern plains, and rubber and tropical timber are produced in the tropical forests in the southeast.

The information available on land distribution shows that landownership is concentrated in the hands of a small number of large farms that occupy most of the available land. According to 1988 data, the 47 percent of farmers who each had less than 10 hectares occupied a total of 10 percent of the available land, while the 15 percent of farmers who each had more than 500 hectares occupied 32 percent of the available land (Ministerio de Agricultura and DNP 1990). The Gini coefficient for the rural sector declined from 0.86 to 0.84 between 1960 and 1988, before rising to 0.88 in 2000 (Fajardo 2002). The inequality in land distribution is closely related to two different types of production: commercial agriculture, which is characterized by large modern farms selling products in organized markets, and peasant agriculture, which is characterized by small, labor-intensive farms located in areas far from markets.

Market Interventions in the Agricultural Sector

The government was actively intervening in agriculture during the period under analysis, 1960 to 2005. For most of the period, the interventions relied on a wide variety of instruments to protect importables and tax exportables. In addition, notwithstanding a few occasions when sporadic devaluations occurred, the overvaluation of the peso discriminated against the export sector.

Agricultural pricing policies were undertaken to guarantee a minimum income to producers and to stimulate agricultural production. Various mechanisms were used across commodities. The main instruments were minimum support prices, price compensations, and direct price controls; procurement agreements, monopoly marketing, and the importation of grains by the Institute for Agricultural Marketing (IDEMA), the marketing agency of the Ministry of Agriculture; the public mechanism for the administration of agricultural contingencies (*mecanismo público de administración de contingentes agropecuarios*); quantitative restrictions on imports (quotas, prohibitions on certain imports, prior licensing), tariffs, and import surcharges on imports; price band systems; and export permissions and export subsidies, such as those provided through tax credit or rebate certificates (the *certificado de abono tributario* and the *certificado de reembolso tributario*) and the Plan Vallejo duty exemption system (also involving a tax rebate certificate).

The government intervened in agricultural input markets as well. Credit was subsidized to various degrees. Beginning in 1992, subsidized credit was only available for small farmers. The implicit subsidy is estimated as the difference between the interest rate charged on agricultural loans and the market interest rate. In 1993, the rural capitalization incentive scheme was created to include large farmers who did not qualify for credit subsidies. Another source of subsidized credit to finance exports was the export promotion fund, which relied on funds from a tax on imports, though the subsidy was eliminated in 1995. Except for fertilizers, agricultural inputs (including insecticides, herbicides, concentrates, seeds, and machinery) were subject to a licensing regime, tariffs, and import surcharges until 1990. In 1991, tariffs were reduced, and import restrictions were eliminated. Urea fertilizer was subsidized from the mid-1970s to the late 1980s, but has been subject to import tariffs since 1990.

In this study, we estimate nominal rates of assistance (NRAs) for 11 agricultural commodities in Colombia. (The annual data are shown in appendix B, table B.4.) The 11 commodities are representative of the country's agriculture. They include coffee, sugar, and beef (exportables); wheat, rice, maize, and soybeans (importables); and cotton, sorghum, palm oil, and milk (a mixed history as importables, exportables, and nontradables). Eight of the products fall under the price band system. If the primary agricultural product is not a tradable, as in the cases of sugarcane,

Table 5.2. Shares of Selected Commodities in Total Agricultural Production at Distorted Prices, Colombia, 1981–2004

(percent)

Commodity	1981–93	1993–98	1995–2004
<i>Annual crops</i>			
Cotton	4.4	2.5	0.8
Rice	4.9	4.7	5.0
Maize	4.2	3.4	1.4
Sorghum	1.3	1.8	0.5
Soybeans	1.3	1.0	0.2
Wheat	0.4	0.4	0.1
<i>Perennial crops</i>			
Sugarcane	5.8	6.3	2.4
Palm oil	0.8	2.0	1.8
Coffee	12.8	12.8	10.7
<i>Animal products</i>			
Beef	17.5	15.7	16.7
Milk	5.8	7.3	13.2
Total	59.3	57.9	52.8

Source: Derived from data in DNP 2007.

parchment coffee (or en pergamino coffee), cottonseed, paddy rice, and palm fruit, the product's trade status is determined according to the status of the corresponding lightly processed commodity. The average share of the selected products in total agricultural production, valued at distorted prices and quantities, is 55 percent (table 5.2).

Coffee

Colombia exports a lightly processed coffee product called green coffee. The primary product—parchment coffee—is not tradable, although we classify it as an exportable.¹

Coffee has been subjected to several policy measures. Exports were taxed for most of the period. The proceeds from coffee exports had to be surrendered to the Central Bank at a surrender price (*reintegro*) based on the international price. The surrender price was usually lower than the world price; the difference accrued to the Central Bank. Export quotas, set by the International Coffee Organization, were in place until 1985. Permission to export was granted to private exporters upon presentation of evidence of the payment of a retention quota. The retention quota had been established in 1958. Initially, the retention quota was a fixed

amount of parchment coffee equivalent to a proportion of the green coffee exported. The payment for the retention quota went to the national coffee fund (*fondo nacional del café*). The chief purposes of the fund were to stabilize prices, promote coffee production, and develop and retain foreign markets for Colombian coffee. In 1993, the retention quota was set as a proportion of the international price of coffee so that it varied directly with fluctuations in the international price.

Coffee was also taxed because there was a lower exchange rate for coffee exports until 1967. This differential was abolished that year and replaced by an ad valorem tax, initially set at 26 percent of the minimum surrender price. Half the revenues from this tax went to the government, and half to the national coffee fund. Over the years, the ad valorem tax declined, and it was finally abolished in 1993. Between 1977 and 1980, a discount on currency exchange certificates was introduced for coffee and some other exports. Between 2002 and 2005, a contribution equivalent to 5 percent of the international price was established for exports of coffee to solve the financial disequilibrium in the national coffee fund.

On the domestic market, a support price for coffee guaranteed minimum producer incomes. In 2001, because of the decline in international coffee prices, the government established a direct price support for coffee growers (*apoyo gubernamental a la caficultura*) that depended on the world price and the exchange rate.

Taxes and other contributions deriving from coffee exports were shared by the government and the national coffee fund. The fund returned a proportion of its revenues to producers through several programs, including research and development, technical assistance, rural housing, education, and infrastructure. In estimating NRAs in this study (see below), we assume that 50 percent of the taxes collected through the national coffee fund in a given year are reinvested in the coffee sector in the same year, and therefore the domestic producer price increases by this amount (García and Montes Llamas 1989).

Sugar

Colombia has exported sugar at above the free international market price to destinations where the country had preferential access. For example, as a member of the Sugar Exporters Association, it enjoyed access to the high-priced market in the United States, albeit for a quota-restricted quantity of exports. Sugar received export subsidies (tax rebate certificates) beginning in 1967 and export credit subsidies until 1991. But the country imports more sugar than it exports, even though the domestic industry is highly protected from import competition. Sugar is thus classed as an import-competing product. Together, the barriers to imports and the opportunity to obtain preferential access to high-priced foreign markets

have been beneficial to producers, but have had an adverse impact on consumers. In addition, safeguards against preferential imports to Colombia have been implemented recently.

In the domestic market, sugar was subject to direct price controls and to IDEMA's intervention in sugar marketing. The domestic producer price was fixed by the Ministry of Agriculture after negotiations with sugarcane producers and processors, taking into account the cost of production and the international price. In 1991, a system of price bands was established for raw and refined sugar to stabilize producer incomes. Another mechanism used beginning in 2001 is the price stabilization fund, which aims to ensure that prices across all domestic markets are equal. The production of ethanol commenced in 2005 for use as fuel in the domestic market. This is likely also to support the incomes of sugar producers.

Beef

Beef is an exportable product. The level of exports varied widely between 1969 and 2005. Exports took the form of live cattle, whole meat, and boneless meat. In this analysis, appropriate conversion factors have been used to express exports and prices in terms of live cattle (Valdés 1996).

The price policy toward beef over the period was a mix of interventionist and noninterventionist measures. In 1957, a minimum price was established for beef, and, after that, sporadic price fixing occurred to control inflation and protect consumers. Price controls were implemented mainly for lower cuts of meat to favor low-income consumers, while the prices of high-quality meat were free of intervention. Price controls were once supplemented by restrictions on the sale of meat in restaurants to release beef for exports.

During 1967–95, beef exports received a subsidy (first, through tax credit certificates; later, through tax rebate certificates), while beef imports were subject to quantitative restrictions until 1991 and high import tariffs throughout the period. In 1999, a price stabilization fund was created to promote beef and milk exports and to stabilize producer incomes. Under this mechanism, producers were made indifferent between selling in the domestic market or selling in the international market because the prices in both had been equalized. Because the level of exports has been much lower than the level of imports despite the barriers to imports and the subsidies for exports, this industry, like sugar, is classed as import-competing.

Milk

Raw milk—a primary agricultural product—is seldom traded; however, milk products such as dry milk, butter, and other derivatives are widely imported and exported. In this study, we use appropriate conversion factors to express exports,

imports, and prices in terms of raw milk (Valdés 1996). Until 1978, Colombia was self-sufficient in milk production. Between 1979 and 1998, milk was imported in varying quantities, and, since 1999, there have been both imports and exports. Nonetheless, the commodity is treated as import-competing in this study because, despite the high ocean-transport costs on imports and the subsidies for exports, the country is now a net importer.

The price policy for milk was subject to regular government intervention because of the need to protect consumers from the oligopolistic production and distribution structures in the milk sector. Direct price controls were first undertaken when the government fixed prices in 1957. Between 1968 and 1972, prices were free from intervention, but they were fixed again during 1973–78. In 1979, supervised price modifications were agreed upon by producers and the Ministry of Agriculture on the basis of domestic inflation. Between 1989 and 1999, a new mechanism, known as 70/30 was implemented, whereby processors paid a minimum price for raw milk equal to 70 percent of the consumer price of processed milk. Later, a new price agreement (a system of quotas and surpluses) was instituted based on a price differential according to seasonal production. Recently, the government provided an incentive for the storage of powdered milk to regulate milk supply and reduce fluctuations in farmer incomes.

The government intervened directly in the marketing of milk. In 1975, producers agreed to sell 20 percent of their milk output to IDEMA for distribution among low-income consumers. The proportion was reduced in 1979 to 1 percent for distribution through the Instituto de Bienestar Familiar and 1 percent for distribution through the national milk fund. In 1991, a price band system was established to stabilize producer incomes. A mechanism used since 2001 is the price stabilization fund, which guarantees that domestic prices and export market prices are equal. Until 2001, exports received a subsidy through the tax rebate certificate mechanism.

Palm oil

The primary agricultural palm oil product is the fruit of the oil palm tree. This is not a tradable commodity, but it is given the same trade status as crude palm oil, which is the lightly processed product sold in domestic and international markets. Palm oil is given mixed trade status in this analysis. Until 1989, Colombia was relatively self-sufficient in palm oil production, though there were small, sporadic imports. Thus, we consider it a nontradable until 1989. In 1990 and 1991, some palm oil was imported, but, since 1992, palm oil has been an exportable commodity. Indeed, export surpluses have risen rapidly. In 2005, palm oil exports accounted for 37 percent of domestic production.

The domestic price received by producers is set by an agreement between producers and industrial processors. Exports of palm oil received an export subsidy until 2002, when the tax rebate certificate level was set at zero. Meanwhile, imports were subject to the price band system, and, beginning in 1998, the price stabilization fund played an important role in stabilizing the incomes of farmers. The fund ensured that prices in the domestic market and in the export and import markets were equal through transfers from the high-price market to the low-price market. Palm oil was an important commodity in the rural capitalization incentive scheme; this mechanism was widely used by the alliances of small farmers to establish new farms. The subsidy component might represent as much as 40 per cent of a credit instrument.

Cotton

Cottonseed—a primary agricultural product—is not tradable; therefore, the trade status has been adopted from the status of cotton fiber. Cotton was an exportable commodity during 1960–92 and an importable after 1993. Government price interventions to promote domestic production were active over the period. The prices of cottonseed and cotton fiber were controlled by the Ministry of Economic Development and, later, by the Ministry of Agriculture. In 1972, internal prices were set for cotton fiber by agreement between cotton growers and textile producers and for cottonseed by agreement between cotton growers and producers of fats and oils. These agreements are still in force.

Exports of cotton received an export subsidy, and, for some years, there was an external support price for exports. The differential between the external price and the support price was paid through the export promotion fund; this subsidy was a compensation received by exporters.

Similarly, minimum guaranteed prices for cotton are still applied based on the international price. However, if the support price falls below the cost of production, producers receive a direct compensation from the government. Imports of cotton fiber are authorized if the domestic production has already been sold to the textile industry.

Rice

Apart from sporadic imports in the late 1990s, paddy rice was not traded during most of the period. However, polished rice was widely traded at the international level and was subject to high import tariffs and quantitative import restrictions during most of the period. We classify both paddy and white rice as importables given that the domestic price was above the free on board border price.

The main policy consideration was the achievement of self-sufficiency in production. Until 1991, the principal government interventions with respect to this commodity were aimed at prohibiting imports of rice whenever the price of domestic rice was not competitive (for example, during 1960–68), prohibiting exports whenever the price of domestic rice was competitive with the international price, and extending substantial support for the development of new rice varieties. In addition, the price of rice was supported by IDEMA.

Procurement agreements and, more recently, the public mechanism for the administration of agricultural contingencies have controlled trade in paddy rice. Under these instruments, processors wishing to import are required to absorb domestic production before they may obtain permission to import from the Ministry of Agriculture. In 1991, a price band system for paddy and white rice was established to protect domestic production, and safeguards were used when the border price declined sharply. Recently, the government has provided an incentive for the storage of dried paddy rice to regulate supply and reduce fluctuations in farmer incomes.

Wheat

Wheat is an importable product. Imports account for over 90 percent of domestic consumption. Until the early 1990s, the wheat market was controlled by IDEMA, which was the sole importer. The imports were sold to flour mills after evidence had been offered that domestic production had been absorbed.

The functions of the agricultural importing monopoly, IDEMA, were modified during the liberalization period, and procurement agreements were implemented based on a minimum support price. Upon presentation of absorption certificates indicating that they were using domestic supplies, firms were allowed to purchase imports at a reduced tariff.

Since 1991, imports of wheat have been subject to a price band system.

Maize, sorghum, and soybeans

Maize, sorghum, and soybeans are classed as importable commodities, although sorghum was classed as a nontradable during the early years of the period we are analyzing. Government interventions in these three commodities allowed imports only if domestic production did not satisfy consumption. The prices of all three products were supported by the import regime and IDEMA until 1991 through quantitative barriers and high tariffs. More recently, a state monopoly over grain imports was eliminated, and domestic procurement by IDEMA was scaled back and now affects only poor, isolated areas. Procurement agreements that were

implemented to guarantee the absorption of domestic production were replaced in 2002 by a new instrument, the public mechanism for the administration of agricultural contingencies. Import contingencies set by the Ministry of Agriculture permitted a reduction in import tariffs whenever evidence could be offered of the purchase of domestic production. In addition, since 1991, imports of all three grains have been covered by the price band system.

The value added tax

A value added tax was widely implemented in 1983; the tax rate varied depending on the product, and some goods and services were exempted or excluded from the tax. (Those exempted were not subject to the tax; those excluded faced a zero tax rate.) Today, the general tax rate is set at 16 percent. Food products and agricultural inputs receive special treatment. Primary agricultural food products, essential processed food (bread, rice, and salt), fertilizers, and agricultural machinery and equipment are among the excluded goods. Meat, fish, eggs, and dairy products are exempted goods. A tax rate of 7 percent is applied to roasted coffee, wheat, flour, oatmeal, and palm fruit oil. In addition, since 2003, the establishment of new perennial crops such as cocoa, fruit trees, palm oil, and rubber are exempt from the tax for 14 years.

Estimates of NRAs through Price Interventions

Our methodology defines indicators for the study of policy-induced agricultural price distortions (see Anderson et al. 2008 and appendix A). Policy-induced distortions are distinct from market developments and infrastructural investments, for example, which may alter prices, but are not the result of explicit policy measures directed at prices. Our focus is on government-imposed distortions that create a gap between domestic prices and prices as they would be under free-market conditions. Because it is not possible to understand the characteristics of agricultural development from 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, thereby considering the overall economic environment. Our price intervention estimates do not consider the distortions in the market for foreign currency, however, because the exchange rates in the parallel market do not reflect the level of overvaluation or undervaluation of official exchange rates.

The NRA for farmers is a direct price comparison. It is defined as the price of a product in the domestic market, less the price of the same product at the border.

It is expressed as a percentage of the border price (plus or minus). This measure thus captures *ad valorem* import taxes, variable import duties resulting from the Andean price band system, quantitative import restrictions, storage subsidies, and any other price-based taxes or subsidies for producers. A crucial task in constructing this measure involves making adjustments for transport costs, processing or marketing margins, and quality premiums or discounts to ensure that the comparison is among like products in the value channel (see Anderson et al. 2008; appendix A). If the NRA is negative, policies are effectively taxing the production of the commodity; if it is positive, production is being subsidized. If border measures on output alone (not domestic production subsidies or taxes or distortions on inputs) are generating the NRA, then, in the absence of direct consumer taxes or subsidies, the consumer tax equivalent of the related policies will have a sign that is opposite to the sign of the NRA, assuming full pass-through along the value chain.

The NRA incorporates not only the above distortions to output prices, but also the output price equivalents of product-specific input subsidies and taxes. In including such measures, we consider the following inputs: fertilizers, pesticides, seeds, concentrates, and vaccines (for cattle). Colombia is a net importer of agricultural inputs, and, except for fertilizer, inputs are subject to import tariffs. The price distortion on inputs are thus measured as the *ad valorem* import tariff, plus other import surcharges where applicable, except in the case of urea because the domestic and international prices were available to capture the subsidy during the 1970s and 1980s before the subsidy was eliminated at the end of the 1980s. There were also farm credit subsidies. These are defined as the difference between the market interest rate and the interest rate charged to agricultural producers, times the total annual amount of credit approved.² Except during a few exceptional years in the 1970s and 1980s, these input distortions lower the NRA because the tariffs on inputs more than outweigh the subsidized fertilizers and credit. The average reduction in the NRA is 2.0 percentage points, though it ranges from 0.2 to 6.5 percentage points. The impact is greatest on milk, sugar, and rice; the inputs in these products account for a higher proportion of the total cost of production.

The production of importable commodities was subsidized for most of the period except in the case of maize (taxed in the 1960s and 1970s) and rice and soybeans (taxed in about one in seven of the years under study). The lowest assistance rates occurred in the first half of the 1970s when international prices peaked. Beginning in 1982, the NRAs increased sharply. They have risen additionally for rice, cotton, milk, and sorghum in more recent years (table 5.3).

The production of exportable commodities shows a mixed history of subsidies and taxation. Coffee was taxed during the entire period except for 2000–05, when

Table 5.3. NRAs for Covered Farm Products, Colombia, 1960–2005
(percent)

Product indicator	1960–64	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–05
Coffee	–12.3	–26.7	–21.6	–27.5	–22.4	–19.5	–6.1	–21.4	6.2
Sugar	34.6	62.0	–39.0	–10.4	33.3	46.0	19.6	66.0	106.3
Wheat	40.6	52.6	18.7	40.1	34.7	38.8	44.8	13.2	20.1
Rice	63.7	32.0	–11.5	–9.2	28.7	41.6	23.4	57.3	76.7
Maize	–2.5	–14.5	–18.1	–4.6	14.2	14.0	–1.1	14.9	19.0
Soybeans	7.1	7.5	–9.3	2.3	39.6	32.0	17.2	3.9	6.4
Cotton	–0.4	2.5	–8.5	0.4	12.5	12.3	6.9	6.9	10.3
Sorghum	–3.7	–3.7	–2.7	5.2	26.0	23.8	6.4	22.1	23.5
Palm oil	–4.2	–4.2	–3.4	–2.0	–2.5	–3.2	33.3	13.7	44.9
Beef	–1.9	6.5	–10.0	10.5	5.3	2.1	8.9	6.4	–9.5
Milk	–3.2	–3.2	–3.9	5.7	96.8	25.1	18.4	44.4	94.5
Exportables ^a	–9.6	–9.8	–17.7	–17.5	–9.2	–8.8	1.7	–1.7	24.9
Import-competing products ^a	22.9	8.2	–14.8	–2.8	52.7	26.6	16.7	40.0	45.5
Total of covered products ^a	–2.1	–6.3	–16.4	–14.6	3.9	–0.9	6.1	10.0	27.6
Dispersion of covered products ^b	28.7	34.8	21.2	29.9	42.5	34.1	27.2	31.0	43.7
% coverage, at undistorted prices	64	62	65	71	72	68	56	54	52

Sources: Guterman 2007 and data compiled by the author.

a. Weighted averages. The weights are based on the unassisted value of production. For the calculation of exportable and import-competing averages and for trade status changes during the period, see appendix A.

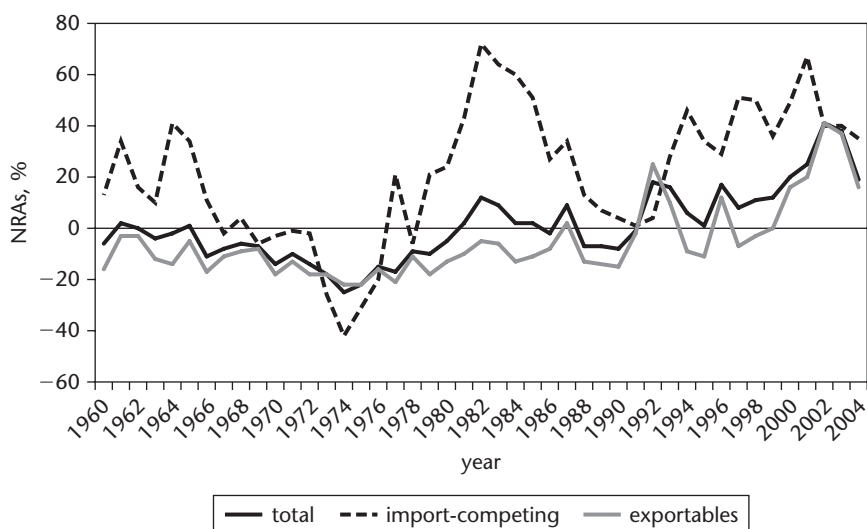
b. Dispersion is a simple five-year average of the annual standard deviation around the weighted mean of the NRAs of covered products.

a direct price support from the government was provided to offset the decline in international prices. Cotton and sugar were taxed during the 1970s when the country still had a comparative advantage in these products, but they have been assisted since then. The sugar industry is protected against import competition at home. This and Colombia's preferential access to high-priced markets abroad have led to high prices for the commodity. Without this support, sugar might well not be even an export product. Beef was assisted until 1999 and taxed during more recent years; the reverse is true for palm oil (table 5.3).

Policy reforms initiated in 1990 reduced the price distortions on seven of our 11 covered products immediately, but they increased the distortions on wheat, palm oil, and beef. In the most recent five-year period, however, the price distortions increased on all but one (beef) of the 11 products.

The average NRA for import-competing products decreased from 15 percent in the 1960s to -9 percent in the 1970s. The average then increased markedly, reaching 40 percent during the 1980s. It declined during the 1990s immediately after trade liberalization, but the average import-competing NRA has increased again, to above 40 percent, in recent years. The average NRA for exportables, by contrast, was negative until the mid-1990s and turned positive at the end of the 1990s and the beginning of the 2000s (figure 5.2). This change in trend was caused

Figure 5.2. NRAs for Exportable, Import-Competing, and All Covered Farm Products, Colombia, 1960–2004



Sources: Guterman 2007 and data compiled by the author.

Note: The total NRA may be above or below the average NRAs for exportables and import-competing because the assistance for nontradables is also included.

by the sharp rise in the subsidy rates for sugar and, to a lesser extent, palm oil. Meanwhile, coffee producers, who were generally taxed over the period, have also been supported slightly recently. If sugar had been treated as an import-competing product (as it might well be if not for the commodity's preferential access to foreign markets and the high tariff on imports), the NRA for exportables might still be negative. On average, the policies directly affecting these 11 products taxed farmers during most years to the end of the 1980s, but, since then, have been increasingly more supportive of farmers (figure 5.2).

Noncovered farm products have also been affected by government policies. Quantifying the effect through price comparisons has not been possible. Nonetheless, by dividing this residual group into exportables, import-competing products, and nontradables and assuming that the NRAs for each of these components of all noncovered products are the same as the NRAs for the corresponding covered products, we have generated a weighted average guesstimate for each year (summarized in table 5.4, row 2).

Non-product-specific assistance for the industry may also be added to the equation. Unfortunately, the relevant data are available only beginning in 1990, but it amounts to only 2 or 3 percent and would have been less in earlier decades.³ Now, it is possible to obtain NRA estimates for all agriculture and for the tradables part of the farm sector, shown in table 5.4, rows 5 and 7, respectively. Both sets of NRAs have transitioned from about -10 percent in the 1960s and 1970s to slightly above zero in the 1980s, to more than 10 percent in the 1990s, and to more than 25 percent in the first half of the present decade. Throughout most of the period, the NRAs for import-competing farm products remained above the NRAs for exportables, leading to an antitrade bias that did not lessen much over the years (table 5.4, row 6).

This upward trend in the NRAs for agriculture contrasts with the opposite trend in the NRAs for nonagriculture. The latter have been estimated by dividing each of the nonfarm sectors into exportables, nontradables, and import-competing. These sectors include nonagricultural primary products, highly processed food, nonfood manufactures, and the service sector. The NRA for nonagriculture is estimated directly from the information available on import tariffs (including import surcharges) and export subsidies. The prices of nontradables are assumed to be undistorted, including the whole of the service sector.

Highly processed food was protected during the whole period, but at a decreasing rate. The rate of protection declined from an average 24 percent during the 1960s and 1970s to only 10 percent between 2000 and 2005. The rate of protection among nonfood import-competing manufactures averaged 27 percent prior to 1992, but, again, the rate has decreased since then because of the general tariff reductions implemented as the economy became more open.

Table 5.4. NRAs in Agriculture Relative to Nonagricultural Industries, Colombia, 1960–2005
(percent)

Indicator	1960–64	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–05
Covered products ^a	–2.1	–6.3	–16.4	–14.6	3.9	–0.9	6.1	10.0	27.6
Noncovered products	1.8	–2.2	–11.7	–8.1	7.8	2.6	4.5	9.4	18.1
All agricultural products ^a	–0.7	–4.7	–14.8	–13.0	5.0	0.2	5.1	9.7	23.1
Non-product-specific assistance	—	—	—	—	—	—	3.1	3.5	1.9
Total agriculture ^b	–0.7	–4.7	–14.8	–13.0	5.0	0.2	8.2	13.2	24.9
Trade bias index ^c	–0.26	–0.15	0.00	–0.11	–0.40	–0.27	–0.11	–0.29	–0.14
All agricultural tradables ^d	–0.4	–5.6	–19.4	–16.1	4.2	0.0	9.5	14.5	28.7
All nonagricultural tradables	19.3	28.1	24.4	18.9	23.7	23.5	9.6	7.9	6.9
Relative rate of assistance ^e	–16.5	–26.0	–35.3	–29.5	–15.7	–19.1	0.3	6.1	20.3

Sources: Guterman 2007 and data compiled by the author.

Note: — = no data are available.

a. Including product-specific input subsidies.

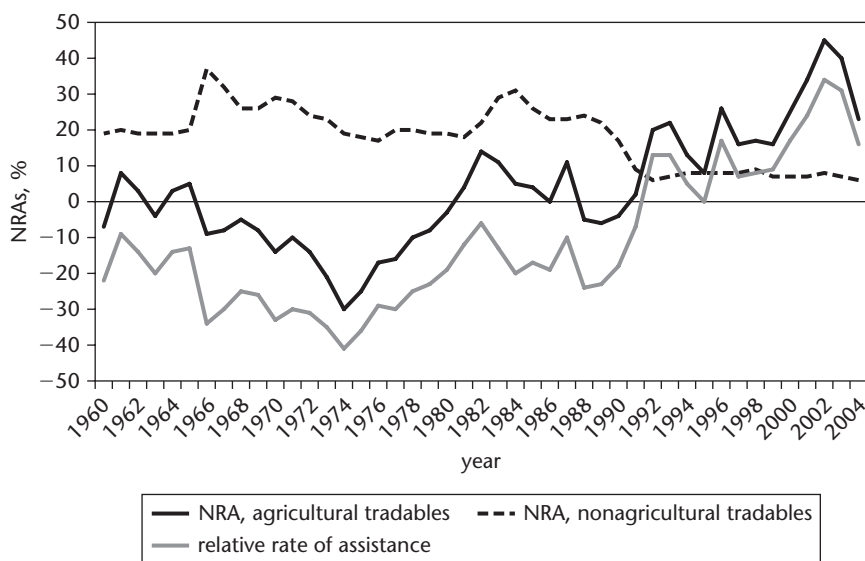
b. Including non-product-specific assistance.

c. The trade bias index = $(1 + NRA_{ag,x}/100) / (1 + NRA_{ag,m}/100) - 1$, where $NRA_{ag,x}$ and $NRA_{ag,m}$ are the average percentage NRAs for the exportable and import-competing parts of the agricultural sector.

d. Including product-specific input subsidies and non-product-specific assistance.

e. The relative rate of assistance = $100 * [(100 + NRA_{ag}^t) / (100 + NRA_{nonag}^t) - 1]$, where NRA_{ag}^t and NRA_{nonag}^t are the percentage NRAs for the tradables parts of the agricultural and nonagricultural sectors.

Figure 5.3. NRAs for All Agricultural and Nonagricultural Tradables and the RRA, Colombia, 1960–2004



Sources: Guterman 2007 and data compiled by the author.

Note: See table 5.4, note e, for an explanation of the relative rate of assistance.

The NRA for nonagricultural tradables is now below 10 percent (see Guterman 2007). This is illustrated in figure 5.3, which also indicates the relative rate of assistance (derived from the two NRAs, as described in table 5.4, note e) and the reduction in the average NRA for agricultural tradables. Relative to other sectors, the taxing of agriculture peaked at around 40 percent in the mid-1970s, when international prices were high, and averaged well over 20 percent before the 1980s. By the 1980s, the relative taxing of agriculture had fallen to around 17 percent, before becoming positive beginning in 1992.

The Political Economy of Agricultural Policies

This section aims to update analyses by García and Montes Llamas (1989) and Krueger, Schiff, and Valdés (1991), who studied the period up to 1982. A brief summary of that history is presented and then compared with subsequent developments.

Colombian agricultural policy during the 20th century had three stated primary goals: to resolve balance of payments problems through self-sufficiency in the production of food and nonfood agricultural commodities; to maintain

price stability; and, especially after the opening of the economy, to increase rural employment and reduce rural poverty.

1900 to 1950

Government agricultural policy during the first 25 years of the 1900s favored agricultural production because of the strong political power of landowners. The policy had three main elements: incentives to grow and export coffee (and, on occasion, tobacco, rubber, and cotton) through specific subsidies and through reductions in transportation costs; import substitution of wheat, rice, sugar, and oils and fats, mainly through tariff protection; and tariff exemptions for inputs such as fertilizer, machinery, tools, and barbed wire.

Because of the increasing importance of manufacturing, the government's emphasis gradually shifted toward policies to promote cheaper food, which led to a reduction in the tariffs on agricultural products through the so-called emergency law (Law 3) of 1926. As a result, food imports almost doubled between 1926 and 1928, and the domestic production of wheat, rice, sugar, and other import-competing agricultural products was undermined.

The negative effects of the Great Depression on the economy led to more significant government intervention and a substantial increase in protection. A 100 percent devaluation of the peso in 1931–32, as well as direct subsidies for producers, stimulated coffee production, which provided most of the country's foreign exchange. By the end of the 1930s, given the economic realities imposed by the prospects of a world war, the government set out the following objectives: the achievement of self-sufficiency in the production of food crops (corn, rice, sugar, and potatoes); the achievement of self-sufficiency in the production of the raw materials used in clothing manufacture (cotton, hides, and furs); and intensified production in tropical exports (coffee, cocoa, bananas, rubber, and others). These objectives, similar to those of the 1920s, were also supported by new funds for agricultural research, extension, credit, storage, and the creation of farmer associations. Quotas on the use of domestic import-competing crops were established to promote self-sufficiency, and price controls were introduced to achieve price stability. In addition, the Instituto Nacional de Abastecimiento (later transformed into IDEMA) was created in 1944 to facilitate food commodity exports and the internal distribution of imported commodities.

The early postwar period was characterized by rapid industrial growth (9.4 percent per year between 1945 and 1950), significant rural-urban migration, substantial monetary growth, and increases in imports, mainly of machinery and equipment. Agricultural production also increased rapidly. A rise in food prices and renewed access to world markets led the government to devise a system of

contracts between the public and the private sectors. These contracts included the concession of import quotas to industrial firms using imported agricultural raw materials as long as they also purchased a designated amount of domestic production at fixed prices, which were usually higher than the international price, and transferred a portion of their domestic crop purchases to the Instituto Nacional de Abastecimiento. The final product had to be sold at a government-designated price.

Import substitution, 1950 to 1966

The 1950–66 period was characterized by a strong effort to develop an industrial sector through import substitution. The design of economic policy and of agricultural policy in particular was influenced by the need to solve balance of payments problems and achieve self-sufficiency. The policy of import substitution in agricultural products persisted, and an attempt was made to promote agricultural exports through direct subsidies.

Importable agricultural products used to develop agroindustries based on the processing of products such as cereals, oilseeds, and cotton received strong protection because of agreements between large landowners and the emergent industrial bourgeoisie (Jaramillo 2002).

The overvaluation of the peso during this period reduced the relative price of imported inputs, mainly tractors. This caused a shift from cattle raising to crop production that led, in various regions, to the expansion of the agricultural frontier. A new system of subsidized credit was implemented under Law 26 of 1957, which obliged banks to allocate about 15 percent of their loans to agricultural enterprises at below market rates of interest. Government investment in agricultural research and extension was strengthened as well. This period ended with a current account crisis caused by a fall in foreign exchange earnings from coffee exports, an increase in imports, and an overvaluation of the peso that the gains from the devaluation of the exchange rate in 1964 were insufficient to reverse.

Export promotion, 1967 to 1974

In 1967, a major effort to rationalize macroeconomic policy management was undertaken. It was evident by then that the strategy of import substitution was exhausted, and the government began to apply a freer trade policy. Decree Law 444 of March 1967 established a crawling peg system that allowed the peso to depreciate substantially. A new export subsidy in the form of a tax credit certificate set at 15 percent was created to promote nontraditional exports (other than coffee, oil, and cattle hides). An export promotion fund, financed by a 1.5 percent

import tax, was instituted. All these measures favored agriculture and areas under cultivation, and the production of the main commodities increased substantially.

A leading policy issue during this period was the relationship between the trade in agricultural products and the impact of this trade on inflation. Exports of food products such as rice and beef were subjected to quotas and other restrictions to ensure that more of the products remained in the country, and price controls were placed on other basic items, such as milk. Imported wheat, meanwhile, was sold at a loss. In short, food policy was consumer-oriented. Although the new macroeconomic policies were more favorable to agricultural development, specific agricultural policies changed frequently. The government of 1966–70, dominated by liberals and insisting on distinctions between *latifundios* (large landholdings) and *minifundios* (small landholdings), applied the agrarian reform law of 1961 vigorously and introduced changes to the law.

The 1970–74 conservative government returned to a policy of promoting agricultural productivity through subsidized credit and expanding the agricultural frontier through fiscal incentives. It revised the agrarian reform law and made it more favorable for landowners. Under the subsequent liberal government, the fiscal incentives for land expansion were abolished, and the credit subsidy was weakened.

The coffee boom, 1975 to 1981

In this period, the world price of coffee increased substantially, and Colombia's export earnings multiplied, favoring liberalization. This led to a substantial accumulation of international reserves, an increase in the rate of monetary expansion, and an acceleration in inflation (García and Montes Llamas 1988). To ease inflationary pressures, restrictions were placed on the allocation of credit to the private sector, and imports were allowed to increase. Public investment was severely curtailed, including investment in agriculture. Export subsidies were reduced. As a result of these developments, interest rates climbed, and the real exchange rate and relative agricultural prices declined. These developments, in combination with rising real wages and land prices, squeezed profits in agriculture.

Crisis and adjustment, 1982 to 1989

This period began with a current account crisis, and greater restrictions were imposed on imports in an attempt to reactivate the economy. Some commodities that had been freely imported were shifted to either the prior licensing classification or to the prohibited import list. Import tariffs were also raised, and an annual import budget was drawn up by the monetary authority. A major devaluation

occurred; the adjustment in the exchange rate between October 1984 and June 1986 represented 84 percent, which led to an increase in the real exchange rate of 12.5 percent. As a result, imports declined, and exports grew rapidly, mainly from the mining and industrial sectors. Agricultural exports began to recover in 1983 and were helped by a mini coffee boom in 1986. During this period, the production of tradable crops expanded rapidly, thanks to high international prices and the devaluation of the real exchange rate.

Trade liberalization and structural change, 1990 to 1994

In 1990, the Gaviria administration started an economy-wide program of trade liberalization, accompanied by the deregulation of foreign exchange and labor markets. Although the program was initially expected to be gradual, the high levels of protection and the uncertainty caused by the slowness of the implementation of the program compelled the government to accelerate the process, despite the opposition of various industrial and agricultural pressure groups.

By the end of 1991, the trade liberalization process had been completed. Quantitative trade restrictions had been abolished, import tariffs reduced, and five levels of ad valorem tariffs established: 0 and 5 percent for raw materials and intermediate and capital goods not produced domestically, 10 and 15 percent for intermediate goods produced locally, and 20 percent for consumption goods.

The role of IDEMA, the state marketing agency that had a monopoly over grain imports, was reduced and limited to poor isolated areas where distance from markets, lack of infrastructure, and political unrest deterred private sector intervention. The producer price support based on average production costs was replaced by a system of minimum guaranteed prices, taking as a benchmark the floor price of the band (or world price) adjusted for port, handling, drying, and storage costs.

Although a basic aim of the reform was to provide a neutral incentive structure for private decision makers by applying trade measures in agriculture and other sectors roughly to the same degree, this goal was not completely achieved. Powerful farm interest groups, arguing against the sharp decline in profits and the collapse in the agricultural sector (mainly grains and oilseeds) because of the greater openness of the economy, pressured the government to adopt various agricultural policy interventions.

Thus, in June 1991, to stabilize producer incomes in the face of price fluctuations in world markets, the government introduced a price band system for six agricultural commodities, their substitutes, and derivatives. It covered a total of 112 products.⁴ Despite the stated purpose of this policy, the way the price bands were constructed to fix the floor and ceiling prices served as a protective device,

providing excessive protection for derivative products. In addition, a number of agricultural commodities were still protected because of the old licensing system, and coffee export taxes were maintained.

The liberalization strategy also included customs reform with the aim of simplifying the regulatory framework and reducing the costs associated with international trade. Ports were privatized, and tariffs and handling costs declined.

In 1992, agricultural production fell sharply, causing a crisis and affecting incomes among large farms. Large farmers pressed the government for reform, arguing that the openness of the economy was the prime reason for the collapse in incomes, the losses in rural jobs, and the increase in poverty, social unrest, violence, and insecurity in rural areas.⁵ Several measures were introduced to compensate for the reduction in rural incomes, reversing the structural change initiative. The measures included debt refinancing at preferential interest rates, increased intervention by IDEMA in the marketing of cereals and oilseeds, two new price bands, export subsidies, increased government expenditures, and a suspension on imports of selected products.

The *ley agraria* (Law 101 of 1993) allowed credit subsidies to small farmers, but it also created a system of capital subsidies to cover up to 40 percent of the total cost of all private investment in irrigation and drainage. This tool, called the rural capitalization incentive, was also expanded to cover the establishment and maintenance of perennial crops that benefited large farmers who did not qualify for credit subsidies.

Law 160 of 1994 introduced market-based land reform by providing a grant to poor farmers equal to 70 percent of the cost of the purchase of a family farm. The grant element was needed to compensate for the factors tending to drive the market price of land above the capitalized value of farm profits. This law was intended to promote cooperatives and alliances among small farmers ready to buy land for crop production. Large capital inflows during this period caused a rapid appreciation of the peso, and this contributed to a rapid increase in imports, while exports did not increase as expected.

During this period, trade agreements were reached, including with the Andean Group (a free trade area created in 1992), the Caribbean Community, Chile, the G3 (with Mexico and the República Bolivariana de Venezuela), and the United States under a program of cooperation and preferential tariffs for selected imports from Andean countries (the Andean Trade Preference Act).

Crisis and adjustment, 1995 to 1999

During 1995–99, the liberalization process was maintained, but was subjected to adjustments according to the performance of macroeconomic variables and the

growth of the economy. A new government was inaugurated in August 1994, and, within the framework of existing laws, it introduced several mechanisms to counteract the liberalization reforms in the wake of the poor performance of the economy, particularly the agricultural sector. The price band system became the model for the Andean Community (the Andean price band system) in 1995, and the system was expanded to include five new bands, for a total of 13 bands covering 154 products. This mechanism played an important role in stabilizing and protecting agriculture.

Under pressure from farmer associations, procurement agreements (*convenios de absorción*) were introduced for grains and oils in which agroindustries exercise oligopsonic power. The system was based on negotiations among the government, farmers, and industrialists on an agreement about the prices paid to farmers and the volume of production absorbed by buyers. In exchange, agroindustrialists were allowed to import under a preferential import tariff approved by the Ministry of Agriculture. The mechanism became a quantitative import restriction because imports were allowed only if domestic production had been completely absorbed by processors.

In 1995, direct and storage subsidies for the producers of selected sensitive products were introduced; import quotas for certain cereals were established; and the level of the tax rebate certificate was increased. Competitive agreements between the government and agroindustrialists were promoted to coordinate the actions of the producers and manufacturers of selected agricultural products (cotton, rice, sorghum, milk, and oilseeds). In 1995, the government applied safeguards to reduce income fluctuations during the crisis. These involved temporary import surcharges added to existing tariffs on the grounds that imports were threatening domestic production because of a sharp decline in international prices.

Agricultural funds already existed for selected products (coffee, cotton, and cocoa), and a large number of additional funds were created during this period. Authorized and supervised by the Ministry of Agriculture, the funds were organized and administered by producer associations and served various purposes. Promotion funds supported and promoted research and development programs, technology transfers, and marketing initiatives. They were financed through the direct contributions of producers. Price stabilization funds regulated marketing according to a unique domestic producer price, whereby markets with higher prices subsidized markets with lower prices.

Despite the implementation of these policies, farmers complained about poor policy outcomes because the production of a large number of agricultural products was falling, and profits were declining, partly as a result of the appreciation in the exchange rate. In addition, the land reform and job creation objectives so

widely promoted by the government had showed only limited success. The period ended in 1999 with negative growth (–3.8 percent) in the gross domestic product—this had never before been seen in the country—and an important devaluation in the exchange rate.

Stabilization and growth, 2000 to 2005

This period is characterized by continuity in the application of past policies and instruments. Despite certain policy adjustments, the level of protection was not altered. The devaluation of the peso continued during 2000, which had a direct impact on the production and profitability of tradables. However, the nominal exchange rate decreased by 19 percent between 2003 and 2005, and, by the end of the period, the peso was overvalued. Productive chains and competitive agreements between farmers and processors were strengthened; new sources of credit became available; and the scope of the rural capitalization incentive was widened. Special attention was devoted to the promotion of producer cooperatives and alliances between small farmers for the production of perennial crops considered labor intensive. Palm oil was one of the most favored products because of optimistic expectations about the future of biodiesel production.

Procurement agreements were abolished in 2003 under World Trade Organization regulations, but, for selected products, they were soon replaced by a new instrument, the public mechanism for the administration of agricultural contingencies. Under this instrument, the Ministry of Agriculture announces the contingent or import volume of goods required to meet domestic demand. Rights to supply this volume are auctioned at the Agricultural Stock Exchange (Bolsa Nacional Agropecuaria) among processors, traders, and retailers wishing to import. The imports are subject to a preferential import tariff. Because the imports are restricted and because the processors are required to absorb domestic production, the protection for producers is maintained through the policy.

Since 2001, the government has provided direct support for coffee growers in the form of a price complement (see elsewhere above). The amount of the price complement is set according to trends in the exchange rate and the international coffee price, and it is subject to the fiscal needs of the central government.

Since 2002, in addition to the Andean price band system and ad valorem import tariffs, the government has implemented a series of measures to stimulate agricultural production and support farmers. Although minimum guaranteed prices were abolished except for cotton, the government created a program of price protection for maize, sorghum, and soybeans in 2004. Under this program, the government subsidizes up to 80 percent of the cost of the purchase of instruments to protect farmers from fluctuations in the exchange rate and international prices. The policy

guarantees a minimum price to producers. The subsidy is also available for the buyers of commodities if the relevant international prices increase above a ceiling.

In a similar way, export producers also receive an incentive to purchase instruments that protect farmers from overvaluation of the peso. The incentive is equivalent to 80 percent of the purchase cost of the instruments offered by the Agricultural Stock Exchange; funds are allocated among products according to the share of each product in total exports. In addition, the producers of bananas and flowers for external markets benefit from government sanitary incentives through which an annual amount of public funds is allocated for pest control. Since 2004, new farms producing selected perennial crops have been exempt from the income tax for 14 years. These new assistance instruments, especially the price stabilization fund for sugar, palm oil, and milk and the direct price support for coffee growers and exporters (a sector that had been highly taxed), mean that producers have been enjoying positive NRAs in recent years.

This most-recent period has been important, too, for the consolidation of trade agreements. In 2005, the trade agreement between the Andean Community and the Southern Common Market came into force, and, in February 2006, a free trade agreement with the United States was signed, pending approval by congress in each country. The negotiations for the agreement with the United States were under pressure from farmer associations demanding more protection for their products in market access, import tariffs, safeguards, and so on. As a result, high import tariffs and long transitions to trade deregulation were established for products such as rice, sugar, maize, and poultry meat. In addition, the government is preparing the safe agricultural earnings package (*agricultura ingreso seguro*) of incentives for maize, sorghum, soybeans, wheat, beans, and rice.

Conclusions

The political economy of government intervention in the agricultural sector may be understood in Colombia according to two significant periods. During the period of import substitution (1950–89), farm pressure groups sought to reduce production costs in inputs and credit, raise government investment in infrastructure, and obtain protection from fluctuations in international prices. This led to a dependency on institutional intervention rather than on the farmers' own efforts to improve technology and increase productivity.

After the end of import substitution and the onset of the period of trade liberalization, the pressure from farmers focused on trade policy and the protective trade mechanisms still available under the new trade agreements. In general, the measures adopted after trade liberalization have protected farmers and slowed the integration of producers into world markets. In a majority of cases, as farm

interest groups have become more powerful, they have also become more isolated from changes in world markets (in sugar and rice, for example). High levels of protection have also been evident if products are sensitive for consumers or producers (such as maize) or if the interests of farmers and processors coincide, especially if international markets are subject to strong price fluctuations.

The Andean price band system that was introduced to foster stabilization also provides important protections. According to recent estimates (Garay Salamanca et al. 2005), the assistance effect of the stabilization price band during 1995–2002 was positive, except for poultry meat in some instances. It was important for products such as sugar, rice, and maize.

One of the objectives of trade liberalization was to promote the integration of domestic and international markets. We might therefore expect the openness of the economy to have increased the transmission of international prices to domestic producers. According to Jaramillo (2002) and Baffes and Gardner (2003), wheat, cotton, and cocoa have shown high integration with world markets since 1970, but there has been no change following the trade reforms of 1991. The protection measures introduced for cotton when it became an importable product have failed to increase production. In the same way, other products associated with powerful interest groups (sugar, rice, bananas, coffee, and palm oil) have not shown changes in the level of price transmission. The lack of market integration among agricultural products following liberalization has been caused by government interventions through price bands, procurement agreements, incentives, and import restrictions. In general terms, it may be concluded that the agricultural sector has been subjected to less trade reform than other sectors during the liberalization undertaken beginning in the early 1990s.

Within the agricultural sector, the development and growth of the rural sector have favored large farmers, and landownership continues to be highly concentrated. Few of the benefits of agricultural reform have reached small farmers. Rural employment has grown only slowly, and the incidence of poverty in rural areas is well above that in urban areas. Thus, the land reform initiatives are also not achieving their goal, which is to reduce poverty and inequality.

Notes

1. En pergamino coffee is subjected to a simple process at the farm level (cleaning, selecting, and drying) to obtain green coffee, which is sold to the National Coffee Federation and to wholesalers and is traded internationally.

2. We should also calculate the subsidy on outstanding credit, but these data are not available. Thus, this subsidy may be underestimated because the average outstanding credit was generally larger than the annual flow of credit.

3. Non-product-specific assistance includes expenditures on research and extension, marketing and promotion, the rural capitalization incentive, rural development, rural housing, support for displaced persons, and land reform.

4. The six agricultural products subject to the price band system are known as markers, while the substitutes and processed versions of the marker products are known as linked products. The tariffs applied to the linked products are based on the tariffs on the corresponding marker products.

5. Several studies have demonstrated that the root of the crisis was not trade liberalization, but the decline in world prices, a severe drought caused by El Niño, and the overvaluation of the peso. See Argüello (2000), Jaramillo (2002), Jaramillo and Junguito (1993), and Quiroz (2000).

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DOMINICAN REPUBLIC

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The Dominican Republic ranked among the more rapidly growing economies in Latin America and the Caribbean in the 1990s. Early in that decade, macroeconomic stabilization had been accompanied by trade liberalization, reforms in pricing and tax policies and in the financial system, and the privatization of public enterprises. These changes had generated the conditions for the rapid economic growth. Per capita income increased at an average annual 4.1 percent during 1991–2000 and 3.5 percent in 2001–02. Thus, it more than doubled over the period, reaching US\$3,250 in 2005.

In addition to preferential access to the U.S. market (conferred by the Caribbean Basin Initiative in 1984), the Dominican Republic enjoyed relatively open access to international markets for exports, particularly in agricultural products, because it had become a party to the Lomé Convention in 1992. Preferential access to the U.S. market is being consolidated through the implementation of the Dominican Republic–Central America Free Trade Agreement that went into effect between the Central American countries and the United States in March 2007.

Poverty remains substantial, and unemployment is a major issue. The Dominican Republic has been an underperformer in terms of progress in achieving poverty reduction and improvement in social indicators, especially in light of the high level of economic growth. Social indicators place the Dominican Republic below other countries at similar per capita incomes. In late 2002 to mid-2003, the country faced a severe economic crisis caused by major bank failures and domestic policy weaknesses. This brought about a significant rise in poverty as real incomes eroded dramatically among the population, especially the poorest.

The economic structure of the Dominican Republic has been transformed over the last 50 years. From mainly farming, the economy has shifted to services and manufacturing as the main sources of employment, foreign exchange, and income earnings. The country is endowed with a diverse topography and generally abundant rainfall, allowing year-round agricultural production. Despite this abundant potential, agricultural production has grown slowly during the last 50 years. The agricultural sector lost importance over the period because of an array of government interventions that introduced price distortions and reduced the sector's competitiveness.

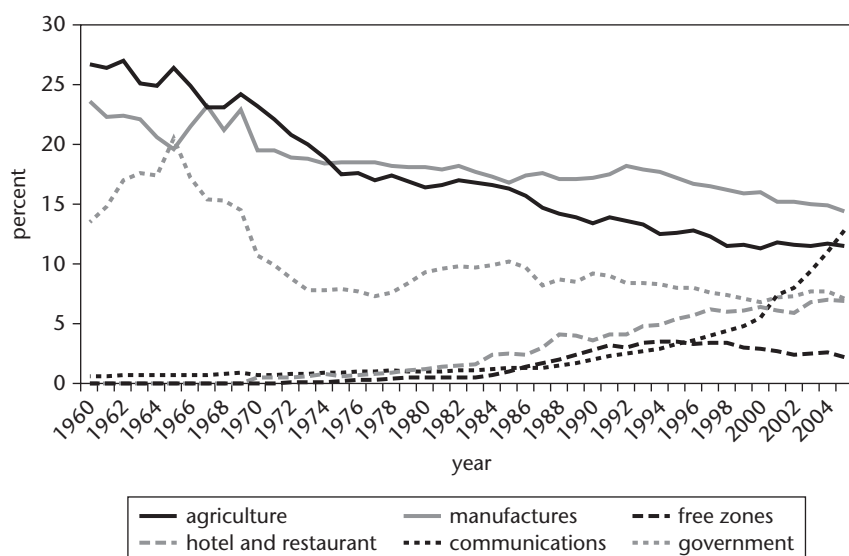
This chapter reports on new estimates of indicators of direct and indirect assistance to or taxation of the agricultural sector in the Dominican Republic. The aim is to assess the performance of the sector in light of the economic reforms and the new wave of trade liberalization. First, we provide a general overview of economic reform and the performance of the agricultural sector in the Dominican Republic. We then examine government interventions through the macro and sectoral policies that influenced agriculture activities. For several agricultural commodities, we present a quantitative assessment of the effects of trade and price interventions on agricultural incentives during the past 50 years. We use the approach of Anderson et al. (2008) (see appendix A). This information is complemented by measures of nonprice transfers, through government expenditures, to and from agricultural producers. In the final section, policy issues are identified that are relevant for an ongoing reform agenda in the agricultural sector in the Dominican Republic.

Growth, Structural Change, and Policy Development

The Dominican Republic comprises 4.8 million hectares on the island of Hispaniola. It is bordered on the west by Haiti. There is great variation in topography and climatic influences, and land use differs from region to region. The country has ample natural resources upon which to build a dynamic agricultural sector: 13 percent of the land is considered suitable for intensive cropping, while 32 percent is considered suitable for pasture or less-intensive cropping. Rainfall is adequate, but unevenly distributed; several areas rely on irrigation for agricultural production.

During the 1950s and 1960s, farming activity represented more than 27 percent of gross domestic product (GDP) (Central Bank Statistics Database 2007). By 1970, the contribution of agriculture in GDP was 23 percent, and, by 2000–04, it had fallen to 11.7 percent (figure 6.1).

Some of the decline was caused by poor performance among agricultural activities. In the 1970s, the sector's growth was almost half the rate in the 1960s,

Figure 6.1. GDP Shares by Economic Sector, Dominican Republic, 1960–2004

Sources: Author compilation; Central Bank Statistics Database 2007.

Table 6.1. Real GDP Growth, Dominican Republic, 1971–2005
(average percent per year)

Year	Crops	Livestock	All agriculture	All sectors
1971–80	2.6	5.0	3.5	7.2
1981–90	–0.8	2.1	0.4	2.4
1991–2000	2.6	5.9	4.2	6.0
2001–05 ^a	0.1	5.2	3.7	3.5
1970–2005	1.3	4.5	2.9	5.0

Sources: Author compilation; Central Bank Statistics Database 2007.

a. Preliminary estimates.

and, in the 1980s, it was close to zero. Agricultural growth recovered somewhat in the 1990s, particularly because of significant expansion in poultry and pork production. And, in the first half of the present decade, it has been more rapid than the growth in the rest of the economy (table 6.1).

The contraction of the share of the farming sector in GDP has been most remarkable in the case of crop activities. Over the past two decades, the trends include a reduction in the share of traditional export crops in total agricultural production; an increase in the share of the production of rice, fruits, vegetables,

and others crops (mainly plantains, bananas, palm fruits, and bulbs and roots); and the consolidation of poultry production as the most dynamic of all livestock activities.

Domestic agricultural markets were affected by price controls, duties, nontrade barriers, exchange rate misalignments, and noncompetitive market structures, especially in government agencies. The government established a policy of subsidizing urban consumers at the expense of local food producers. The heavy intervention brought about a significant distortion in relative prices and, as a consequence, a resource misallocation in the agricultural sector and in the economy as a whole. Investment in agriculture greatly decreased, which adversely affected crop production, especially for export.

Along with the reduction in the farming sector's share of GDP, there has been a reduction in the share of the economically active population in farming. In 2006, 15 percent of the economically active population was working in the farming sector, compared with 55 percent in 1970 (Central Bank Statistics Database 2007). The share of the economically active population living in rural areas averaged 48 percent in the 1980s, but, by 2006, it had shrunk to 26 percent.

The macroeconomic context

Since 1950, the Dominican Republic has undergone various growth cycles. Real GDP grew by 6.5 percent per year in 1950–58, but the growth then slowed under the pressures of political conflict and civil war. After 1966, a favorable external environment and political stability led to an accelerated growth rate over the next 10 years. Government policy actively promoted investment through tax and tariff concessions to the private sector, which led to rising investment in import-substituting industries, construction, and selected export activities. These policies were initially effective in promoting private investment, but the impact of the tax concessions soon began to fade when public investment and other resources were channeled to sectors that were not internationally competitive (World Bank 1987).

Buoyed by expanding world trade and the high prices for traditional agricultural and mining exports, the economy experienced rapid growth during 1968–74. GDP went up at an average annual rate of 11 percent (Development Associates 1985). Rising world sugar and coffee prices shielded the domestic economy from the drastic 1974 oil price increase, and, in 1974–79, GDP grew an average 5 percent per year.

A sharp increase in oil prices in 1979 and a drop in world sugar prices in 1981 generated significant trade and fiscal imbalances. A factor contributing to the government's fiscal deficit was the losses incurred by public sector enterprises.

Price controls, inappropriate and unrealistic exchange rates, import substitution, unfavorable export trade policies, and other structural inefficiencies exacerbated the situation (Development Associates 1985). By 1984, the parallel market exchange rate premium had increased briefly from 20 percent to 200 percent; real GDP growth had declined to less than 2 percent; and the official exchange rate had devalued. The subsequent elimination of the dual exchange rate and temporary surcharges, combined with food price adjustments in 1984, removed many of the pricing disincentives (World Bank 1987).

An ambitious public investment program that was put in place by a new government administration in the mid-1980s sought to restore economic growth. Instead, it led to high inflation and depreciation in the national currency in the late 1980s, which was the prelude to one of the worst economic crises experienced by the country in the 20th century. In 1990, GDP fell by 6 percent, the consolidated fiscal deficit reached 5 percent of GDP, the inflation rate was 79 percent, and official and parallel market exchange rates were depreciated by 60 and 36 percent, respectively (Lizardo and Los Santos 2003).

A tight monetary policy that produced a drastic reduction in internal credit, along with greater control over the official exchange rate, fostered a significant drop in the inflation rate beginning in 1992. Thereafter, the inflation rate remained below two digits except in 1994 and 2002 (World Bank and IDB 2005).

In late 2002 to mid-2003, the country entered into a severe economic crisis in the face of major bank failures and domestic policy weaknesses. Currency depreciation, spiraling inflation, electricity blackouts, and deterioration in basic services caused a significant rise in poverty. The country sought to cope with dramatically eroded real incomes. Economic stability began to return in 2004. Changes in the external environment, particularly high oil prices and the free trade agreement with the United States, represent mid- to long-term challenges and opportunities.

Trade and price policies

The reform in the country's agricultural price and trade policies has been taking place against a backdrop of significant declines in the profitability of agriculture. Before 1990, the trade regime was characterized by high tariffs. Policy instruments such as levies, quotas licenses, and import and export prohibitions were also common. These were based on laws, presidential decrees, administrative measures, and rules and regulations. In most cases, important administrative measures overruled current laws. Trade policies taxed agricultural exports heavily (both explicitly and through the exchange rate system), while, through a network of controls and subsidies, pricing policy maintained low urban consumer prices.

In the first half of the 1990s and in early 2000, the share of international trade taxes in total tax revenues was high not only by regional standards, but also globally. The share of total tax revenues coming from international trade taxes was 46 percent in 1990–94, but, by 2003–05, had fallen to 25 percent (Central Bank Statistics Database 2007). In 2004 and 2005, government revenues generated through import taxes rose by 29 and 24 percent, respectively (Central Bank Statistics Database 2007). This included a foreign exchange surcharge on imports, which was minor in the 1990s, but was raised in 2003 and again in 2005 when it accounted for 13 percent of total fiscal revenues on imports. The surcharge was eliminated in 2006.¹

Trade reform was initiated in 1990, and the country made additional commitments to liberalization in 1994 at the conclusion of the Uruguay Round and took steps toward tariffication by eliminating quantitative restrictions and removing export taxes and quotas. The new regime set nine tariff rates between 0 and 35 percent (Los Santos 2001).

The government introduced a *rectificación técnica* (technical rectification) before the World Trade Organization for eight farm commodities it considered sensitive. They are poultry parts, powdered milk, red beans, rice, garlic, onions, corn, and refined sugar. For these commodities, the country established tariff rate quotas and set different bound tariff rates. The technical rectification as proposed was to last 10 years (1995–2004), although it did not enter into effect until 1999.

There have been numerous reductions in import duties since 1990. In 1995, import surcharges were removed, which lowered average duties on imports. In June 1997, the government enacted a law that eliminated import tariffs on most agricultural inputs and machinery.

After the trade reform of 1990, the average tariff on agricultural products was 23 percent, while the average tariffs on the capital goods and inputs used in agriculture were initially 6 and 8 percent, respectively. They were reduced again in 1997 by two percentage points each. The trade reform of 2001 reduced the tariffs on all three categories of goods.

Because of the implementation of the Dominican Republic–Central America Free Trade Agreement between the Central American countries and the United States, the tariffs on goods imported from member states are to be reduced and eventually eliminated. The phaseout period varies depending on the nature of the goods. In the case of sensitive agricultural commodities such as rice, poultry, and milk, the phaseout period is 20 years, and tariff rate quotas and special safeguards have been established. A summary of the negotiations, particularly those relative to market access, is presented in Los Santos and Peña (2007).

Agriculture performance and agricultural policies

Agricultural production has not shown great dynamism in the Dominican Republic. Agricultural GDP grew at 2.9 percent per year over the last 35 years, while the economy as a whole grew at 5 percent per year (table 6.1). Agricultural imports have increased greatly, while exports have been stagnant, especially in traditional commodities such as sugar, tobacco and cigars, cocoa, and coffee. This has been partly caused by unfavorable external market conditions, but it has also been caused by an array of government interventions that have prevented agricultural development.

Agricultural commodities that did experience increased production over the period were assisted by the government. Rice production, for example, increased significantly from 1970 to 2004. This is because the government had a goal of self-sufficiency in basic staple foods, especially rice, and most of the government subsidies and financing derived through the Banco Agrícola—a public bank specialized in financing agricultural activities—were devoted to rice production.

Livestock activities show mixed results. Poultry production increased and had the highest growth rate in the sector during the 1990s. Pork production also experienced significant growth after 1980, when the entire pig population had to be eliminated because of serious evidence of the presence of swine fever. On the other hand, dairy production stagnated during the period. Some domestic policies, such as price controls and subsidized imports, had negative impacts on domestic milk production.

An analysis of the evolution of producer prices indicates that, between 1970 and 2005, all major agricultural producer prices declined in real terms. On average, the price decline was larger for importables than for exportables, which led to increased political pressure by farmers for protection for import-competing subsectors.

Agricultural trade

Until the mid-1980s, traditional agroindustrial goods accounted for more than 50 percent of total exports. However, by the late 1990s, this had changed, and processing zone exports represented more than 80 percent of total exports. In the 1990s, traditional agroindustrial exports declined at an average rate of 5 percent per year, while nontraditional exports grew at an annual 12 percent, increasing their share in total exports (excluding processing zone exports) from 12 percent in 1990 to 27 percent in 2001 (Lizardo and Los Santos 2003).

Sugar is the main agricultural export commodity. The country enjoys preferential access to the U.S. market, and it was the main beneficiary of a quota granted to

Latin American countries by the United States. Prices under the quota regime are twice as high as world market prices. Exports of sugar to the world market by the Dominican Republic are insignificant in global terms. In 2005, exports totaled US\$74 million, half the value of exports in 1997, the year following the sugar mill privatizations in the Dominican Republic. After the privatization, sugarcane production dropped sharply, and some of the sugarcane fields were used for tourist resorts or were shifted to other agricultural activities.

Coffee and tobacco are important agricultural export commodities. The Dominican Republic exports tobacco to Spain, although these exports have been declining because of the new regulations in force since Spain joined the European Union. Nonetheless, the Dominican Republic has also been exporting manufactured tobacco and has become the world leader in exports of cigars. In 2004, exports of tobacco and manufactures accounted for US\$218 million. Coffee export earnings have declined significantly in the last decade because of a reduction by over 50 percent in international prices, a hurricane that struck the country in 1998, and the spread of the coffee berry borer, a parasite that harms coffee plantations. Export earnings dropped from US\$68 million in 1997 to US\$8 million in 2005. However, the country has been successful in exporting organic coffee to the European market. Most of the other private investment in agriculture has shifted to the production of nontraditional export crops such as bananas, citrus, mangos, avocados, palm oil, and winter vegetables.

The main market for the exports is the United States, which, in recent years, has absorbed nearly 50 percent of the country's total exports. The other main markets are the European Union (17 percent), Puerto Rico (8 percent), and Japan and the Republic of Korea (11 percent). The country benefits from preferential U.S. market access through the Caribbean Basin Initiative and a preferential sugar market scheme of the United States.

Some production enjoys preferential access to European Union markets. By virtue of the Cotonou Agreement, exports of agricultural produce, especially bananas, may enter the European Union free of duty. Banana production was significant in the 1990s because of the preferential access to the European Union. Banana exports rose from 4,000 tons in 1990 to 92,000 tons in 1992 and 134,000 tons in 2004, valued at US\$36 million.

The country must import significant amounts of foodstuffs to satisfy the domestic demand for food and animal feed. In 1995, agricultural imports were valued at US\$536 million, and, 10 years later, they were valued at US\$826 million. The main imported foodstuffs are wheat, corn, dairy products, sorghum, milk, cooking oil, rice, and red beans. Most agricultural imports come from the United States. During 1995–2004, the average share of agricultural imports in total imports was 18 percent (Los Santos and Peña 2007).

Credit policy

As a percentage of agricultural GDP, the resources devoted to the agricultural sector by the banking system have been diminishing since 1990. Starting in June 1993, the government adopted new banking regulations. The objective was to increase regulatory supervision over the banking sector so as to meet international standards and improve transparency, especially in prudential regulation, accounting, and the disclosure of information on financial institutions.

The reform affected agricultural loans in two ways. First, interest rates skyrocketed. Second, because of new norms, loans were classed according to the payment record and repayment capacity of the debtor and the quality of the collateral backing the loan. Commercial banks became more reluctant to offer credit for agricultural activities because they had to make higher provisions (a higher share of the outstanding balance of loans) available to ensure against the high default risk associated with these loans. Most agricultural loans were classed as significant risk or high risk, which required provisions of 20 and 40 percent, respectively.

A substantial proportion of agricultural business financing is provided through moneylenders because moneylenders have fewer prerequisites, and their credit is readily available. However, there are no assessments of the amount of money channeled to agricultural business through this outlet because moneylenders are not included in the formal financial system. Some economists estimate that around 40 percent of agricultural business financing is supplied by moneylenders. The interest rate charged by moneylenders is as high as 20 percent a month.

The government has provided subsidized loans through Banco Agrícola and the Department of Project Development and Finance.² The subsidized credit is used to help small and medium farmers. It accounts for less than 20 percent of the total financing in agricultural activities. Rice is the major beneficiary of loans from the public banking system, followed by cattle, poultry, the purchase of seeds, and, to a lesser extent, the production of garlic, plantains, potatoes, and onions. In 2004, financing for rice represented 60 percent of the total financing provided by the Banco Agrícola, and around one-third of this was taken up by land reform among rice producers (Banco Agrícola 2005). Animal production accounted for another 15 percent of total financing in 2004.

Government Interventions in the Agricultural Sector

The major instruments used by the government to support the agricultural sector have been border protection (though at a decreasing rate), public investment, subsidized and directed credit, price supports, and the provision of agricultural services.

Foreign trade measures

The trade regime has involved an array of discretionary measures aimed at achieving certain policy objectives. Legislation on export promotion has been erratic. Until recently, important agricultural commodities were subject to export taxes. This was the case of sugar, coffee, cocoa, and tobacco during the 1980s and for part of the 1990s. Until 2003, exporters of traditional agricultural products (sugar, cocoa, tobacco, and coffee) had to surrender their foreign exchange to the Central Bank.

In June 1995, the government eliminated the exchange rate tax on imports. This levy had been calculated on a cost, insurance, and freight value basis. An additional reduction in import tariff levels occurred in 1997 when tariffs were eliminated on machinery, other equipment, and inputs used by the agricultural sector. In 2001, the tariffs on final agricultural goods that had not been included in the *rectificación técnica* were reduced to a maximum of 20 percent, but tariffs were later increased to 40 percent for a select group of animal products.

In 1998, all nontariff measures established by decree or administrative procedure were eliminated, but those established by law remained in place. In some cases, laws authorized public institutions to control prices and intervene in agri-food markets. Currently, licenses are needed to import garlic, milk, onions, pork, potatoes, poultry, red beans, rice, sugar, and tomato paste. Sugar may only be imported through the quota mechanism negotiated under the World Trade Organization agreement. In the case of garlic, onions, poultry, red beans, and rice, an internal bidding mechanism is used to allocate import licenses among producers, traditional importers, and wholesalers. There is still a great deal of discretion allowed for in the distribution of import licenses by the public and private bilateral commissions that allot the licenses, such as the Comisión Nacional Arrocería and the Instituto Azucarero Dominicano. The Ministry of Agriculture issues import phytosanitary permits for fruit, plants, flowers, and vegetables.

Domestic market interventions

During the 1970s and 1980s, the complex system of price controls and consumer subsidies was based on four mechanisms: low official foreign exchange rates for food imports, subsidized foreign credits for food imports, financial subsidies to cover food trading losses by the state monopoly, and internal cross-subsidies among products (World Bank 1987). The distortions induced by market price interventions in the agricultural sector have decreased since the mid-1990s. The liberalization process has led to a sharp reduction in the role of the national marketing board (the Instituto Nacional de Estabilización de Precios).

Notwithstanding the reforms, there are substantial differences in the way importable and exportable crops are treated. One of the most powerful marketing intervention instruments is the Crop Warehousing Program (mainly used for rice, but sometimes also for beans and garlic). Through this program, producers may store their harvests in government or processor warehouses. The government covers the cost of storage (up to 70 percent of the value of a harvest). In 2006, the government devoted RD\$350 million to the program. Rice accounted for 85 percent of the total outlay. The system stabilizes the prices of importables and spreads domestic supplies across fat and lean periods. It thus favors the actors in the production chain at the expense of taxpayers and consumers (World Bank 2005a).

Price policies

Before the reforms of the early 1990s, the domestic marketing of agricultural products involved the national marketing board. The board established support prices for a wide variety of crops, such as rice, red beans, garlic, onions, and potatoes. This official marketing agency controlled the distribution of key staple products and regulated internal consumer and producer prices.

The deregulation of the domestic market was initiated in 1990 when the government eliminated price controls on several agricultural commodities. In 1991, the government also eliminated the consumer subsidy for wheat flour and sugar, as well as price controls on rice and poultry. From mid-1992 to mid-1997, the board reduced its level of intervention in the domestic marketing of agricultural commodities. Instead, its role became focused mainly on surveillance over selected staple foods such as tomato paste, sugar, rice, sorghum, and garlic.

Los Santos (2001) argues that the programs that existed prior to 1998 were not capable of fostering capacity development among farmers in product marketing. The programs have also been criticized for infrastructure that was insufficient to handle all the products covered, ineffective targeting on the poorest populations, and sustainability problems caused by fiscal constraints. In general, the programs generated false expectations about prices among farmers, some of whom were producing on marginal or fragile lands. They also tended to discourage a switch to more competitive products. In several instances, the national marketing board was not able to honor its debts with producers on time, which resulted in additional costs for producers.

The government still intervenes in a handful of crops such as rice, red beans, and garlic. In the case of rice, the government—through the National Rice Commission (composed of representatives of producers, rice mill owners, and the government)—recommends producer prices and determines the volume to be imported, if necessary. Similarly, the government provides price support

to producers of garlic and red beans by issuing import licenses to middlemen who buy local production at previously agreed prices.

Agricultural services

The Ministry of Agriculture once operated several public agroenterprises that provided subsidized seed, inputs, and mechanization assistance for farmers. The government supplied free seeds and subsidized water and credit. The Ministry of Agriculture continues to offer machinery services, though to a more limited extent.

Irrigation services are provided by the Instituto Nacional de Recursos Hidráulicos, which is responsible for the construction and operation of irrigation infrastructure. A flat irrigation fee per hectare is charged to water users based on the types of crops being cultivated (mainly rice), the farm size (smaller or larger than 10 hectares), and the estimated annual budget for the maintenance, operation, and conservation of the irrigation systems. The irrigation fee per hectare remained fixed from 1989 to 1997, after which it was modified. Several studies gauge the magnitude of the water subsidy received by farmers. Abt Associates and Agrofora (2002) estimate that, on average, only 30 percent of the cost is recovered from users. Whitaker (1999) noted that the level of subsidy per hectare and year differs among irrigation systems and ranges from 73 to 86 percent.

In the late 1990s, the authorities transferred more control, operation, and maintenance systems to water users (*junta de regantes*) to improve water administration. The country is also in the process of passing a new water law, which would establish a pricing scheme designed to promote more efficient water use.

Land policy

Land reform was undertaken in 1962 following the approval of the land reform law and the creation of the Dominican Agrarian Institute. The overall objectives were to reduce land concentration and make land more accessible to landless peasants. Since 1962, the government has gathered 638,000 hectares of land—equivalent to 25 percent of the total land suitable for agricultural activities—and distributed it among 95,250 landless peasants. Most of the land was either already government land (59 percent) or land bought by the government (30 percent). The other sources of land were donations and acquisition through the land quota law. The average distributed plot was 60 *tareas* (3.75 hectares), to be cropped individually or collectively.

The prevalence of provisional land titles prevents new farmers emerging from the land reform from participating in formal private credit markets. The titling

process in areas not involved in the land reform has also been costly and lengthy, which means there are still high transaction costs. The Program of Modernization of Land Jurisdiction, established in the late 1990s, is oriented to the modernization of the legal framework and the administrative procedures for land titling.

Public investment

Public expenditure on activities related to agriculture has been decreasing as a proportion of GDP. According to information in a consolidation of the agriculture budget and the rural public budget carried out by Gómez (2001), the share of the national budget devoted to agriculture and the rural sector fell from 15.5 percent in 1985 to 12.1 percent in 1995 and 11.3 percent in 2000.

The main activities sponsored by the public sector were irrigation programs, credit programs, land reform, and the promotion of production and marketing. A significant share of agriculture expenditure and rural public expenditure is oriented toward payments for personal services and other operating expenditures. During the 1990s, operating expenditures absorbed 51 percent of the total agricultural and rural budget, while real investment accounted for 38 percent (Gómez 2001). Government expenditures devoted to the provision of subsidies and other private goods accounted for two-thirds of the total, with only one-third going to public goods (López 2005; World Bank 2005b; World Bank and IDB 2005).

During the 1990s, the government executed several projects intended to foster rural development, increase food production, and preserve the natural resource base. These projects were focused on poor areas that were characterized by fragile environmental conditions and a lack of basic infrastructure. As part of a strategy to protect watersheds, an effort was made to train farmers in the adoption of sustainable agricultural practices, the construction and rehabilitation of irrigation infrastructure, the construction of sanitary facilities in rural dwellings, and the distribution of land titles to improve access to private financial resources.

Agricultural research received significant support after the establishment of the National Agriculture and Forest Research System (Sistema Nacional de Investigaciones Agropecuarias y Forestales) in 2000/01. This included the start-up of the Dominican Republic Agricultural Research Agency (Instituto Dominicano de Investigaciones Agropecuarias y Forestales) as the operational arm for policy on agricultural technology. It also included the creation of the National Council for Agricultural and Forestry Research (Consejo Nacional de Investigaciones Agropecuarias y Forestales) as a mixed public-private umbrella for the promotion of technology. Likewise, the Agriculture and Forestry Development Center was strengthened. The center is devoted to human capacity building. A competitive fund also operates through the National Council for Agricultural and Forestry

Research to carry out projects based on producer demand for the adoption of technologies. These institutions are almost entirely financed through budget resources, although the Dominican Republic Agricultural Research Agency receives small contributions from specialized international agencies, and the Agriculture and Forestry Development Center finances some of its services on its own behalf (World Bank 2005a, 2005b; World Bank and IDB 2005).

Estimating Direct and Indirect Distortions in Agricultural Incentives

The pattern of government interventions affecting farmer incentives in the Dominican Republic prior to the reforms was similar to that in other developing countries at the time. The interventions were described by Krueger, Schiff, and Valdés (1988) on the basis of three key elements: they encouraged the growth of nonfarm activities by establishing protection against imports that were competing with domestic production; they overvalued the exchange rate through exchange control regimes and import licensing mechanisms; and they suppressed producer prices for agricultural commodities through government procurement policies and export restrictions and taxation.

Schiff and Valdés (1992) summarize their project's empirical estimates of the income transfers involved in direct and indirect interventions in agricultural markets in the Dominican Republic. Their direct intervention estimate equals the percentage by which domestic producer prices diverge from the prices that would have prevailed in a well-functioning market under free trade conditions, assuming the actual exchange rate and the current degree of industrial protection. This measure is equivalent to the nominal rate of protection. Schiff and Valdés find that importables tended to be protected (nominal rates of protection of 23 percent in 1966–72 and 38 percent in 1976–85), while exportables tended to be taxed (rates of –33 percent in 1966–72 and –26 percent in 1976–85). Their estimates of the total direct nominal rate of protection for all agriculture were –24 percent in 1966–72 and –17 percent in 1976–85. Their indirect estimates include the effect of trade and macroeconomic policies on the real exchange rate and the extent of protection afforded to nonagricultural commodities. They find that the negative impact of indirect interventions on producer incentives was even slightly stronger than the impact of direct incentives. As a result, their estimates of the total negative impact on the country's agriculture (direct, plus indirect) are huge: –50 percent in 1966–72 and –36 percent in 1976–85.

In this section, we present alternative estimates of distortions in agricultural incentives in the Dominican Republic for a much longer time period: the past 50 years (1955 to 2005). Our project's methodology also focuses on government-imposed

distortions that create a gap between domestic prices and prices as they would be under free-market conditions, thereby generating estimates of the effects of direct agricultural policy measures. It covers distortions in the foreign exchange market as they affect producers directly. And it generates estimates of distortions in nonagricultural sectors for comparative evaluation, including distortions in the foreign exchange market as they affect nonfarm producers of tradables directly. Specifically, the main indicators used in this project are the nominal rate of assistance (NRA) in an industry or sector and the relative rate of assistance (RRA) for agricultural tradables compared with nonagricultural tradables (see Anderson et al. 2008 and appendix A). The RRA indicates effects that are similar to the effects found through the total (direct and indirect) measure reported by Schiff and Valdés.

Ten commodities are included in the analysis. They are characterized as importables (garlic, onions, poultry, red beans, and rice), exportables (bananas, coffee, sugar, and tomatoes), and nontradables (cassava). The selected commodities account for around 40 percent of total agricultural value added, 40 percent of total exports, and 20 percent of total agricultural imports. These products are the ones on which the government most frequently and significantly intervenes in those markets. (The annual data on the relevant NRAs are provided in appendix B, table B.5.) Their shares in the value of agricultural production are shown in table 6.2.

The estimated NRAs for the 10 covered products are summarized in table 6.3. These products account for about two-fifths of the gross value of the country's

Table 6.2. Selected Product Shares in the Gross Value of Agricultural Production, Dominican Republic, 2001–05
(percent at distorted prices)

Product	2001–05
Paddy rice	10
Sugarcane	5
Coffee (green)	5
Red beans	1
Onions	1
Cassava	1
Garlic	0
Bananas	2
Tomatoes	3
Poultry	10
Other crops	32
Other livestock	27
Other	3
Total	100

Sources: Author compilation; Central Bank Statistics Database 2007.

Table 6.3. NRAs for Covered Farm Products, Dominican Republic, 1955–2005
(percent)

Products	1955–59	1960–64	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–05
Exportables	–39.6	–30.5	–10.9	–27.5	–36.1	–51.7	–61.0	–44.6	–13.4	–26.1
Bananas	–26.7	–26.9	–31.4	6.8	5.5	–53.4	–49.9	–52.4	–30.7	–66.5
Coffee	–67.8	–39.8	–33.8	–49.7	–49.2	–51.1	–54.5	–22.7	–20.9	–24.4
Sugar	–30.2	–28.4	8.4	–18.0	–2.3	–50.9	–68.4	–53.8	5.5	15.1
Tomatoes	–22.1	–3.2	40.6	75.5	123.4	46.4	81.1	95.5	32.2	–14.7
Import-competing products	100.2	107.6	40.8	14.7	15.9	20.2	6.7	69.8	48.5	49.9
Beans	32.7	46.5	53.3	24.5	54.1	66.4	41.6	144.6	84.0	99.7
Garlic	232.6	312.7	165.6	35.9	84.9	100.5	139.3	227.7	209.9	352.6
Onions	188.9	169.2	159.9	37.0	79.2	101.7	127.9	197.1	112.0	107.7
Poultry	168.6	152.0	63.2	83.6	6.9	1.0	–26.3	–18.7	11.9	6.8
Rice	84.0	95.9	25.9	5.2	8.8	12.9	14.0	150.4	67.7	86.3
Nontradables	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cassava ^a	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total of covered products	–11.0	–5.4	5.0	–17.5	–21.2	–30.7	–36.4	–1.0	9.2	6.8
Dispersion of covered products ^b	135.0	140.7	86.5	64.0	89.3	83.0	102.3	137.1	92.6	134.6
% coverage (at undistorted prices)	40	40	40	40	40	40	40	40	40	40

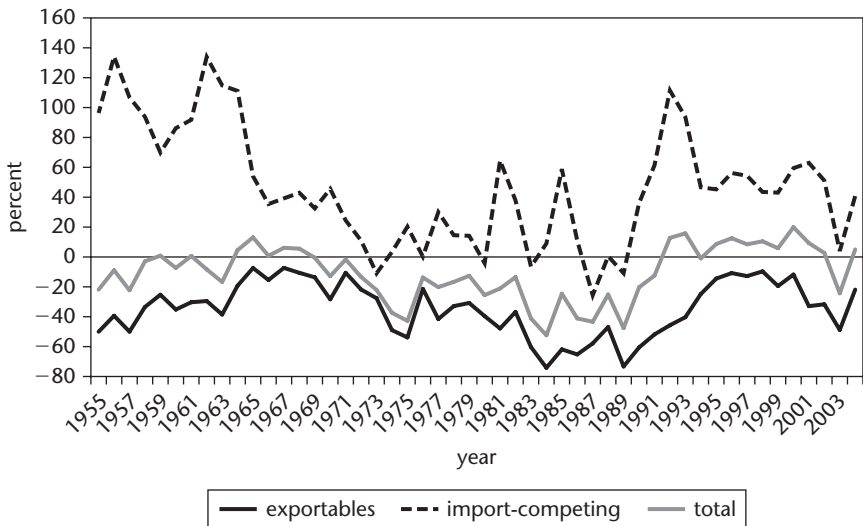
Sources: Los Santos and Peña 2007 and data compiled by the authors.

Note: Except for the last two rows, the table shows weighted averages. The weights are based on the unassisted value of production.

a. Cassava had a zero NRA throughout the period.

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

Figure 6.2. NRAs for Exportable, Import-Competing, and All Covered Farm Products, Dominican Republic, 1955–2004



Sources: Los Santos and Peña 2007 and data compiled by the authors.

agricultural production at undistorted prices. For most products during most years, farmers producing exportables faced negative NRAs. By contrast, import-competing agriculture experienced positive NRAs. For the farm sector overall, figure 6.2 shows that the average NRA has been negative in most periods, but that it has become slightly positive over the past decade.

Noncovered farm products have also been affected by government policies. In the absence of adequate information on these products, we have assumed that the relevant NRA, in aggregate, is the same as the average NRA for covered products. Data on non-product-specific assistance to the industry are likewise unavailable; so, this assistance is ignored. The NRA estimates for the sector as a whole are therefore the same as the NRAs for covered products. The situation is slightly different in the tradables part of the farm sector because cassava is a nontradable. Given that the NRA for import-competing farm products has always been well above the NRA for exportables, the strong antitrade bias has not shrunk much despite the reforms (table 6.4, row 6).

The NRA for agriculture contrasts with the NRA for nonagriculture. The latter has been estimated by dividing each of the nonfarm sectors into exportable, nontradable, and import-competing subsectors. The nonfarm sectors include nonagricultural primary products, highly processed food, nonfood manufactures, and the service sector. Their average NRA is estimated directly from information on

Table 6.4. NRAs in Agriculture Relative to Nonagricultural Industries, Dominican Republic, 1955–2005
(percent)

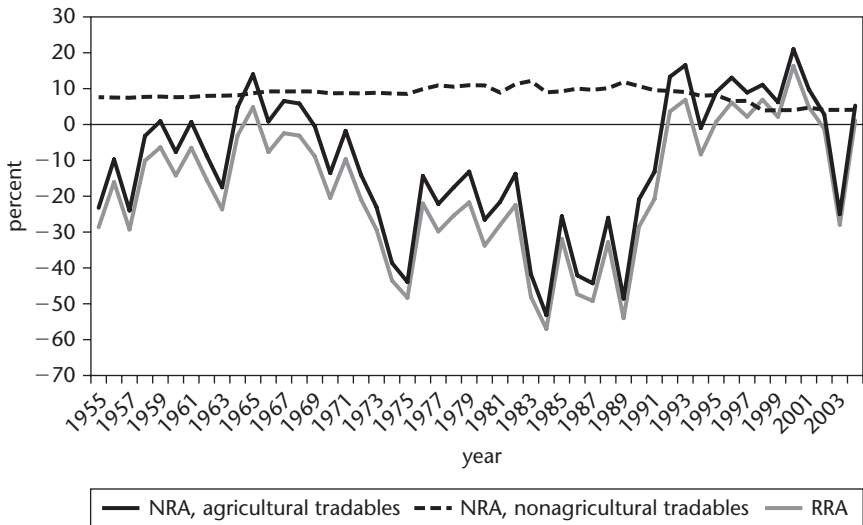
Indicator	1955–59	1960–64	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–05
Covered products ^a	–11.0	–5.4	5.0	–17.5	–21.2	–30.7	–36.4	–1.0	9.2	6.8
Noncovered products	–11.0	–5.4	5.0	–17.5	–21.2	–30.7	–36.4	–1.0	9.2	6.8
All agricultural products	–11.0	–5.4	5.0	–17.5	–21.2	–30.7	–36.4	–1.0	9.2	6.8
Non-product-specific assistance	—	—	—	—	—	—	—	—	—	—
Total agriculture	–11.0	–5.4	5.0	–17.5	–21.2	–30.7	–36.4	–1.0	9.2	6.8
Trade bias index ^a	–0.69	–0.66	–0.37	–0.36	–0.44	–0.59	–0.61	–0.67	–0.42	–0.51
All agricultural tradables	–11.8	–5.7	5.3	–18.2	–22.2	–31.4	–37.3	–1.0	9.7	7.3
All nonagricultural tradables	7.6	7.9	9.1	8.7	10.2	10.4	10.2	9.3	5.8	4.2
RRA ^b	–18.1	–12.6	–3.5	–24.8	–29.5	–37.9	–43.0	–9.4	3.6	3.0

Sources: Los Santos and Peña 2007 and data compiled by the authors.

Note: — = no data are available.

- a. The trade bias index = $(1 + NRA_{ag_x}/100) / (1 + NRA_{ag_m}/100) - 1$, where NRA_{ag_x} and NRA_{ag_m} are the average percentage NRAs for the exportable and import-competing parts of the agricultural sector.
- b. The RRA = $100 * [(100 + NRA_{ag}^t) / (100 + NRA_{nonag}^t) - 1]$, where NRA_{ag}^t and NRA_{nonag}^t are the percentage NRAs for the tradables parts of the agricultural and nonagricultural sectors.

Figure 6.3. NRAs for Agricultural and Nonagricultural Tradables and the RRA, Dominican Republic, 1955–2004



Sources: Los Santos and Peña 2007 and data compiled by the authors.

Note: For a definition of the RRA, see table 6.4, note b.

import tariffs in the case of import-competing tradables. The prices of exportables and nontradables in the nonfarm sectors are assumed to be undistorted, including in the entire service sector. The NRAs of all nonagricultural tradables are summarized in table 6.4, row 8. The average NRA was around 10 percent in the 1970s and 1980s, but it has gradually fallen since the reforms and is now only around 4 percent. This is illustrated in figure 6.3, together with the trend in the average NRA for agricultural tradables and the RRA, which is derived from these two average NRAs (as described in table 6.4, note b). The RRAs show that, relative to other sectors, the taxing of agriculture peaked at around 40 percent in the 1980s.³ However, during the past 10 years, the RRA has become slightly positive, indicating that the NRA for agriculture has been exceeding the NRA for nonagricultural tradables.

Sugar and coffee were the main beneficiaries of the reduction in government price and market distortions. In the case of sugar, after the privatization of the public sugar mills, domestic production decreased considerably. All sugar exports were sold only in the preferential U.S. market, where they received an export price higher than the world market price. The elimination of the foreign exchange surcharge for traditional export crops and of the need to surrender foreign exchange to the Central Bank greatly reduced all government intervention in these commodity markets.

Prospects

According to our RRA estimates, the government has made considerable progress in leveling the playing field in agriculture. The quasi-monopoly power of the national marketing board over imported agricultural commodities has been greatly downsized. Similarly, the country has joined in a free trade agreement with Central America and the United States. This will reduce distortions and improve resource allocation in agriculture. However, the country still shows a strong anti-trade policy bias within the agricultural sector. So, there is also scope for reducing distortions by opening up the market for import-competing farm products.

In addition to the challenges involved in increasing the country's integration with the global economy, there is much room for improvement in the quality and quantity of public expenditures to provide adequate public goods that foster agricultural and rural development.

Assistance has apparently been allocated with the aim of ensuring food security, but also because of political pressure from interest groups that engage in rent seeking. Although the government spends a significant amount of resources on the agricultural sector and the rural sector more generally, the allocation and effectiveness of the expenditures are poor. Innovative approaches to government expenditure in the agricultural sector are needed if the process of agricultural modernization is to accelerate. More emphasis should be assigned to the provision of public goods that help build human capital and to investments in the protection of natural resources and the environment. Furthermore, because of the Dominican Republic–Central America Free Trade Agreement, the significance of the opportunity to increase market access for the country's agricultural commodities will depend on the ability of exporters to meet sanitary and phytosanitary requirements. It is also important to strengthen the national capacity for the provision of services for certification in good agricultural practices and organic production.

Because of the free trade agreement, a set of policies needs to be identified to increase the production and export of agricultural goods, while providing the necessary incentives for agricultural diversification in the medium and long run. The new, more-open environment also puts pressure on import-competing producers who fear they will not be able to compete. They are already asking for compensation programs to provide a transitional cushion. These programs might involve activities such as technical support so that small farmers are able to shift to new activities or adopt more productive technologies, practices, and varieties. A program of income transfers such as Procampo in Mexico has been proposed by some producer associations. This initiative has been questioned by others, who argue that an income transfer scheme would be a refined version of a distortion because it would impose a budgetary burden on the government without increasing agricultural efficiency.

More effort is needed to strengthen links within domestic markets and the value chain and to tie agricultural production to other income-generating activities such as agri- and rural tourism. The country is now in the process of implementing a national competitiveness plan that emphasizes the development of agribusiness clusters and the provision of a better business climate for investment in the agricultural sector. If well implemented, the plan might provide a boost to much-needed investment in the sector.

Notes

1. In 1991, the monetary board issued a resolution establishing a transitory exchange rate surcharge of 1.5 percent. The surcharge was increased to 1.75 percent in 1998 and then to 5 percent in October 1999. In September 2001, the monetary board decided to dismantle the exchange rate surcharge gradually, and it established a 0.25 percent reduction. However, in October 2003, the exchange rate surcharge was increased to 10 percent, and, in January 2005, it was raised to 13 percent. Finally, to comply with regulations of the World Trade Organization and the Dominican Republic–Central America Free Trade Agreement, the exchange rate surcharge was eliminated in June 2006.

2. The Departamento de desarrollo y financiamiento de proyectos in the Central Bank financed development projects in several economic sectors. Public funds were allocated to finance economic activities through private development banks. After enactment of the new monetary law in 2002, this department was dismantled, and its resources were channeled through the Banco Nacional de la Vivienda (National Housing Bank).

3. The average RRA for 1976–85 was –32 percent, close to the –36 percent estimate of the total (direct and indirect) measure reported by Schiff and Valdés (1992).

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ECUADOR

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Ecuador is a lower-middle-income country. About 45 percent of its exports are primary and processed agricultural products. Until the 1970s, agriculture was a more important generator of foreign currency, but the discovery of oil fields in 1967 transformed the economy's export profile. Since 1973, oil exports have been the most important source of government revenue, and petroleum now accounts for about 45 percent of export earnings (Banco Central 2005).

Historically, agriculture has had a major economic role, but also a crucial sociocultural role. One-third of the country's population still lives in rural areas, and a quarter of the labor force is employed in agricultural activities (table 7.1). No less than 60 percent of Ecuador's rural population is considered poor (Sanchez-Paramo 2005).

The protection of agricultural producers has always been a stated goal of the government and has received the support of the general population. Interventions have been aimed at reducing the variability among domestic agricultural incomes caused by crop diseases, the weather, and fluctuating international prices.

Governments have adopted policies that affect agricultural price incentives both directly and indirectly through industrial protection and macroeconomic initiatives. The direct government interventions in agriculture include support for import-competing production through subsidies and border protectionist measures (tariffs and quotas on imports), as well as the subsidization of farm credit and certain intermediate inputs for small farmers. On the export side, particularly during the period when farm products were the main source of export revenues (before 1973), governments taxed export-oriented agricultural activities as a

Table 7.1. Basic Economic Indicators, Ecuador, 1965–2004

Indicator	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–04
Population, millions	5.5	6.3	7.3	8.4	9.6	10.7	11.8	12.7
Labor force, millions	1.8	2.0	2.4	2.7	3.3	3.9	4.5	5.0
Agricultural workers, % of labor force	54	49	43	38	35	32	28	25
Agricultural land, million hectares	4.7	5.0	5.8	6.9	7.6	8.0	8.0	8.1
Gross domestic product per capita, current US\$	268	371	946	1,466	1,043	1,255	1,786	1,875
Agriculture's share in gross domestic product, %	26	21	16	13	15	16	15	8
Foreign exchange, secondary market premium, %	17	7	7	58	32	14	4	—

Source: Sandri, Valenzuela, and Anderson 2006.

Note: — = no data are available.

key source of government revenue. This amalgam of policies affected farmer incentives by making agricultural activities more or less profitable with respect to other sectors of the economy. It also altered the competition among industries within the sector, and it altered the prices paid by consumers for food.

A key purpose of this chapter is to construct estimates of indicators of the direct and indirect assistance to or taxation of the agricultural sector in Ecuador. Estimates have been calculated for the whole sector, for aggregates of export-oriented and import-competing activities, and for individual commodities. Following Anderson et al. (2008) (see appendix A), the focus is on government policies that cause domestic prices to diverge from the prices that would prevail under free-market conditions.

The conclusions about agricultural support in Ecuador should be interpreted with the usual caution about conclusions drawn from distortion indicators based on price comparisons. Necessarily, assumptions and judgments are made in computing the various components of these measures. Nonetheless, we believe that the measures of the distortions to total agriculture and of the support for and taxation of specific industries provide a reasonable foundation for assessing the impact of agricultural policies and major economy-wide policies on the agriculture of Ecuador.

Our analysis shows that agriculture as a whole was subject to declining net taxation during the majority of the years between 1966 and 2003, and that, in the more recent years, there was even a slightly positive level of net assistance. The taxation of export-oriented crops was in constant decline and recently reached a phase of minimum intervention, while the heavy government intervention in import-competing agriculture during the import-substitution period gave way to little or no protection in 2000–03.

Despite considerable reform in the import restrictions imposed since the late 1980s, there is evidence that sectoral policies still create varying levels of distortions in agricultural incentives. The greater the variability in these government policy-induced distortions, the greater the impact on the sectoral allocation of factors of production and the higher the national economic welfare costs (Lloyd 1974).

The remainder of this chapter is organized as follows. The next section presents a brief history of the agricultural sector prior to the 1960s. Economic growth, structural changes, and political developments since the 1960s are then described. An examination of agricultural policies over the last 45 years follows. We raise methodological issues before discussing our estimates of the indicators of agricultural distortions. The final section draws out the implications of current policies and the prospects for reform.

Agriculture Prior to the 1960s

During colonial times, 1534–1822, the Spanish established a state agricultural system worked by native peons, or landless laborers, in La Sierra (the highlands), the mountainous Andean region of Ecuador. The climate and the peon system in La Sierra were considered appropriate for crop cultivation (maize, wheat, and corn) and livestock farming. In La Costa, the region of the Pacific coastal plain, there were frequent outbreaks of disease, and fewer natives were of mixed ethnicity, which made it difficult for the Spanish to coerce labor from them. As a result, La Costa was neglected during the colonial period, and the culture became more distinct from the culture of La Sierra, although there was some export-oriented agriculture, such as sugarcane, bananas, tobacco, cotton, and cocoa. In El Oriente, the region on the eastern slopes between the Andes and the headwaters of the Amazon, fierce natives and a difficult climate prevented settlement; so, only religious missions attempted to reach these lands (Rudolph 1991).

Following independence and after a period of regional political distress, Ecuador separated from Gran Colombia in 1830 and became a separate republic.¹ The new republic had a largely rural population, mostly consisting of people living and working under the peonage system. The economy was based on cash crops and inexpensive raw materials that were vulnerable to fluctuations in international prices and in market demand.

Until the beginning of the 19th century, the *terratenientes*, the large land tenants, had almost absolute control over the labor and resources in La Sierra (Baraona 1965). The peons were dependent economically and socially on them. Between these two poles were other subordinate social groups, including merchants, small landowners, and local authorities (Pachano 1984).

El Oriente had a different history and different social and economic structures; there was no dominant class at the regional level.

In La Costa at the beginning of the 1900s, the owners of large cocoa plantations were at the center of social and political life. They exercised considerable control over the land and the economic landscape (Pachano 1984). From 1850 to 1910, cocoa exports and, to a lesser extent, coffee and sugar products were the mainstay of the economy. The cocoa sector started to weaken following World War I because of severe adjustments in the global market and the growth in competition from Africa and Brazil, which contributed to oversupply. In the 1920s, the sector was affected by Witch's Broom disease, which wiped out entire plantations. By the 1930s, the sector was in serious decline. This had significant repercussions for the entire economy (Luxner 1996). The transformation did not eliminate the privileged agroexporter class in La Costa, but it encouraged the development of medium-sized landownership.

During the 1950s, government-sponsored replanting efforts contributed to a partial resurgence of the cocoa industry. Coffee and bananas started to become important export products with export shares of between 40 and 60 percent. In the 1960s, when cocoa and coffee started to lose share in the international market, bananas became the most important export product. Since then, Ecuador has been one of the world's key exporters of bananas.

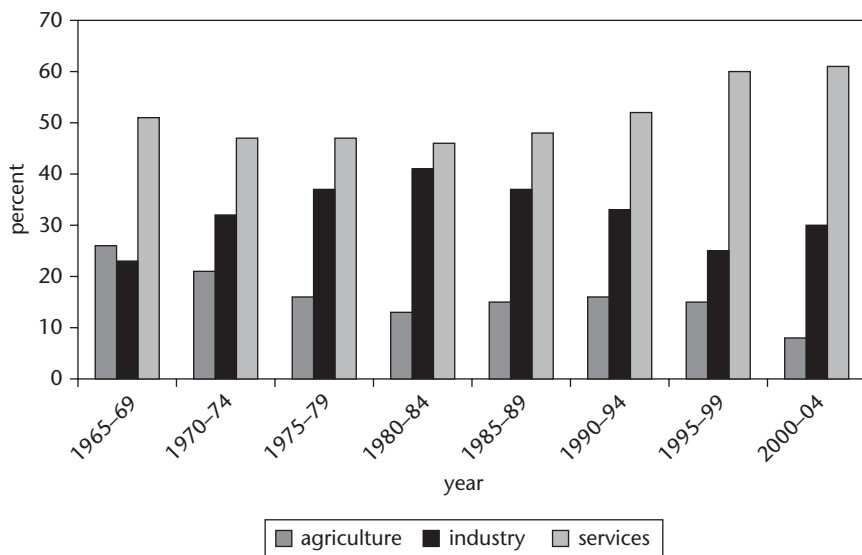
In the late 1950s, primary agriculture accounted for 90 percent of the country's exports (Banco Central 2005). A law on industrial incentives that was approved in 1957 involved adopting a development strategy based on import-substitution industrialization. The industrial incentives included tariff and nontariff measures to protect national manufacturing production, together with low tariffs or exemptions for imports of raw materials and some intermediate inputs used in manufacturing. The law also created provisions for subsidized credit and income tax exemptions for manufacturing industries.

Growth, Structural Change, and Policy Evolution since 1960

The discovery of oil fields in 1967 transformed Ecuador's agriculture-based economy. The oil attracted substantial foreign investment. This coincided on the political front with a military regime (1963–66) that facilitated oil exploration, which induced external indebtedness.

Between 1965 and 1975, the share of agriculture in gross domestic product (GDP) decreased from 27 to 18 percent. To meet the growth in domestic demand, non-agricultural activities developed rapidly, especially the services sector (figure 7.1). Industrial incentives were strengthened and broadened in 1962 and 1965 through a law on industrial promotion (which was modified again in 1971). However, the small size of the domestic market, the lack of a large pool of skilled people, and limited physical and financial infrastructure constrained industrial expansion. Hence, a large share of manufacturing was concentrated in food processing, an area in which industrial expertise already existed in the country.

During the second military interlude, from 1972 to 1979, Ecuador reaped the benefits of high-priced oil exports. Total GDP grew at an average 8 percent per year between 1971 and 1980, and export earnings increased more than 10-fold (Banco Central 2005). The growth in revenue allowed the government to finance subsidies involved in the import-substitution policy. At the same time, it encouraged a rapid rise in public and private expenditures. The accelerated economic expansion was accompanied by import growth and a buildup in foreign debt. Annual imports increased by an average 7 percent during the 1970s, spawning an

Figure 7.1. Shares of Agriculture, Industry, and Services in GDP, Ecuador, 1965–2004

Sources: Author calculations; World Development Indicators Database 2007.

inflationary pattern that eroded household purchasing power. From 1974 to 1979, the country's external debt, mainly arising from oil sector expansion, grew from 324 million to 44,500 million sucres (Flores and Merrill 1991).

Because the economic growth of Ecuador was highly dependent on oil, the sharp drop in oil prices in the early 1980s had large consequences. The public deficit reached 7 percent of GDP, and there was a period of structural adjustment after foreign banks questioned the country's financial strength and resolved not to supply new loans (Whitaker and Greene 1990). Because government revenues were directly linked to oil exports, the downward price trend affected government resources dramatically. It also led to a recession, which cut into other sources of revenue as well (de Janvry, Sadoulet, and Fargeix 1991). The government deficit was eased through a devaluation of the currency and tight control of the foreign exchange market. Nonetheless, the foreign exchange rate premium on the secondary market averaged 58 percent during 1980–84 (table 7.1).

In 1985–89, the average GDP per capita was slightly more than US\$1,000. Manufacturing's share in GDP was 17 percent, compared with an average for Latin America of 25 percent. The agricultural sector accounted for 15 percent of GDP, but employed 35 percent of the economically active population (table 7.1). Exports as a share of GDP reached 27 percent; oil accounted for 48 percent of the total, and agricultural products accounted for 29 percent (table 7.2).

Table 7.2. Value and Product Composition of Merchandise Exports, Ecuador, 1965–2004
(percent)

Product	1965–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–04
Oil	1	27	57	69	48	42	31	45
Bananas	43	31	10	7	13	20	22	17
Coffee and related products	22	15	13	7	10	5	3	1
Cocoa and related products	16	9	3	5	6	3	2	2
Flowers, abaca, and wood	0	0	0	0	0	0	4	6
Shrimp	1	2	2	5	14	15	16	5
Tuna and other fish	1	1	1	0	1	2	2	2
Other, including manufactures	17	15	14	8	8	12	20	22
Total	100	100	100	100	100	100	100	100
Total, current US\$, millions	155	474	1,425	2,426	2,313	3,117	4,634	5,723

Sources: Data of the Banco Central; Acosta 2006.

Three weather shocks contributed to the economic crisis during the 1980s. In 1982–83, the pluvial phenomenon El Niño caused floods that damaged public infrastructure and devastated agriculture in La Costa. In 1987, an earthquake damaged the oil pipeline that links extraction points and distribution sites, interrupting oil exports for six months. In 1988, there was a drought in La Sierra that affected crop production and disrupted hydroelectric power generation.

By the late 1980s, it was apparent that the import-substitution policy framework had not contributed to the creation of a solid and efficient manufacturing sector. The share of manufacturing in value added was about the same in 1965–74 and in 1975–84. By contrast, the share of the agricultural sector in GDP shrank from one-quarter in 1965–74 to one-seventh in 1975–84 (table 7.1).

The turnaround from the import-substitution framework to a less-protective, export-oriented trade policy began in the late 1980s. The trade policy changes included tariff cuts and other reductions in import restrictions, the elimination of export taxes (although some permits and licenses were maintained), laws to promote exports, modernization among trade institutions, and a simplification in trade procedures. Trade reform brought import tariff rates down gradually, from an average 51 percent in 1985 to 29 percent in 1989 and 11 percent in 1994 (World Bank 1988; Tamayo 1997).

During the 1990s, trade policy restructuring led to consolidation with trade partners in the Andean Community (Bolivia, Colombia, Peru, and the República Bolivariana de Venezuela), and to Ecuador's accession to the World Trade Organization in 1995. According to the Global Trade Analysis Project (GTAP) Database (Dimaranan 2006), in 2001 the average applied rate of protection for all tradables was 8 percent.² In addition to trade policies, important economic reforms were focused on the labor market and the exchange rate and were intended to favor export-oriented activities. The exchange rate reforms included exchange rate harmonization (to reduce the gap between the official and secondary rates), periodical minidevaluations, and the floating of the currency within fixed bands.

Ecuador experienced a tumultuous period from 1997 to 1999, including a marked economic crisis in 1999 (a GDP growth rate of –7 percent) and four presidents in four years. The tumult resulted from the collapse of the banking system and simultaneous currency and public finance problems. The crisis was triggered by a combination of exogenous and domestic policy-induced shocks that led to a loss of confidence in the banking system and the domestic currency. Government liabilities increased dramatically, causing the country to default on its recently restructured Brady foreign debt (Jácome 2004). With the economy on the brink of hyperinflation, the government, in 2000, adopted the U.S. dollar as legal tender and began demonetizing the sucre. The exchange rate, in sucres per U.S. dollar, changed from an annual average of 11,787 in 1999 to 25,000 in January 2000. The inflation

rate moved from 52 percent in 1999 to a peak of 96 percent in 2000, before falling to single-digit rates in 2003 and 2004.

The dollarization of the Ecuadorian economy was designed to increase macroeconomic stability by imposing tight fiscal discipline and eliminating governmental (ab)use of exchange rate and monetary policies. The production of some nontraditional exports (such as flowers, seafood products, and processed foods) grew at an average rate of 10 percent per year in 2000–05.³ However, an evaluation of the dollarization regime is compromised by the simultaneous occurrence of high oil demand and high oil prices and, importantly, a high volume of remittances sent by migrants who left the country during the economic crisis. In 2005, remittances represented 6 percent of GDP, and they were the second main source of U.S. dollars for the economy, behind oil, but ahead of banana exports.⁴

López-Cálix (2003) notes that the stability and development of the country are promising, but that tighter fiscal controls and a drop in external debt servicing are required to reduce the economy's susceptibility to external shocks in financial and oil markets. As a priority in the attempt to improve competitiveness, he advocates a major reform in trade policy to limit the antiexport bias and to reduce the multiple and chronic distortions that still protect some sectors of the economy.

Agricultural Policies since 1960

Export taxes on agriculture and import tariffs were the main sources of public revenue up to the mid-1960s (World Bank 1972). In the early 1960s, to anchor agricultural development, the government took three steps: in 1963, it created the National Institute of Agricultural Research to accelerate the adoption of technologies; it redefined some of the functions of the Ministry of Development by creating the Ministry of Agriculture in 1964; and it established a national system for agricultural credit. (Table 7.3 provides a chronological summary of the main agricultural policies in the last 45 years.)

However, the most significant agricultural policy change occurred in 1964 when the military dictatorship implemented a law on agrarian reform and settlements. This policy was a response by the military regime to the many people who sympathized with socialist reform. The military wanted to gain the acceptance of the people and validate its claim on government authority by conceding to the demands of the rural poor for landownership.⁵ The stated objectives of the land reform were improvement in the conditions among small farmers and laborers, title redistribution to eliminate absentee ownership and insecure land tenure systems, provision of extension services, and an expansion in the social security system to cover agricultural workers. The military government considered the agrarian reform the cornerstone on which to build a new, harmonious, just, and dynamic Ecuador (Blankstein and Zuvekas 1973).

Table 7.3. Major Agricultural Policy Milestones, Ecuador, 1957–2003

Year	Measure	Description, aim
1957, 1962	Law on industrial incentives, import-substitution policy	Implementation of tariff and nontariff barriers to protect manufacturing, low tariffs or exemptions for imports of intermediate inputs, subsidized credit and income tax exemptions for manufacturing industries
1963	Creation of the National Institute of Agricultural Research	The institute became the main mechanism for the adoption of technologies
1964	Creation of the Ministry of Agriculture (based on functions of the Ministry of Development)	Guide agricultural development through technology transfers, the provision of services, and price setting
1964	Agrarian reform law: <i>la ley de tierras baldías y colonización</i> (law on unfarmed lands and settlement)	Redistribute landownership with the objectives of: eliminating precarious land tenure systems, improving the conditions of small farmers and agricultural workers, providing agricultural extension services, and incorporating agricultural workers into the social security system
1964	Establishment of a national system for agricultural credit, Banco Nacional de Fomento	The system became the main mechanism to supply credit to the agricultural sector
1966	Creation of the Water Resources Institute, the national irrigation system	Development and assignment of irrigation areas
1970	Law abolishing insecure land tenure systems	Eliminate insecure rental agreements and turn all farmers into landowners
1973	Second agrarian reform law	Promote agricultural efficiency by redistributing landownership in low productivity systems, reassign ownership on government and church lands, provide credit and technical assistance, implement subsidies, and establish minimum prices
1979	Law on agricultural development, law on settlement of the Amazon region	Provide support for agriculture through subsidies for production, technical assistance, access to credit, and minimum floor prices and control further land encroachments through hard, repressive measures

Table 7.3 (continued)

Year	Measure	Description, aim
1980–90	Implementation of land purchase programs	The most notable program was Prot ierras; negotiated external debt funds were used to establish loans for land purchases
1986	Marketing board	Promote efficient agricultural trading
1992, 1994	Export promotion and water transport	Boost and diversify the country's exports, eliminate legal procedures that restrict exports
1990	Implementation of value added tax	10% tax on value added; exceptions in agriculture
1992	Elimination of export taxes	Promote agricultural exports
1993	Implementation of agricultural import tariff band mechanism	Reduce agricultural price volatility and provide a stable production environment
1994	Law on agricultural development	Improve access to credit for production, provide technical assistance and extension programs
1995	Accession to the World Trade Organization	Opportunity to expand trade
1997	Creation of the Corporation for the Promotion of Exports and Investment	Promote the country's exports and attract foreign investment by offering technical assistance to exporters, supporting trade promotion events, facilitating the establishment of private trading groups, and operating a network of trade bureaus
1997	Creation of the Council of External Trade and Investment	Identify external trade policies and direct investment, determine strategies in trade negotiations and economic integration, draft the strategic export promotion plan of the Corporation for the Promotion of Exports and Investment
1999	Debt, exchange rate, banking crisis	Default on external debt
2000	Dollarization	Adoption of U.S. dollar as legal tender
2000	Changes in the value added tax	12% tax on value added; exemptions in agriculture
2003	Drawback law	Reimburse the taxes paid on production inputs for exportable goods

Source: Author compilation.

The Ecuadorian Institute of Agrarian Reform and Settlement (Instituto Ecuatoriano de Reforma Agraria y Colonización) was created to administer the law. The size of landholdings was limited to 800 hectares of arable land in La Sierra, 2,500 hectares of arable land in La Costa, and 1,000 hectares of pastureland in either region.⁶ The law also set the minimum amount of land to be granted in the redistribution at 4.8 hectares (Flores and Merrill 1991).

From the beginning, the program was not properly funded. The mechanism for paying property owners for expropriated land was flawed, and most of the land that was reassigned was church or government land. Of the 517,049 hectares that were affected in 1964–69, 70 percent were transferred through the settlement program, and only the remaining 30 percent were transferred through the land redistribution scheme (Blankstein and Zuvekas 1973). Moreover, the slow and lengthy process involved in issuing titles and other instruments of ownership meant that many of the new landowning farmers faced serious obstacles in gaining access to credit and technical assistance.

In the early 1970s, after the end of the military regime, the law was revised. The revisions required that all land held by absentee landlords be sold to the tenants and that farm residents be permitted to acquire title over land they had worked for at least three years. In response, many landowners refused to rent land to former tenants, and, in some cases, forced tenants off the land.

The role of the government in conferring settlement rights over land, reexamining property rights in light of the inefficiencies of land tenure systems, and reassigning landownership from low-productivity systems and abandoned lands became central issues in an ongoing agrarian conflict that was a significant political, social, and economic problem (Chiriboga 1984).

In La Costa, squatting was encouraged by political leaders associated with leftist groups. The *precaristas*, poor nontenant farmers working and living under the precarious conditions typical of the large landowning system, were convinced they were entitled to the land, though they had not paid for it. They formed *cooperativas*, and their leaders were harshly and repressively confronted by landowners. The land conflict claimed the lives of hundreds of people in La Costa and some parts of La Sierra.⁷

From 1964 to 1982, the agrarian reform affected 2 million hectares, 70 percent through the settlement program, largely in El Oriente.⁸ The impact of the agrarian reform on agricultural productivity cannot be assessed properly because the quality of the data on land use varies widely; the data are often found by analysts to be unreliable (Flores and Merrill 1991). The data for the mid-1980s, for example, contain estimates of cropland and pastureland that vary by 20 to 50 percent, and estimates of the total land area suitable for agriculture show variations of 50 percent.⁹

In the effort to instill dynamism in the agricultural sector and encourage economic growth, the reform produced mixed results. Large landowners were deprived of the opportunity to expand their systems, and land that was abandoned or unclaimed, especially in El Oriente, was brought into production (Warman 1980; Chiriboga 1984). The government intended to support the agrarian reform through its policy of agricultural growth, including access to credit, subsidies for production, the provision of road infrastructure, and guarantees on minimum producer prices. However, many of the measures were contradictory. Export-oriented activities were taxed, and numerous credit funds were disbursed without any technical support network or even verifications of titles to the land.

Owning land alone was not a sufficient condition for achieving a viable agriculture among small farmers. This is clear from the account of Martínez (1984), who points out that, between 1954 and 1974, the average real income among small farms (less than 5 hectares) decreased by 16 percent relative to the general price index and 31 percent relative to food prices. The agrarian reform left the beneficiaries without access to proper technical knowledge, equipment, credit, and irrigation systems and other infrastructure.

From the 1960s to the 1980s, the agricultural sector evolved based on the spread of labor-saving technologies and the introduction of entrepreneurship. The policy of import substitution provided protection for crops that were important to industrial processes, and this led to modernization in production systems that favored large landowners, many of whom consolidated and even expanded their positions by negotiating with small tenants for the direct sale of the newly allocated lands. This modernization was more evident in La Sierra, where the traditional production systems centered on livestock and dairy products, while, in La Costa, rent-oriented systems were more evolved, although many large rice and sugar farms had been affected by the *precaristas* (Pachano 1984).

During the 1980s, the government sought to provide support for agriculture through the creation of a marketing board; the establishment of minimum floor producer prices; the provision of credit, direct output subsidies, and subsidies for fertilizers; loans of government agricultural machinery; irrigation projects and low water user fees; the construction of rural roads and crop storage installations; and funds for agricultural research and extension programs.

However, agriculture was negatively impacted by several policy measures. For example, the incentives created to encourage import-competing activities included import barriers on primary agricultural products linked to industrial processes, overvalued exchange rates, the government marketing of agricultural products, and consumer prices set at a low level (Vos 1983; Chiriboga 1984; Whitaker and Greene 1990; Whitaker 1996). Meanwhile, the focus on the rent-oriented system

led, during the decade, to a rise by 10 percentage points, from 36 to 46 percent, in the export share of agricultural production.

In the mid-1990s, a new law on agricultural development was aimed at improving the access of rural communities to credit, technical assistance, and extension programs. However, thereafter, the government eliminated a program on agricultural product marketing and a program on grain storage. The program on grain storage was eliminated when Ecuador opened its markets to imports, and the government decided to stop stockpiling grain in favor of buying it on the world market. Both programs had had a positive influence on food nutrition among the poorest segment of the population and had helped improve harvest prices among small farmers.

Important trade reforms were also implemented during the 1990s. Export-oriented activities in agriculture benefited from the elimination of export taxes. Agricultural imports were facilitated by the elimination of most quotas, as well as cuts in tariffs. Ecuador joined the Andean Community in 1994. It adopted the common external tariff rates of 5, 10, 15, and 20 percent for all tariff lines. However, the classification of agriculture as a sensitive sector led to the adoption, in 1995, of a mechanism for price stabilization known as the Sistema Andino de Franjas de Precios, the Andean price band system (SAFP). Still in place, the SAFP is a mechanism involving variable tariffs designed to maintain import prices between floor and ceiling prices. In theory, domestic price stabilization is achieved by (a) applying an extra import tax (the variable) whenever the import price (the reference price), plus the regular tariff does not correspond to a floor price or (b) reducing the tariff down to zero whenever the reference import price is higher than the ceiling price. The system sets tariffs that fluctuate between 35 and 95 percent, and it applies the tariffs to 12 marker products and 138 related products according to 148 tariff subheadings.¹⁰

In 1995, when Ecuador acceded to the World Trade Organization, tariff ceilings were established at 10 percentage points higher than the common external tariff except for automobiles, chemical products, and certain primary agricultural products and lightly processed food products. The country had successfully established its tariff schemes before 2001 and currently receives preferential treatment within the framework of the Global System of Trade Preferences among Developing Countries and the U.S. Generalized System of Preferences. Both mechanisms intended to favor industrialization and accelerated growth (Hachette 2003). In addition to these schemes, Ecuador receives preferential access to U.S. markets for certain products under the Andean Trade Promotion and Drug Eradication Act.¹¹

In 1993, the most favored nation tariff rate on primary agricultural products was 8 percent, and the rate on processed food was 15 percent (author calculations; WITS Databases; data of the United Nations Conference on Trade and Development). The bound rates in 1996, following World Trade Organization accession,

were 20 percent for primary agriculture and 29 percent for processed food (WTO 2005). In 2001, the tariff rates that were effectively applied were 8 percent on primary agriculture, 11 percent on processed food, 4 percent on other primary products, and 8 percent on other manufacturing products (author calculations; GTAP Database). For 2001–04, Kee, Nicita, and Olarreaga (2006) estimate an overall rate of protection (a trade restrictiveness index), including tariffs and non-tariff barriers, at 36 percent for agriculture and food and 12 percent for nonfood manufactures.

The trade policy reforms have resulted in a greater openness in the Ecuadorian economy toward international markets. Thus, the share in GDP of total merchandise imports plus exports rose from 37 percent in 1993 to 49 percent in 2004 (author calculations; data of the Banco Central). In particular, for the agricultural sector, the reforms have produced noticeable structural changes. From 1980 to 2003, the share of crops in the total value of farm production fell from 70 to 57 percent, and the share of livestock rose from 30 to 43 percent (author calculations; FAO 2004). Despite the protection for import-competing dairy and livestock products, the export performance of agriculture saw improvement; the export share of the value of farm production rose from 36 percent in 1980 to 53 percent in 2003.

The adoption of the U.S. dollar as the Ecuadorian currency in 2000 initially had a negative impact by reducing the total value of agricultural exports by one-quarter with respect to the previous year. However, the stability brought by the new currency system has helped boost productivity. Some nontraditional exports have evolved in an important manner over subsequent years (for example, flower exports reached 11 percent of nonoil exports in 2000–04). In 2003, the value of agricultural exports reached the same level, in nominal terms, as the level before the currency and debt crisis in 1999.

Estimating the Distortions to Incentives

In their seminal volume, Krueger, Schiff, and Valdés (1991) quantitatively assess policy interventions in agriculture in Latin America from 1960 to 1985. The study makes a distinction between direct effects caused by sectoral policies (subsidies and price and border protection) and indirect effects caused by economy-wide policies. Ecuador was not included in the study, but it was one of the eight countries included in the subsequent surveillance of agricultural price and trade policies in Latin America by the World Bank that covered Ecuador in 1986–93 (Valdés and Schaeffer 1996). Several other studies quantify the role of policies in agriculture in Ecuador, but they focus on a limited set of commodities or years (Vos 1983; Whitaker and Greene 1990; Whitaker 1996; Josling 1997; Banco Central 2003; Fernández 2003).

Defining and calculating various policy indicators

Our project's methodology (Anderson et al. 2008; see appendix A) generates indicators of the agricultural price distortions induced by policy. We consider the effects of policies separately from market factors, infrastructural investments, or services that cause prices and incentives to change more generally. Our focus is on government-imposed distortions that create a gap between domestic prices and prices as they would be under free-market conditions. An understanding of the characteristics of agricultural development is not possible through a sectoral view alone. For comparative evaluation, we therefore use the project methodology to estimate not only the effects of direct agricultural policy measures (including distortions in the foreign exchange market), but also nonagricultural price distortions. We thus consider the overall environment for economic incentives.

The NRAs for agriculture and the products selected

The nominal rate of assistance (NRA) for farmers involves a direct price comparison. It is defined as the price of a product in the domestic market, less the price of the same product at the border; it is expressed as a percentage of the border price. A crucial task in constructing this measure is to make adjustments for transport costs and margins so as to derive an equivalent level of comparison along the marketing channel (see Anderson et al. 2008). In the absence of trade flows because of prohibitive tariffs, one may compare an international reference price to the domestic price, taking into account international trading costs. The same approach may be applied to compensate for preferential free on board prices on some quota-restricted exports: a direct comparison of the preferential export price and the domestic price would be misleading. (Valenzuela, Wong, and Sandri [2007] describe the data sources for the producer and border or reference prices and supply information on the various adjustments and assumptions.)

To account for government-induced distortions in the market for foreign currency, an equilibrium exchange rate is estimated. The parallel market exchange rate is used as an indicator of the marginal price paid for foreign exchange by importers. The exporter exchange rate is calculated as the weighted average of the official and the parallel market exchange rates; the weights are based on the exporter retention rate. The difference between the importer exchange rate and the equilibrium exchange rate is used as a measure of the exchange rate distortion component of the protection provided for importables. Similarly, the difference between the exporter exchange rate and the equilibrium rate is used as a measure of the exchange rate distortion affecting exportable goods.

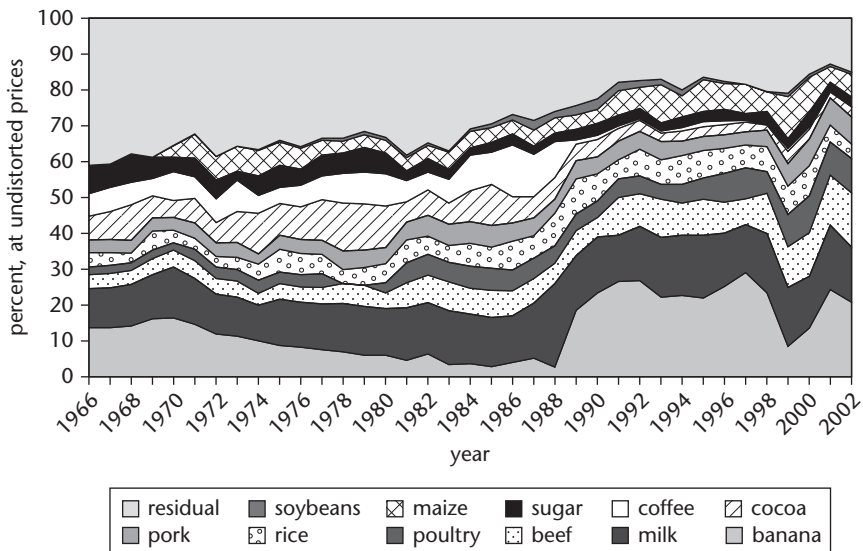
The indicators of distortion are estimated for the agricultural sector as a whole, for aggregates of export-oriented and import-competing activities, and for individual commodities. Because of data availability, the NRAs from 1990 to 2000 also cover assistance for primary factors and purchased farm inputs and any other non-product-specific subsidies, net of taxes. (The annual data are shown in appendix B, table B.6.)

Our study covers the following production activities: bananas, beef, cocoa, coffee, maize, milk, chicken meat, pig meat, rice, sugar, and soybeans. These 11 products account for between 60 and 84 percent of the total market value of production for the period under study, 1966 to 2003 (see figure 7.2). These commodities were subjected to heavy direct interventions through export taxes, import quotas, tariff restrictions, and bans.

Classifying the tradability of products

The classification of products according to their trade status is straightforward for traditional export products such as rice before 1975 and bananas, coffee, cocoa, and sugar before 1983. However, the classification of the remaining products according to their trade value data may be misleading in the presence of hindering

Figure 7.2. Value Shares of Agricultural Production by Farm Product, Ecuador, 1966–2003



Source: Author calculations.

trade barriers or export subsidies designed to stabilize domestic prices. These remaining products are traded in small amounts or they are not traded at all because governments have deliberately directed efforts at protecting national industries. The approach adopted here relies on comparisons between domestic prices and international price equivalents and on the *potential* net trade status in the absence of distortions. This is so notwithstanding, in some cases, the absence of actual border prices. Thus, the remaining products are considered import-competing activities; the exceptions are sugar and rice during years in which weather-induced oversupply resulted in a clear trading position as net exporter.¹² This assumption accords with the policy debate between interest groups and the government regarding interventions in these activities; the debate has focused almost exclusively on tariffs and, occasionally, on safeguards.¹³ In Ecuador, with the exception of exports of flowers and fruit beginning in the late 1980s, the remaining agricultural products are considered as if they were not traded internationally.

NRAs for nonagriculture and the relative rate of assistance

Nonagricultural industries are grouped into five aggregates: lightly processed food, highly processed food, nonagricultural primary resources, nonfood manufacturing, and services. Within each of these subsectors, shares are defined according to the tradable status: importable, exportable, and nontradable. Tariff information is used to determine the assistance estimates in nonagricultural import-competing industries and is drawn from the World Bank (1976, 1988), the IMF (2005), and the WITS Databases. Export taxes, including fees and permits in the later periods, are used to define the (negative) assistance to exportables; the information is drawn from International Monetary Fund (IMF, 2005) and the World Trade Organization (WTO, 2005). It is assumed that there are no distortions in nontradables. The classification and weights for aggregation are based on the best judgment of the authors, national input-output tables produced by the Banco Central, and the GTAP Database 2001.¹⁴

Anderson et al. (2008) (see appendix A) suggest that, for comparison with the assistance to agriculture, the relevant economy-wide indicator of policy intervention is not necessarily the aggregate for all nonagricultural activities. They propose a comparison between the NRAs of only the tradable component of the agricultural sectors and the NRAs of the tradable component of the nonagricultural sectors. This comparison, called the relative rate of assistance (RRA) for agriculture, is defined as follows:

$$RRA = 100 * \left[\frac{(100 + \text{NRA in agricultural tradables})}{(100 + \text{NRA in nonagricultural tradables})} - 1 \right], \quad (7.1)$$

where negative values indicate that the policy regime has an antiagricultural bias, while positive values indicate a proagricultural policy bias.

What Do the Estimates of the Distortions Reveal?

This section summarizes the results for the agricultural sector and the results for the rest of the economy.

Indicators on primary agriculture

The NRAs for agriculture for 1966–2003—by commodities and by aggregates of exportables and import-competing activities—are shown in table 7.4 and summarized in figure 7.3. Agriculture was negatively affected as an aggregate during most of the period; agricultural policies depressed prices by as much as one-third in the early 1970s, and the average effect was above zero only during the import-substitution period of the early 1980s. However, this result masks the high dispersion of policy interventions. Thus, export producers faced disprotection of up to 40+ percent, and import-competing farmers benefitted during the later 1970s and the 1980s, when NRAs averaged as high as 50+ percent. NRA variability or dispersion—as measured by the annual standard deviation around the value of the production-weighted mean—ranged around 100 percent until the mid-1980s, but has dropped to less than 30 percent since then. This reflects the considerable progress in trade policy reform since the late 1980s.¹⁵

Exportable NRAs show a downward trend. They passed a peak in net taxation of around 40 percent during the 1970s and reached a low level of net assistance in 2000–03, when the remaining interventions involved mainly small fees for licenses and permits, as well as support for the promotion of exports. Given the large weight of exportables in the value of production, exportables have dictated the trend in the NRAs for total agriculture. The elimination of export taxes and the implementation of more dynamic and transparent trade procedures have contributed in recent years to a significant reduction in distortions. The trend in the NRAs for import-competing products shows that, during the land-reform years, there was a small degree of disprotection for these products, but, subsequently, there was growing support for import-competing agriculture through a combination of exchange rate policies, border policies, and minimum floor producer prices. One consequence was an expansion in livestock activities following the land reform as a way of diverting labor from labor-intensive activities and taking advantage of the battery of support programs intended to complement the land reform.

Table 7.4. NRAs for Covered Farm Products, Ecuador, 1966–2003
(percent)

Products	1966–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–03
Exportables	–20.6	–40.0	–43.2	–31.1	–26.1	–11.1	–10.4	–2.9
Bananas	–34.6	–48.5	–52.4	–39.1	–37.4	–8.6	–16.4	–7.3
Cocoa	5.6	–16.2	–13.3	–4.0	–13.5	–16.4	–11.7	–6.7
Coffee	–19.0	–41.8	–61.9	–39.4	–28.6	–15.6	–21.6	0.1
Import-competing products	–1.9	–14.5	26.4	53.8	26.7	–1.0	7.8	22.2
Maize	28.2	39.8	69.9	62.5	39.4	18.6	30.3	49.9
Soybeans	50.7	–7.8	29.9	11.9	4.5	–1.8	–7.3	12.2
Milk	–14.2	–28.3	22.7	58.1	24.0	9.8	6.6	8.7
Beef	–11.7	–29.2	74.9	62.0	41.3	–6.2	5.3	31.8
Chicken meat	284.8	228.8	254.0	315.4	105.7	20.0	28.5	24.6
Pig meat	6.4	–13.7	–9.1	33.2	4.9	–20.0	–10.9	50.5
Mixed trade status ^a								
Rice	–6.5	–8.0	–1.7	24.7	25.7	–6.2	35.2	39.8
Sugar	–9.6	–47.1	21.4	–15.3	–0.9	–15.2	28.5	13.0
Total covered products ^b	–14.8	–31.5	–20.8	9.9	–0.8	–6.4	–2.0	12.2
Dispersion of covered products ^c	99.0	88.6	104.8	106.2	48.5	18.8	27.9	29.6
% coverage (at undistorted prices)	64.8	71.2	71.9	62.4	73.2	82.5	82.1	82.6

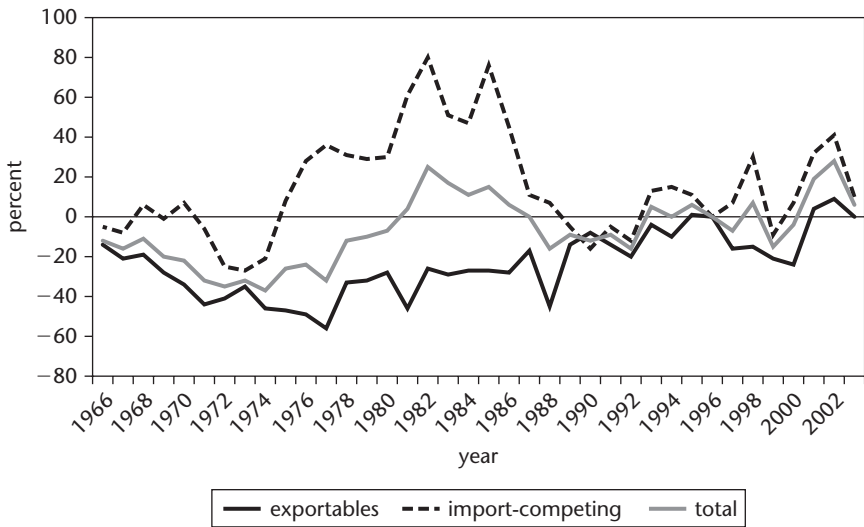
Sources: Author calculations; Valenzuela, Wong, and Sandri 2007.

a. These are products that are included among the exportables or the import-competing group depending on their trade status in a particular year.

b. The row shows weighted averages. The weights are based on the value of output at unassisted farmgate prices.

c. Dispersion is a simple five-year average of the annual standard deviation around the weighted mean.

Figure 7.3. NRAs for Exportable, Importable, and All Covered Farm Products, Ecuador, 1966–2003

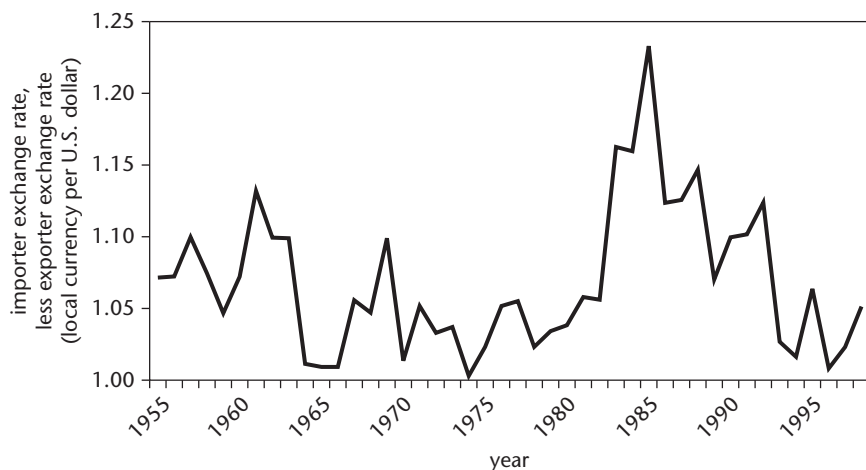


Sources: Author calculations; Valenzuela, Wong, and Sandri 2007.

Our calculations are consistent with the main findings of Valdés and Schaeffer (1996). They, too, find net taxation of the production of exportables and support for importables in 1986–93.¹⁶ Although they report an increasing level of taxation on exportables rather than the decreasing disprotection found by our study, the discrepancy is likely caused by their use of reference border prices that differ from the free on board prices used in our study. (Our prices are based on data of the Banco Central.)¹⁷

The divergent policy treatment of exportable and import-competing products by the government occurred because of the government's need to generate revenue through trade taxes, given the absence of a consolidated tax base and the lack of the institutional capacity to carry out low-cost collection of income taxes. Protection for import-competing production activities was always a poor choice as a source of revenue for the government, although the general population seemed unaware that the protection represented an implicit tax on food consumers.

Moreover, the large gap between the taxation of exportables and the support for import-competing activities in the 1980s was a direct consequence of distortions in the exchange rate market. Figure 7.4 shows the percentage gap between the exporter and the importer exchange rates from 1955 to 1998 (which became zero after dollarization). We do not incorporate real exchange rate misalignments into measures of agricultural distortions, unlike Krueger, Schiff, and Valdés (1991). Rather, we treat distortions in exchange rates as if they were equivalent to

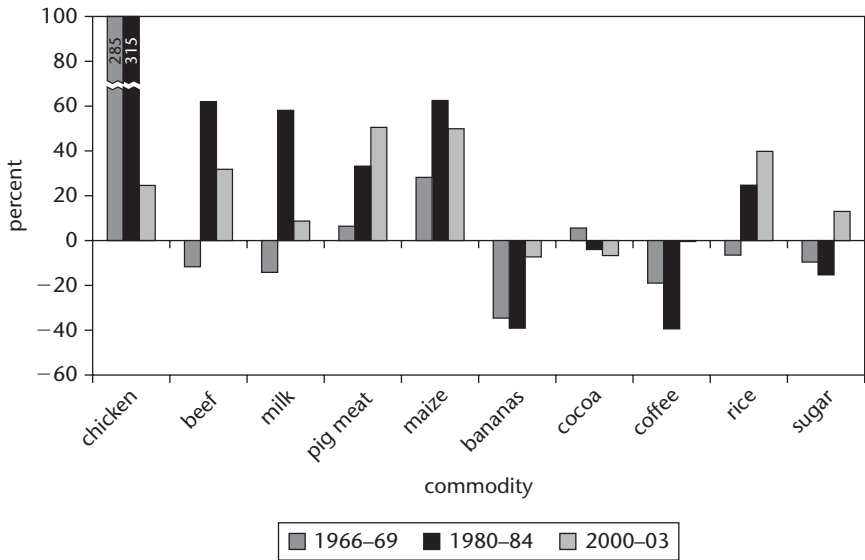
Figure 7.4. The Gap between Importer and Exporter Exchange Rates, Ecuador, 1955–98

Sources: Author calculations; Valenzuela, Wong, and Sandri 2007.

import and export taxes; indeed, the distortions translate into implicit protection for import-competing activities (Anderson et al. 2008; appendix A).¹⁸

Figure 7.5 shows the trends in the effects of agricultural policy on individual commodities during three periods: the first land-reform years; the period of high protection through the tariff structure, nontariff measures, and the exchange rate; and the most recent period. Bananas and coffee, the key sources of export revenue in 1966–69, were subject to a marked increase in taxation after the land-reform years, in contrast to the minimum intervention more recently. Government attempts to return cocoa to its role as a main-exporting commodity are reflected in the support shown during the reform years. This changed in the 1980s because of exchange rate distortions and, in the most recent period, because of export licensing and contributions.

Rice is the main staple food in Ecuador, and the related policies are therefore particularly important to consumers. From 1951 to 1968, specific exchange rate programs existed to support rice exports. These accounted for a nominal average NRA of 15 percent (IMF 2005). But the land-reform process had a severe impact on many rice production zones, and domestic demand absorbed the entire production from 1968 to 1974. Annual average production during this period was only 10 percent greater than the corresponding production figure in 1961. Since 1975, the country has assumed a fluctuating trade position. The overriding goal has been to secure floor prices for domestic producers. Our calculations show that protection in the rice sector rose to 37 percent during 1995–2003, which compares

Figure 7.5. NRAs by Product, Ecuador, 1966–2003

Sources: Author calculations; Valenzuela, Wong, and Sandri 2007.

with the estimate of Fernández (2003) that the effective rate of protection conferred by the SAFP was 24 percent.

Sugar evolved as a competitive export product until 1983. Thereafter, the existence of preferential quota access to the U.S. market and simultaneous import barriers distorted the evolutionary trend of the industry. Both of these mechanisms raised the price received by producers. It was as if an export subsidy had been conferred externally on local producers, who were simultaneously supported through import restrictions. Our 22 percent estimate for 1995–2003 coincides with the estimate by Fernández (2003) that the effective rate of protection was 21 percent for sugar producers over this period.

The trends in beef and milk production were a direct result of the land reform. Agricultural production was directed toward less labor-intensive activities to reduce the risk of losses in land tenure through occupancy pressure. After the negative protection of the land-reform years, both sectors capitalized on the protection offered through the import-substitution framework and the bans on imports. Our estimates show a peak rate of protection of almost 60 percent in the early 1980s, which is consistent with Chiriboga (1984), who found a fourfold increase in minimum domestic prices from 1978 to 1983. The results for the current period show assistance of 32 percent for beef and 9 percent for milk.

Chicken meat was once the most distorted sector because of protective trade policies, subsidies for intermediate imports, and access to subsidized credit. Production benefited because domestic prices were as much as three times higher than international prices. The greater openness to external trade has put the sector on track to a normal process of industrial development, although our calculations still show support (around 25 percent) during the most recent period. According to Fernández's numbers (2003), the SAFP provided an effective protection of 9 percent in 1995–2003, and Calderón (2005) reports an effective rate of protection of 78 percent in 2004. However, poultry production costs are directly influenced by the tariff-supported domestic prices of maize and soybeans, which, as feed mix inputs, represent up to 65 percent of the production costs of chickens.

Pig meat production has developed according to a pattern of industrialization and modernization and increasing protection conferred through border measures. However, like the poultry sector, the industry faces high production costs because the prices of maize and soybeans are supported. Our estimate of the NRA at the producer level is volatile because it requires an international reference producer price and trade cost proxies (see appendix to Valenzuela, Wong, and Sandri 2007 for details). The calculations for 2000–03 suggest that the domestic price is 50 percent higher than the border price.

Yellow maize, an SAFP marker product, is supported by a fluctuating tariff mechanism. Because local maize production is not sufficient to supply poultry and pork activities, which represent 90 percent of total domestic consumption, governments have sponsored import quota programs for producers who agree to buy up local production. Our NRA estimate for maize of 40 percent for the period covered by Fernández (1995–2003) compares with the Fernández estimate of the effective rate of protection, 18 percent. According to a Ministry of Agriculture study of competitiveness (CORPEI and INCAE 2000), maize production exhibits low productivity and high production costs, and profits are possible only because of the significant rate of protection at the border, 70 percent.

Soybean production is also supported by a SAFP tariff mechanism. According to data of the Ministry of Agriculture, current domestic production covers only two months of the requirements in soybeans of the poultry and feed industries. Security of supply is therefore a policy argument for supporting soybean production. Our estimates for 2000–03 show a rate of protection at 12 percent.

Indicators for nonagriculture and the RRA

Details about the NRA estimates for nonagricultural industries are presented in Valenzuela, Wong, and Sandri (2007). The production-weighted average for total nonagriculture shows minimum intervention during the period under study.

A protection estimate of 3 percent has been current recently. Import-competing industries have consistently enjoyed protection, which reached a peak of 33 percent for these industries in the early 1980s. The current average estimate for recent years shows 14 percent. Exportables have historically experienced taxation, but recent estimates show almost no intervention.

The sectoral view is useful as an aid in identifying differences in the policy treatment of these industries.¹⁹ Other primary sectors (mainly oil and gas production) have been subject to minimum distortions in the past, and our measures do not capture any distortion since 1995. Nonfood manufacturing has experienced a decreasing trend in protection; the estimate is around 5 percent for the most recent period. Based on our calculations, food production activities (lightly processed agriculture and processed food) are the most distorted sectors. Protection has focused on these sectors to enhance production stability and as a food supply reserve for consumers. Highly processed food industries show minimum intervention; the average is 4 percent for the most recent years. Lightly processed food production has experienced a trend from taxation to protection in recent years, with a peak of 20 percent (through tariffs).

After considering the distortions to nonagricultural industries, one is able to determine the RRA, which shows that there was a decreasing trend in the taxation of agricultural tradables. The peak RRA was -30 percent in 1970–74, and a minimum intervention was reached in 2000–03 (table 7.5 and figure 7.6). This RRA estimate understates the degree of reform, not least because, ignoring quantitative restrictions on trade, the only distortions captured in the NRA for nonagriculture are trade taxes. These NRA and RRA estimates attempt to include exchange rate distortions, however. If these distortions are ignored, the NRA, the trade bias index, and the RRA estimates would tend to be less negative, as shown on the final three rows of table 7.5.

Conclusions and the Prospects for Agricultural Policy Reform

Ecuadorian agriculture has experienced a profound transformation as a result of policy interventions during the past 45 years. The agricultural landownership reforms of the late 1960s and the 1970s affected patterns of production and resulted in marked structural changes. Price controls and myriad subsidies for production altered the sector during the 1980s. Trade policies and interventions in foreign exchange markets during the 1980s and 1990s created incentives to transfer resources to import-competing sectors and imposed a burden on export industries. Government protection was largely influenced by the lobbying of interest groups. Arguments advanced for agricultural protectionism included the

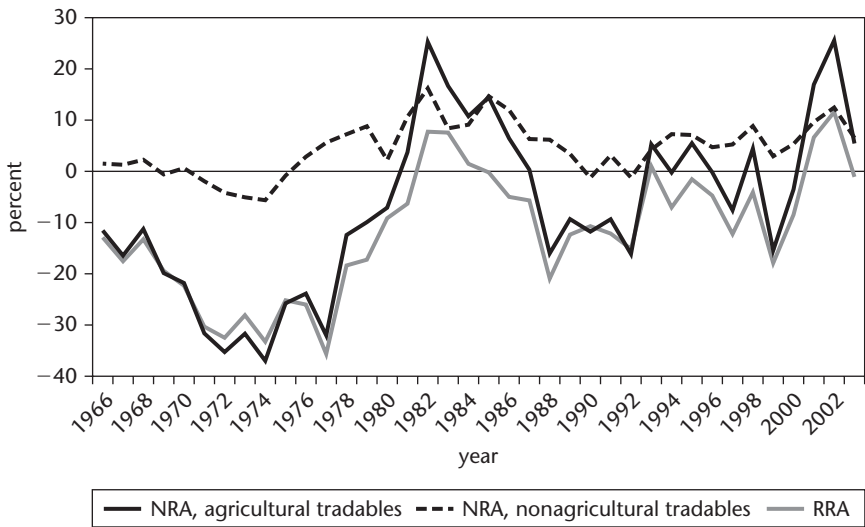
Table 7.5. NRAs in Agriculture Relative to Nonagricultural Industries, Ecuador, 1966–2003
(percent)

Indicator	1966–69	1970–74	1975–79	1980–84	1985–89	1990–94	1995–99	2000–03
Covered products	–14.8	–31.5	–20.8	9.9	–0.8	–6.4	–2.0	12.2
Noncovered products	0.0	0.0	0.0	0.0	0.0	–0.2	–1.7	–3.4
Total agricultural NRA ^a	–9.6	–22.4	–15.0	5.9	–1.0	–5.3	–2.0	10.2
Trade bias index ^b	–0.19	–0.28	–0.54	–0.55	–0.38	–0.09	–0.15	–0.20
All agricultural tradables ^a	–14.8	–31.5	–20.8	9.9	–0.8	–6.4	–2.6	11.2
All nonagricultural tradables	1.2	–3.2	4.8	9.4	8.6	2.5	5.8	8.5
RRA ^c	–15.8	–29.3	–24.5	0.3	–8.8	–8.8	–8.1	2.2
<i>Memo item: ignoring exchange rate distortions^d</i>								
Total agricultural NRA	–6.8	–21.2	–13.0	9.0	4.5	–2.5	–0.5	10.2
Trade bias index	–0.10	–0.24	–0.51	–0.44	–0.18	0.07	–0.10	–0.20
RRA	–12.3	–28.0	–22.5	3.7	–3.2	–6.2	–6.1	2.2

Sources: Author calculations; Valenzuela, Wong, and Sandri 2007.

- The inclusion of non-product-specific subsidies from 1990 to 2000 adds less than 0.1 percent to the NRA for total agriculture.
- Trade bias index = $(1 + NRA_{ag}/100) / (1 + NRA_{agm}/100) - 1$, where NRA_{agm} and NRA_{ag} are the average percentage NRAs for the import-competing and exportable parts of the agricultural sector.
- The RRA is defined as $100 * [(100 + NRA_{ag}^i) / (100 + NRA_{nonag}^i) - 1]$, where NRA_{ag}^i and NRA_{nonag}^i are the percentage NRAs for the tradables part of the agricultural and nonagricultural sectors, respectively.
- Without considering the distortions in the foreign currency market as captured by the methodology outlined in appendix A.

Figure 7.6. NRAs for Agricultural and Nonagricultural Tradables and the RRA, Ecuador, 1966–2003



Sources: Author calculations; Valenzuela, Wong, and Sandri 2007.

Note: For the definition of the RRA, see table 7.5, note c.

importance of securing production activities as employment generators and the need to secure domestic food supplies. However, export-oriented agroindustries were successful at competing internationally despite policy-induced distortions in the incentives affecting them, and export-oriented agriculture offers the best prospect for sustainable and stable employment and supporting a rise in rural incomes.

The policy environment of the last decade significantly decreased the antiagricultural policy bias. Because of the adoption of dollarization in 2000, the direct effect on agriculture of interventions in the foreign exchange market has been eliminated. However, the intrasectoral bias has persisted although there has been substantial reform in trade policy. Border measures continue to confer significant protection to import-competing activities. The trade policy reforms included the abolition of export subsidies and export taxes (some contributions and permit fees still apply) and a considerable reduction in tariffs and quotas.

The economic welfare of the country (including producers and consumers) would be enhanced by the elimination of the remaining agricultural protectionist measures. The greatest impact of agriculture in the effort to reduce poverty may occur through growth in internationally competitive activities that generate rural employment and increase rural incomes. For instance, cocoa, banana, shrimps, and, more recently, flowers have become lead export industries.

The near-term trade policy challenge for Ecuador is not to lose preferential market access to the United States through the eventual end of the benefits granted under the Andean Trade Promotion and Drug Eradication Act. It seems unlikely that preferential market access extensions will continue to be granted indefinitely in the absence of a free trade agreement between Ecuador and the United States. This is so especially because Colombia and Peru, Ecuador's most important trading partners in the Andean Community, have already concluded their negotiations with the United States.²⁰ The prospects for more trade reform and integration are also positive in two other areas: the ongoing negotiations between the Andean Community and the European Union and the government's apparent desire to initiate negotiations with the Southern Common Market.

Notes

1. The Galápagos Islands (Región Insular) were annexed to Ecuador in 1832.
2. Kee, Nicita, and Olarreaga (2006), using empirical trade models, estimate an own-country trade restrictiveness index of 15 percent for Ecuador. Restrictions faced by Ecuadorian exporters abroad averaged 18 percent.
3. This performance is considered the outcome of improved macroeconomic stability that overcompensated for the initial real exchange rate appreciation immediately after the implementation of dollarization (Abrego et al. 2006).
4. In 1998, remittances amounted to 3 percent of GDP (IFS Database 2006).
5. According to some accounts, the law was enacted in response to pressure from abroad to reform feudal agricultural practices, as well as pressure from humanitarian and liberal elements within the country and from large landowners in La Costa who needed additional cheap labor (Flores and Merrill 1991).
6. The distribution of agricultural land in Ecuador up to 1954 was one of the most unequal in Latin America. The first national agricultural census in 1954 showed that 57 percent of the agricultural land was concentrated in 3,704 units (around 1 percent of the total number of farms). At the other end of the scale, 73 percent of the landholdings were less than 5 hectares each and comprised a total of only 7 percent of the land area (Blankstein and Zuvekas 1973).
7. The authors conducted interviews about land reform. They interviewed Ivan and Carolina Mendoza, children of a former *terrateniente*, Don Mendoza. The children told the following story:

Our farm, Rosa de Oro, had been in our family's possession for generations; it was located in Urbina Jado, province of Guayas. It had 1,200 hectares of livestock, sugar, cocoa, and rice production. We lived a harmonious life with workers and their families. The greed of lawyers and political leaders in Guayaquil [capital of Guayas Province and largest city in Ecuador] infected our workers, and their hope for landownership was transformed into an aggressive encroachment on our land. The name of their cooperative *tierra o muerte* (land or death) reflected their actions. After facing death threats, we were forced off our land. The once-respected farm was reduced to 70 hectares in our possession and a myriad redistribution among many people. Without proper access to technology, and agricultural assistance funds wasted in nonagricultural, private activities, the reform was a catastrophe for this farm and this region. Many, wanting to imitate the lifestyle of Don Mendoza, saw the opportunity in loosely disbursed money from government agencies.
8. The amount of land legally redistributed was 1.5 million hectares (IERAC 1982).

9. Accurate information on agricultural employment is also lacking. Moreover, as Blankstein and Zuvekas (1973) explain, faulty procedures were used in taking the 1968 census, and data in that census are not comparable with data in the 1954 census.

10. The SAFP marker products are palm oil, white rice, sugar, sugarcane, pork, barley, milk, yellow maize, white corn, soybeans, wheat, and chicken meat.

11. The Andean Trade Promotion and Drug Eradication Act was implemented in 2002. It added product coverage to the Andean Trade Preference Act passed in 1991. The provisions of the act were originally set to expire in December 2006. However, limited extensions have been approved by the U.S. Congress.

12. However, marginally, the milk and beef sectors are exporters of high-quality products.

13. Anecdotal, in light of the presence of the avian flu virus (H9) in poultry farms in Colombia, Ecuador banned poultry imports from Colombia (reported on October 12, 2005, in *El Universo*, a newspaper published in Guayaquil, Ecuador).

14. We exclude the treatment of value added tax in our assistance calculations; Anderson et al. (2008) consider this a tax on consumption. A value added tax was first implemented in Ecuador in 1990 at a 10 percent rate, which was raised to 12 percent in 2000. The tax includes provisions for the exclusion of primary agriculture and lightly processed food products.

15. Non-product-specific assistance is incorporated in the calculations of agricultural support through the use of information in the GPRural Database, which focuses on public expenditure in agriculture and rural areas. The GPRural Database contains estimates of public expenditures on internal and external marketing, education, forestry support, special rural production support programs, managerial expenses in agriculture, irrigation infrastructure, agricultural research and extension, land acquisition programs, phytosanitary programs, integrated rural development, the promotion of associations, and regularization of landownership. The support provided through non-product-specific subsidies adds less than 0.1 percent to the total agricultural NRA in the 1990s.

16. The estimates of the two studies of the NRAs for exportables, importables, and total agriculture yield a correlation of 0.71.

17. Moreover, Valdés and Schaeffer (1996) classify beef as an exportable. We find their argument unconvincing. The bulk of beef production does not occur in border provinces. Valdés and Schaeffer claim that, although the data suggest that beef is an importable, beef is really an exportable because the data do not capture all the ad hoc cross-border trading. For instance, they write that large quantities of beef *walk* into the country from Peru for summer grazing and, later, either *walk* back or are sent back following processing. They write that a similar situation exists in Colombia.

18. Defining and estimating exchange rate misalignments are complex undertakings. There is no consensus in the economics profession toward the significance or the effects of the long-run behavior of a real exchange rate. It might be argued now that real appreciation in the foreign exchange rate uniformly lowers the prices of all tradables relative to the prices of nontradables and that a real devaluation has the opposite effect and, thus, does not have any effect within the tradables group of industries. Shifts in perceptions about the market might also generate foreign exchange rate misalignment relative to an outcome the fundamentals might suggest. This may also be quite independent of distortionary government policy choices. Additionally, the definition of a year as the base unit is not without bias if exchange rates vary appreciably within each year and products are sold unevenly throughout the year.

19. In the absence of reliable estimates, we have assumed the NRA for services is zero.

20. At the time our research was being completed, members of the Andean Community have been enduring heavy scrutiny. The República Bolivariana de Venezuela withdrew its membership as a consequence of the trade agreement of Colombia and Peru with the United States.

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MEXICO

Isidro Soloaga and Gabriel Lara

This chapter estimates indicators of direct and indirect interventions in agriculture by the government in Mexico from 1979 to 2005. To put the estimates in context, we describe the main characteristics of Mexican agriculture and the main economic policy developments that have affected the sector over the last 25 years. We present estimates of the nominal rate of assistance (NRA) for crops and animal products that comprise about 70 percent of the total value of the agricultural production of the country.

A significant share of the population lives in rural areas. In 2005, Mexico's population was 103 million, and 23 percent of the population was living in rural areas. This is less than half the 57 percent share that was living in rural areas in 1950. Agriculture remains important for employment. In 2005, about 20 percent (8.5 million) of the 43 million economically active were employed in agriculture.

Mexico is in the final stages of a demographic transition. The rate of population growth was 1.2 percent per year in 2000–05, not quite two-fifths the 3.1 percent annual growth rate of the 1950s and half the rate of 1990–95. Migration to the United States, to urban areas, and within urban centers are powerful forces in Mexican labor markets.

During the period we have analyzed, Mexico showed relatively modest economic growth. Growth rates averaged more than 5 percent per year from 1950 and 1970, but average growth in gross domestic product (GDP) fell to 2.6 percent per year between 1980 and 2005. This translates into per capita growth of only 0.9 percent per year or a cumulative 25 percent over the last 25 years. Table 8.1 shows the composition of growth by the three main economic sectors. Sluggish agricultural growth beginning in the mid-1980s led to a lower share for agriculture in overall GDP. The service sector now accounts for about two-thirds of total GDP.

Table 8.1. Real Growth and Sectoral Shares of GDP, Mexico, 1980–2005
(percent)

Indicator	1980–85	1985–90	1990–95	1995–00	2000–05	1980–2005
<i>Annual GDP growth</i>						
Total	2.0	1.8	1.6	5.4	2.0	2.6
Agriculture	2.3	0.4	0.9	1.7	1.7	1.4
Industry	1.1	2.4	0.9	7.3	0.4	2.4
Services	2.3	1.8	1.9	5.0	2.7	2.7
<i>Sectoral shares of GDP</i>						
Agriculture	6.9	6.9	6.2	6.0	5.4	6.3
Industry	26.1	25.7	26.3	27.3	26.7	26.4
Services	67.0	67.4	67.4	66.8	67.9	67.3

Sources: Author calculations; INEGI Estadística Database 2007.

Economic policy in agriculture since the late 1980s and, particularly, since the late 1990s has represented a clear departure from the schemes of earlier periods that focused on a closed economy and interventionist measures. Until 1990, agricultural policies were characterized by direct market interventions. In general, domestic prices were kept above world prices by means of tariffs and import quotas. Beginning in 1991, the policy regime was changed. Although some price supports remained, support payments were now being made on the basis of the amount of land owned or the amount of inputs used. This is more supportive of markets. The North American Free Trade Agreement (NAFTA) has also contributed to Mexico's trade liberalization. In the context of NAFTA, almost all trade barriers with the United States were eliminated by 2005. The main Mexican agricultural policy now in place involves direct income support for farmers.

Our NRA results illustrate the policy shift. For the agricultural products covered in this study, nominal assistance averaged 17 percent in 2000–04. This implies a one-third decrease from the NRAs in 1990–94. The share of non-product-specific assistance in the aggregate NRA rose significantly over the same period.

Agriculture in Mexico

Agricultural land in Mexico is approximately 75 percent rainfed and 25 percent irrigated. Major land uses include crop agriculture (13 percent of the total area), livestock (55 percent), and forestry (23 percent). Annual cultivation dominates, accounting for approximately 85 percent of total agricultural land use. Grains—maize, beans, wheat, and sorghum—occupy 80 percent of the cultivated area;

Table 8.2. Area Planted, by Main Crop, Mexico, 1980–2004
(percent)

Commodity	1980–85	1986–90	1991–95	1996–2000	2000–04
Maize	51	50	54	53	52
Wheat	6	7	6	5	4
Forage	15	16	14	18	21
Fruit	1	1	1	1	1
Vegetables	2	3	3	3	3
Industrial crops	4	4	3	3	3
Legumes	15	15	15	15	14
Oilseeds	6	5	4	2	2
Total	100	100	100	100	100

Sources: Author calculations; SIAP Database 2007.

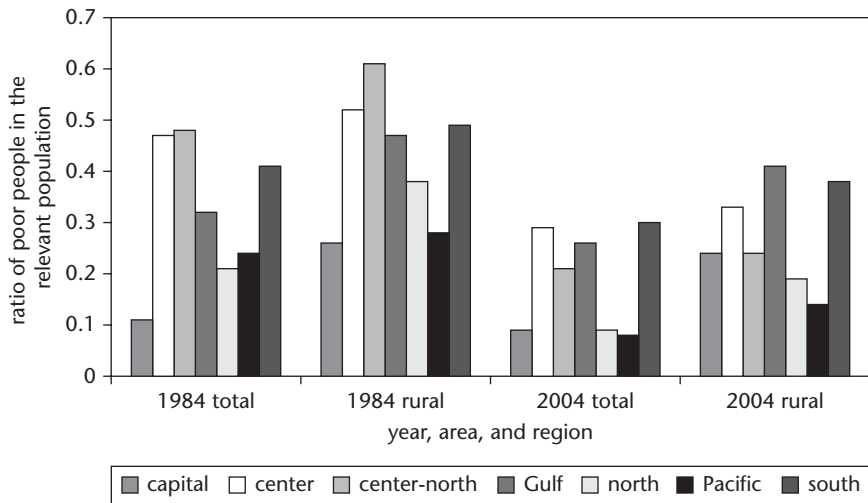
maize alone occupies 52 percent (table 8.2). Much of the agricultural sector is characterized by low-value crops and low labor productivity.

There are vast differences across rural areas in Mexico. A small number of large commercial, globally competitive farms coexist alongside many import-substituting, subsistence-oriented small farms. The overall incidence of poverty is more than five times higher in the rural sector than in the urban sector, although there are large regional differences. Poverty is much more prevalent in the south.

Over the past 15 years, the rural sector has experienced sweeping reform in the land tenure system, prices, markets, and trade liberalization. Public investments, privatization, fiscal transfers, and the retrenchment of key autonomous public firms—the *paraestatales* or parastatals—have also affected the sector. The policy changes have produced shifts in the rural economy, increasingly linking local farm prices to international prices. Farmers in productive areas have been switching to new technologies and higher-value crops. Large-scale farmers—generally well connected to markets—have adapted easily to the new environment. Subsistence farmers, on the other hand, have mostly remained isolated from markets. This is because they tend to live in regions with limited potential for shifting to higher-value crops or to sustainable intensification. Many of these farmers have resorted instead to migration and employment in local off-farm jobs to complement their agricultural incomes.

The pressure on marginal lands is still high, and forests at the agricultural frontier continue to be cleared for subsistence agriculture and animal husbandry.

Agricultural yields for major importables and exportables grew during the 1990s, particularly on irrigated land. The heterogeneous nature of Mexican agriculture (one-third of farmers produce for self-consumption) and a series of sectoral programs to manage the transition to a more market-oriented economy have helped prevent a collapse in the domestic production of corn and other importables since the adoption of NAFTA.

Figure 8.1. Poverty Headcount Ratio, by Region, Mexico, 1984 and 2004

Source: Soloaga and Torres 2007.

Total and rural poverty levels (headcount index) are shown by region in figure 8.1. Poverty levels in rural areas are somewhat higher than those in urban areas, but there has been a substantial drop in the levels over the last 20 years. There are still regional differences in poverty. In the capital area, the north, and the Pacific, there is relatively less poverty than in the center, the Gulf of Mexico, and the south.

A recent study has quantified the impact of growth on poverty reduction (Soloaga and Torres 2007). The study finds that urban economic growth has an elasticity of around 1 in reducing headcount poverty levels in urban areas. Rural growth (broadly defined as growth in agricultural and nonagricultural output in rural areas) has the same elasticity in reducing headcount poverty in rural areas. But the authors also find that rural growth has a greater impact on other poverty measures (the depth and severity of poverty) and thus has an impact that is more pro-poor than the impact of urban growth.

Economic Policy and Agriculture

Since the mid-1980s, the government has undertaken significant changes in economic policy, mostly aimed at driving the economy toward more openness and more competition. The opening of the economy and deregulation have had a substantial impact on the agricultural sector. The new policies have included significant trade and price reforms, as well as the privatization of parastatals, some

of them crucial to the agricultural sector. These reforms have increasingly exposed the sector to global forces and to new sets of regulations in land, output, and input markets. This section provides a summary of the main aspects of the policy reforms. (The section draws on Soloaga 2003 for information about developments up to 2001.)

The opening of the economy

Since 1985, the government has significantly reduced tariffs. Mexico joined the General Agreement on Tariffs and Trade in 1986. With the exception of sugar, the maximum tariff rate dropped from 100 percent to 20 percent. Mexico met most of its international commitments ahead of time and ahead of other developing countries. For example, the General Agreement on Tariffs and Trade allowed Mexico to have a maximum tariff of 50 percent, but tariffs have been significantly lower since the 1980s, and many import licenses were converted to tariffs.

In 1994, Mexico signed NAFTA with Canada and the United States. NAFTA's main declared purposes are to eliminate tariff and nontariff barriers among member states and to facilitate investment within the free trade area. NAFTA also contains provisions dealing with the environment and labor rights. Tariffs among NAFTA members are set at levels that are lower than the rates in General Agreement on Tariffs and Trade provisions. The three countries agreed to eliminate tariffs and nontariff barriers by 2008 according to a fixed program. Under NAFTA, Mexico has liberalized 42 percent of the tariff codes and agreed to phase out tariffs on foodstuffs and cotton over a period of 5 to 15 years. In addition, import licensing for the related crops began to disappear, and subsidies for bread producers were eliminated (Rello and Trápaga 2001).

Changes in domestic policies

In the agricultural sector, domestic policy changes included the liberalization of land property rights in the *ejido* (communal land) system; the elimination or reduction of producer price supports for basic crops; the closing of the Compañía Nacional de Subsistencias Populares (Conasupo), the state agricultural trade enterprise; and the reduction or elimination of input, credit, and insurance subsidies (OECD 1997; Cornelius and Myhre 1998; Casco 1999; Yúnez-Naude 2003). Each of these policies is described hereafter.

Reform in the ejido sector

The ejido sector was recognized by the Mexican Constitution of 1917, which embodied a strong program of land reform. Under the program, the government

granted land and water resources to communities of landless producers. Community members, or *ejidatarios*, had usufruct rights to the land that were contingent on occupation and cultivation. They were prohibited from hiring labor. Under the ejido system, land could not be alienated, rented, or mortgaged, and absences from the ejido land of more than two years led to a forfeit of the rights. By the late 1980s, the system accounted for 30,000 ejidos and 3.2 million ejidatarios, about 70 percent of whom were agricultural producers. The ejido sector controlled the majority of the country's agricultural resources, including approximately half of Mexico's farmland and 70 percent of the nation's forests. The sector was responsible for more than 70 percent of the nation's corn production and 80 percent of bean production (de Janvry et al. 1995). However, by the late 1980s, the sector was obsolete; it had become characterized by productive inflexibility and increasing noncompliance with respect to the sector's legal framework. To allow the ejido sector to adjust to economic liberalization, the government initiated a bold program of agrarian reform in 1992.

Reform of the ejido sector was viewed as a critical component of the reform of the agricultural sector in general. A change in the land tenure system and greater economic collaboration with the private sector were considered key ingredients in a reform package that would enable the ejido sector to modernize and adjust to the economic reforms. In 1992, the government modified article 27 of the Mexican Constitution, which governed all land use and the related agrarian laws. In the ejido sector, there were four important changes. First, the 70-year-old agrarian ejido reform program came to an end. The concentration of land in large estates continued to be forbidden, and a legal mechanism was created to distribute individual landholdings in excess of the legal limits. Second, the prohibitions on the sale, rent, or sharecropping of parceled ejido farmland and land for human settlement were removed. (Nonetheless, the sale of parceled farmland to outsiders required the approval of the ejido assembly unless the latter had previously approved the passage of the land parcel to *dominio pleno* or full title status.) Third, ejido members were prohibited from redefining the boundaries of communal land or from exercising the traditional right that allowed them to assign common land individually (though it cannot be appropriated individually). Fourth, economic associations between private sector entrepreneurs and ejidatarios were prohibited.

These reforms were expected to have several benefits. It was anticipated that they would encourage investment in ejido lands because the farmers had gained greater land security and higher projected incomes and returns to investment. The reforms also were expected to increase the supply of credit because farmers could now use their land as collateral for loans. The ability to engage in rental and sale transactions was expected to promote a more efficient allocation of land among

agricultural producers because land would be passed from less-productive to more-productive farmers. Although the state no longer told ejidatarios what to grow and how to market their output, the policy also meant that the government would no longer provide widespread technical assistance, input and output subsidies, and marketing channels.

The main instrument of the reform was the Certification Program of Ejido Rights and Titles to Urban Lots (Programa de certificación de derechos ejidales y titulación de solares urbanos). As ejido land became tradable, the program helped to resolve boundary conflicts and regulate land tenure, and property right certificates were issued to members of the ejidos. The program, which started in 1993, allowed ejidatarios to choose their property rights regime, delineate ejido boundaries, and measure individual plots. Eventually, certificates were issued for individually owned plots (including house lots) and communally managed lands. The program also played an important information-gathering role. All communities undertook a diagnosis of their legal situation with regard to land. Overall, 2.9 million farmers received titles and certificates, and 57 million hectares of land were measured and mapped.

Many positive outcomes have been attributed to the program, including greater equity through increased land access among the ejidatarios and the approximately 1 million *avencindados* (nonejidatarios who reside on ejido land) and *posesionarios* households (nonresident nonejidatarios who have obtained permission to work ejido land) that previously had no property rights, conflict resolution and social peace in rural areas, improved governance and transparency at the grassroots, greater access to common property resources, greater participation in off-farm labor markets; and improved operation of land markets. A cost-benefit analysis of the program suggests that, although the costs were not inconsequential, the program was justified on economic grounds (World Bank 2001).

Changes in price supports and other mechanisms

Significant reforms in price support mechanisms were initiated in the late 1980s and have continued through to the present. In 1988–89, guaranteed prices for wheat, sorghum, barley, rice, and oilseeds were eliminated (although a similar system of agreement prices was in place for many of these crops between 1992 and 1995). Price subsidies for corn and beans were due to be phased out gradually in the early NAFTA years and replaced by a new system of direct income support payments, the Programa de Apoyos Directos al Campo (Procampo), a farm support payment program. They were eliminated during the currency devaluation in late 1994 when Procampo was introduced. The government withdrew from procurement and marketing functions (except for beans and corn, although the government also sharply reduced its involvement in these crops after the currency devaluation).

Input subsidies for seeds, fertilizer, pesticides, machinery, and diesel fuel were partly eliminated. An input subsidy for electricity to pump groundwater was the only major such subsidy that was still in place after the devaluation. Felipe Calderón, the president of Mexico, has pledged to maintain this subsidy until the end of his term in 2012.

The closing of Conasupo

A key government player in agricultural policy was the state agency Conasupo. The dismantling of this agency is an example of the diminishing role of government intervention in the agricultural sector.

From its creation until the macroeconomic crisis of 1982, Conasupo was expanding. Its subsidiary organizations grew, and new ones were created. The agency's activities included the processing of grains, vegetable oils, and milk powder to produce animal feed and consumer goods such as corn, flour, wheat, pasta, edible oils, and fluid milk. Conasupo also managed retail shops that marketed basic foods among the rural and urban poor, and it was involved in the trade of fertilizer and improved seeds and in training programs among poor farmers and farmworkers.

Conasupo bought a significant amount of maize and other outputs from producers at nationally guaranteed prices, and it imported maize at international prices for sale to regional millers at set prices. A substantially lower price was granted to millers in the Federal District. Transportation and handling expenses were absorbed by the agency (Larson 1993).

Conasupo's functions began to be reduced at the beginning of the 1980s. From 1991 to 1999, price interventions by Conasupo were limited to beans and corn. Subsidies for inputs such as seeds, fertilizer, pesticides, machinery, and diesel fuel were dismantled. Along with several other governmental agencies, the Conasupo subsidiaries active in financial support programs were privatized, dismantled, or transferred to the control of farmers. By 1999, the closing of Conasupo was practically complete.

Until 1989, Conasupo purchased part of the domestic production of each of Mexico's 12 basic crops. In 1996, after a sharp drop in the international price of corn, the government initiated an intermediate scheme for price setting, whereby the domestic price was fixed at a base price at the regional level. The base price was intermediate between a guaranteed price and the international price. In the winter of 1996/97, the price support scheme for corn was altered. Corn and beans were bought within the areas of production by Conasupo at indifference prices, which varied depending on the region. Under this scheme, Conasupo became a buyer of last resort for white corn for human consumption, granting purchases of corn to those farmers who could not obtain a price higher than the indifference price in the private sector.

The quantity of domestic production purchased by Conasupo declined in line with the organization's decreasing role in domestic corn and bean markets. Conasupo bought approximately 41 percent of the domestic supply of corn in 1993 and 31 percent in 1994, but only 12.5 percent in 1998. In 1991, the governmental agricultural marketing agency, Apoyos y Servicios a la Comercialización Agropecuaria (ASERCA), assumed the role of Conasupo in supporting producers through price interventions. In the case of corn, the continuation of the policy of guaranteed prices applied by Conasupo meant growing market price support each year from 1989 to 1993.

Rural financial markets

Rural financial markets in Mexico are comprised of formally organized institutions, as well as informal lenders (trade lenders and moneylenders). The latter cover a significant part of the market and are characterized by high interest rates. Government intermediaries and private commercial banks are the country's main formal lenders. Up to the mid-1990s, rural entrepreneurs had only limited access to financial services, and markets were considered either not competitive or highly inefficient (World Bank 1995). There were two main formal development institutions of the government in the agricultural financial sector: the Banco Nacional de Crédito Rural (Banrural)—the National Rural Credit Bank, which was replaced by Financiera Rural in 2003 (see below)—and the National Trust Funds for Agriculture (Fideicomisos Instituidos en Relación con la Agricultura, FIRA).

Banrural was created in 1975 through the merger of three public banks: the Banco Nacional de Crédito Ejidal, the Banco Nacional Agropecuario, and the Banco Nacional de Crédito Agrícola. Its aim was to provide credit to low-income agricultural producers who were unable to offer collateral. Banrural comprised 12 regional banks and a national bank located in Mexico City. Before 1995, its operations were complex; it supplied massive amounts of credit to small farmers, distributed production inputs, bought products, and participated in an insurance system.

FIRA functions as a discount banking service so first-tier lenders may discount their credit schemes to provide working capital and investment for low- and medium-income producers (Carrillo 2001).

After the 1988 liberalization, the government sold off its commercial banks, keeping only the development institutions. This reform forced Banrural and FIRA, among others, to operate in a more efficient and competitive way with respect to private intermediaries, thus generating important reforms among them as well. The total amount of loans to the sector fell in real terms beginning in the mid-1980s and more significantly after the 1995 financial crisis. The participation

of the agricultural sector in financial markets also decreased sharply. More than 50 percent of the loans were short term, and the rest were middle or long term.

By 2003, Banrural was experiencing financial problems. Around 60 percent of its outstanding loans were unpaid. It was replaced by Financiera Rural, which has the same objectives as FIRA, although it is able to offer loans directly to producers (OECD 2007). Meanwhile, FIRA's activities were expanded, and it now also channels resources to newly created rural financial intermediaries. A new system, the Programa de Apoyo para Acceder al Sistema Financiero Rural (Support Program for Accessing the Rural Financial Sector) provides cash guarantees, in addition to the guarantees supplied by FIRA.

The National Solidarity Program (Programa Nacional de Solidaridad) was announced in the inaugural address of President Carlos Salinas on December 1, 1988. It is an umbrella social welfare agency that, besides providing credit to poor farmers and basic infrastructure, seeks to promote health, education, housing, nutrition, and employment. It has consolidated the programs in various government agencies to coordinate their operations in a more cost-effective manner.

Access to rural financial services among low-income households remains problematic (World Bank 2001; OECD 2007). Because of years of subsidized, directed credit through government banks, the rural credit system no longer responds well to the credit needs of low-income rural households seeking to farm their way out of poverty. A lack of financial discipline, exacerbated by periodic debt forgiveness initiatives, has resulted in poor recovery rates in subsidized, directed programs that tend to benefit the more well off in any case. Rural financial markets are shallow, segmented, and individualized. There are few lenders, and most are high cost. Nonbank financial intermediaries, which were resilient in the face of the financial crisis in the mid-1990s, have been constrained by an inadequate legal, regulatory, and supervisory environment.

As a result of these factors, there is a generalized lack of public confidence in the banking sector and in nonbank financial intermediaries. This lack of confidence is costly for private individuals and in terms of the country's development. The poor save, but the ways they save tend to be high risk and yield low returns. For example, most savings take the form of highly liquid and insecure physical assets such as livestock that show high mortality rates. Savings are held 56 percent in chickens and 40 percent in pigs. Moreover, according to a recent survey, most farmers reported that they had difficulty selling their livestock during emergencies. They had to borrow and then repay the loans by selling the livestock later. Other important lending channels for the rural poor include savings associations and informal lending among friends. Informal lending exhibits a 20 percent arrears and default rate. *Tandas* (savings societies) report a 6 percent noncompliance rate (members who cease to contribute once they have

taken out their loans). The major forms of savings scored low in terms of liquidity, return, and security.

Programs providing assistance during the transition to a more open market

The government has implemented major rural programs to assist producers in managing the transition to a liberalized and competitive system (World Bank 2001; OECD 2007). The most important programs are Procampo, which was implemented during the fall and winter of 1993/94; the Alliance for the Country-side (*Alianza para al Campo*) (1996); ASERCA, which has provided marketing subsidies since 1991; and the Secretariat of Social Development, a government ministry that, among other initiatives, supplies infrastructure subsidies in poor areas. Another important program that guides resources to the poorest producers is *Crédito a la Palabra*, a program for the provision of credit without collateral (*crédito a la palabra*) that is administered by the Secretariat of Social Development. Altogether, these programs have supported the incomes of farmers facing competition from abroad and also promoted the use of commercial inputs. This has led to a rise in the productivity of at least some farmers (Yúnez-Naude 2002). Nonetheless, since many of the current subsidies cover a limited range of traditional crops, they may not favor a change in production to account for Mexico's comparative advantages (OECD 2007).

ASERCA

ASERCA, created in 1991, has partially taken the place of Conasupo's price and direct market interventions by subsidizing marketing activities among producers of crops besides corn or beans and by providing direct income transfers for farmers producing basic crops. The most important interventions have involved marketing subsidies and the promotion of production contracts. The interventions have had four main objectives: promote the development of regional grain markets, while ensuring the absorption of marketable surpluses; reduce the price uncertainty that characterizes these crops; help eliminate imbalances in production among the country's regions; and develop appropriate channels for the exchange of information about prices, crops, areas under cultivation, and other key issues that may help farmers make better management decisions.

To accomplish these objectives, ASERCA's marketing subsidies originally covered the difference between a reference price, which was established during the previous year, and the actual market price. Under this program, the government and producer organizations negotiated prices for certain commodities that were above the prices that would have prevailed if the commodities had been imported.

Then, in a public bid, interested buyers of the crops applied for subsidies to commit to buy a certain amount of the crops at the negotiated prices. Over 90 percent of the program's marketing subsidies were allocated for wheat, maize, and sorghum. Subsidies were directed mainly toward regions with a large share of these crops and were awarded to marketing firms.

Until 2001, the scheme was increasingly criticized, mainly because a few large buyers asked for subsidies that were too high relative to prevailing marketing costs and because it was difficult to guarantee that the negotiated price was being paid to the producer (Rosenzweig 2003). Consequently, the program was altered in 2001, and subsidy payments began being made directly to producers who enroll in the program in certain designated states that have an historical surplus in one of the subsidized products. In 2003, this new focus of ASERCA operations was also changed. The program now addresses its efforts on producers with surplus production, disregarding the state where the producer has operations. Moreover, the practice of announcing an agreed price for each season on a year-to-year basis has been replaced by a multiyear commitment over a five-year period for each product in the program. This new approach is known as target income (*ingreso objetivo*) and operates as a deficiency payment. The scheme pays only up to a government-set maximum yield per hectare that is determined for each region (OECD 2007).

Notwithstanding these recent reforms, it is likely that the ACERCA subsidy program undermines the general aim of trade reform in Mexico, namely, to create appropriate incentives so that producers will shift from grains to fruits and vegetables (World Bank 2001). This is because ASERCA covers substantial portions of the national production of grain crops. For example, in 1999/2000 it covered 32 percent of the spring and summer production and 47 percent of the fall and winter production of maize. Since 1996/97, ASERCA's coverage of fall and winter sorghum production in Tamaulipas (the most important state for sorghum) has varied between 86 and 90 percent. For wheat, ASERCA's interventions covered almost 100 percent of production during the 1998/99 fall and winter cycle. The consequences of these interventions in grain markets are particularly troublesome in view of the fact that the prices determined by ASERCA generally exceed those that would have prevailed in a completely liberalized environment. Taken together, ASERCA's interventions have impeded an adjustment in regional production patterns based on local comparative advantage.

There are two other major problems with the program. It sets producer prices without regard for adjustments according to the development of the crop cycle, and it eliminates the incentive to establish local storage facilities that producers may use to sell their products at the most profitable moment.

There is ample evidence that a major problem in converting from grains to fruits and vegetables arises during marketing. Rather than concentrating on

supporting grains, ASERCA should have concentrated on promoting and developing the marketing of perishables to attract resources toward the production of these crops. It is hoped that the new system will eventually eliminate the distortions.

Procampo

A major reform in the government's interventions in the production of staples was implemented in parallel with the creation of ASERCA. This consisted in the elimination of the guaranteed price system that Conasupo had established for producers of nine crops: cottonseeds, grain, barley, rice, soybeans, sorghum, safflower, sunflowers, and wheat. To facilitate the transition from price supports to free markets, Procampo—a partially decoupled income support program for all farmers producing basic crops—was created in 1994. Under the management of the Secretariat of Agriculture, Procampo provides cash transfers to 90 percent of all farmers. The transfers are provided on a per hectare basis. Procampo's mission from its inception has not been to support the production of specific commodities, but to support farm incomes (Baffes and Meerman 1997). Nonetheless, in practice, payments are linked to grain and oilseed production.

Procampo's main objective is to compensate producers for the elimination of deficiency payments (the payments based on the difference between administered prices and market prices), thus compensating agricultural producers for the loss of revenue caused by the liberalization of agricultural trade and the removal of price supports in the grain sector. It was planned as a 15-year program to be phased out by 2008. Eligibility initially depended on the number of hectares planted in nine key grains and oilseeds in the three agricultural years prior to and including August 1993. The nine crops—corn, beans, rice, wheat, sorghum, barley, soybeans, cotton, and cardamom—were all previously covered by the Conasupo deficiency payment schedule. The program was expanded early on to apply to land that was planted or otherwise maintained for raising livestock or for forest products or that was covered by an eligible ecological project. No new beneficiaries were added after 1994. The scheme recognized eligible land parcels, not particular farmers, and therefore payments went to those working specific pieces of land. Also, because payments were set for each cropping season, they could be made more than once a year if irrigation made more crops per year possible.

Procampo has been important because of the number of producers it has reached and the large expenditures involved. By 2005, Procampo expenditures amounted to around US\$1.4 billion (0.2 percent of GDP), and the program was benefiting 2.4 million producers who owned 12 millions hectares of land in about 3.5 million land parcels. It is estimated that Procampo has contributed about 8 percent of household incomes among ejidatarios, although the share may be as high as 40 percent among low-income families. A modification to the scheme in

2001 assigned preferential treatment to poor producers, who were defined as producers with less than five hectares of rainfed land. These producers received payments in advance of planting; producers with less than one hectare received the payments corresponding to a full hectare. In 2001, the scheme also allowed financial institutions to make advance payments to producers who presented investment plans that each cost the equivalent of the net present value of the future entitlements of the respective producer.

Secretariat of Social Development

The Secretariat of Social Development supports programs that have as their main purpose the eradication of poverty (World Bank 2001). The agricultural sector components of two programs of importance—the National Solidarity Program and Crédito a la Palabra—are reviewed above under the discussion of rural financial markets. The National Solidarity Program also aims at promoting the development of social infrastructure at the municipal level. The program was initiated in the early 1990s and has been characterized by significant variability in terms of effectiveness, sustainability, and targeting. There have been several reorganizations.

Crédito a la Palabra supports low-interest, collateral-free credit among small producers on resource-poor rainfed plots. The producers typically cultivate grains for home consumption. To be eligible for the program, they must demonstrate a legitimate entitlement to the land they are cultivating, and they must show that they have been regular residents in their communities. The program was launched in 1989 and was expanded in 1990 to include the solidarity funds for production (*fondos de solidaridad para la producción*), which were created that year to assist farmers excluded from Banrural. The funds consisted of payments made directly to producers, who were obliged to reimburse the money into community funds. These funds then provided the seed capital for nonbanking financial intermediaries, the *cajas solidarias* (solidarity savings associations), created in 1992. These entities emphasized savings mobilization. Their savings-equity ratio rose from 0.09 in 1995 to 0.33 in 1999. Crédito a la Palabra has been available to help producers in the private sector and the social sectors. It covers up to three hectares of land per producer. At the peak of its coverage, Crédito a la Palabra was used by 760,000 producers cultivating 1.4 million hectares. The states where most of the beneficiaries are located are Chiapas, Guanajuato, Michoacán, Oaxaca, and Veracruz. The program has an insurance component that helps producers write off loans in case of harvest failure. In 2000, the amount loaned was Mex\$550 per hectare. While the *cajas solidarias* have achieved an extensive outreach in marginal areas, their main challenge has been financial sustainability; thus, arrears rose from around 4 percent of the portfolio in 1994 to around 22 percent in 1999.

Alianza

The Alianza program was introduced in 1996 to provide matching grants for agricultural producers to promote investment in infrastructure, decrease the incidence of animal diseases, and support the integrated development of rural communities. Alianza is decentralized; cofinancing is required by state governments and beneficiary producers. It includes several subprograms. The most important are programs in ferti-irrigation (drip irrigation, plus fertilizer), mechanization, the provision of equipment to rural areas, and pasture improvement and the *Kilo por Kilo* Program, which provides growers with 1 kilogram of certified seeds for the price of 1 kilogram of normal seeds. Together, these programs account for more than 50 percent of Alianza's budget. State governments are responsible for the implementation of the program at the local level. Most of the programs require a matching contribution by the beneficiary (World Bank 2001).

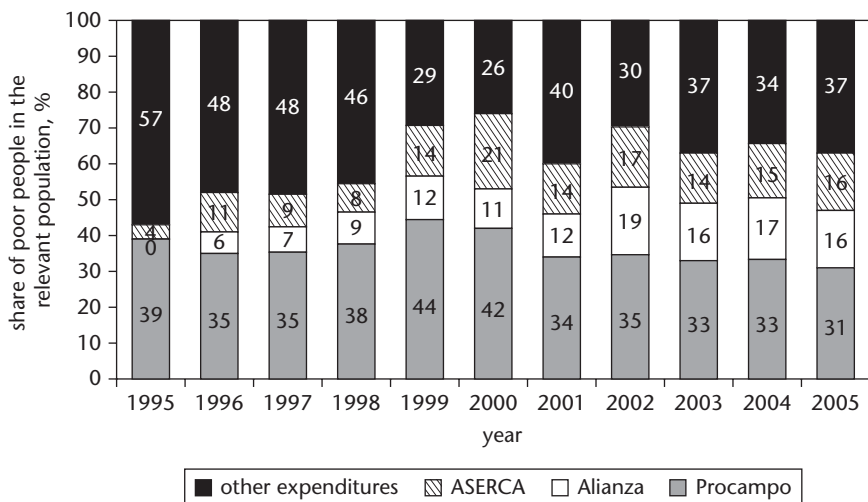
The Alianza program was reorganized in 2003 (the official name was changed to *Alianza Contigo*, alliance with you) to serve as an umbrella for around 100 programs. These may be grouped into three categories: capitalization programs, product chain enhancement programs, and programs involving the development of technologies to support the agrifood system (OECD 2006).

Alianza has been supported by the 2001 law on sustainable rural development, which represents a shift from the one-sector agricultural policy that was relied on for decades to a policy that aims to integrate a range of activities carried out by several ministries and levels of government (federal, state, and municipal). The law established the Interministerial Commission for Sustainable Rural Development to coordinate rural policy and the Councils for Sustainable Rural Development to foster the participatory involvement of civil society in rural development. The law also developed the Programa Especial Concurrente, which evolved into a scheme to append a rural budget to the federal budget every year (OECD 2007).

More-recent programs

A special program to support the use of electricity and fuel in agricultural activities was established in 2002. The program introduced two prices for electricity: a subsidized price and an even lower price for electricity consumption to pump water for irrigation at night. These prices were in addition to the two prices for electricity for pumping (one for low tension and one for medium tension). In 2003, a preferential pricing scheme (with some quantity restrictions) was launched for diesel fuel for machinery and equipment used in agricultural and livestock production.

The Livestock Productivity Improvement Program (Programa de Estímulos a la Productividad Ganadera) was created in 2003. To be eligible to receive the program subsidy, producers must register their cattle with the National System of

Figure 8.2. Four Main Farm Programs in the Secretariat of Agriculture's Budget, Mexico, 1995–2005

Source: Fox 2006.

Individual Cattle Identification. The system helps to strengthen sanitary controls in the cattle sector. The subsidy consists of one payment per animal per year over four years. Payments start at about US\$28 in the first year and increase each year by about US\$10.

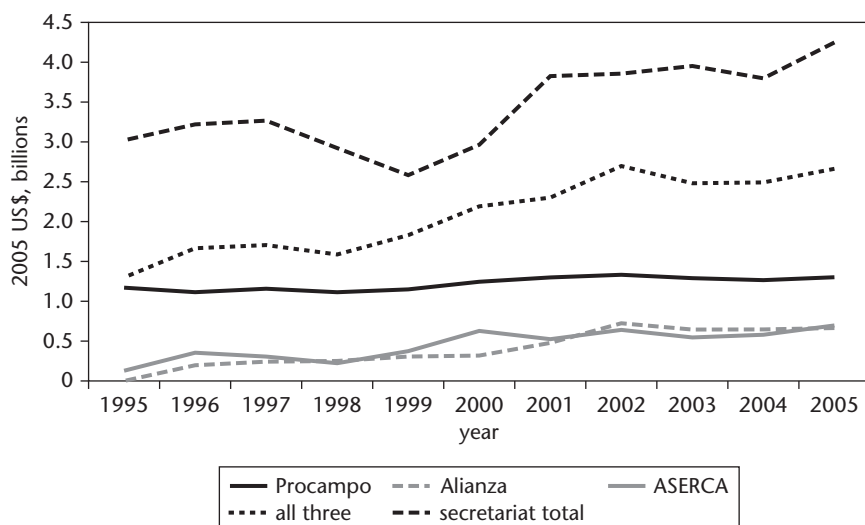
Expenditures on agricultural programs

Figure 8.2 offers a breakdown of annual government expenditures on four principal agricultural assistance programs in 1995–2005. After 1994, Procampo payments represented between 31 and 44 percent of the budget of the Secretariat of Agriculture. Expenditure on Alianza and ASERCA increased in importance over the period. These three programs together represented about two-thirds of the secretariat's total expenditures over 2000–05. In real terms, total expenditures on the three major programs showed a clear upward trend between 1995 and 2002. It reached a plateau in 2002 at about US\$2.6 billion (2005 U.S. dollars), equivalent to about 10 percent of Mexico's agricultural GDP (figure 8.3).

Summary

The main agricultural policy measures since the mid-1980s are summarized in table 8.3. They were initially characterized by direct market interventions. In general, domestic prices were kept above world prices by means of tariffs and import quotas. The system began to change in 1991, when the government started providing

Figure 8.3. Expenditure on the Main Farm Programs, Secretariat of Agriculture, Mexico, 1995–2005



Source: Fox 2006.

direct income payments and region-specific marketing supports. Border measures were progressively liberalized, and the extremely high tariffs were converted to tariff and quota schemes. The implementation of NAFTA in 1994 implied a de facto liberalization for the most important agricultural goods. The in-quota tariff was, in general, set to zero, and, because it was not filled that effectively, was the marginal tariff. By 2004, the import tariffs of almost all the main agricultural products were equal to zero. The liberalization process during the implementation of the NAFTA agreement is expected to be completed for the remaining goods by 2008. Thus, agricultural policies in Mexico have shifted from a heavy reliance on market price supports that increase domestic producer prices to a heavy reliance on budgetary payments (OECD 2006).¹

Estimating the Rates of Distortion to Agricultural Incentives

Our project's methodology (Anderson et al. 2008; see appendix A) defines indicators of policy-induced agricultural price distortions that are distinct from market factors, infrastructural investments, and services that change prices and incentives more generally. The focus is on government-imposed distortions that create a gap between actual domestic prices and the prices as they would be under free-market conditions. Because it is not possible to understand the

Table 8.3. Main Price and Income Support Measures, by Product, Mexico, Mid-1980s–2005

Commodity	Mid-1980s			1995							2005				
	Support prices			Market price support			Direct payments		Border measures		Direct payments				Border measures NAFTA
	Conasupo guaranteed price	Concerted price	Border measures	Conasupo guaranteed price	Concerted price	Marketing subsidy, PACE	ASERCA	Procampo	NAFTA	GATT	Procampo	ASERCA	Alianza	PROGAN	
Maize	yes	n.a.	P	yes	n.a.	yes	n.a.	yes	TQ	TQ	yes	yes	yes	n.a.	TQ
Beans	yes	n.a.	P	yes	n.a.	yes	n.a.	yes	TQ	TQ	yes	yes	yes	n.a.	TQ
Wheat	yes	n.a.	P	n.a.	n.a.	n.a.	n.a.	yes	T	TQ	yes	yes	yes	n.a.	Free
Barley	yes	n.a.	P	n.a.	n.a.	n.a.	n.a.	yes	Q	TQ	yes	yes	yes	n.a.	Free
Sorghum	yes	n.a.	P	n.a.	n.a.	n.a.	n.a.	yes	Free	T	yes	yes	yes	n.a.	Free
Rice	yes	n.a.	T	n.a.	n.a.	n.a.	Yes	yes	T	T	yes	yes	yes	n.a.	Free
Soybeans	yes	n.a.	P	n.a.	n.a.	n.a.	n.a.	yes	Free	T	yes	yes	yes	n.a.	Free
Sugarcane	n.a.	yes	P	n.a.	yes	n.a.	n.a.	n.a.	Q	TQ	n.a.	n.a.	yes	n.a.	Q
Coffee	n.a.	yes	P	n.a.	n.a.	n.a.	n.a.	n.a.	T	TQ	n.a.	n.a.	yes	n.a.	T
Milk	n.a.	n.a.	P	n.a.	n.a.	n.a.	n.a.	n.a.	T	Q	n.a.	n.a.	yes	n.a.	TQ
Beef and veal	n.a.	n.a.	T	n.a.	n.a.	n.a.	n.a.	n.a.	Free	T	n.a.	n.a.	yes	yes	Free
Pig meat	n.a.	n.a.	T	n.a.	n.a.	n.a.	n.a.	n.a.	T	T	n.a.	n.a.	yes	n.a.	n.a.
Poultry meat	n.a.	n.a.	P	n.a.	n.a.	n.a.	n.a.	n.a.	Q	TQ	n.a.	n.a.	yes	n.a.	n.a.
Eggs	n.a.	n.a.	P	n.a.	n.a.	n.a.	n.a.	n.a.	Q	T	n.a.	n.a.	yes	n.a.	n.a.

Sources: Author calculations; OECD 2006; SIAP Database 2007.

Note: n.a. = not applicable. P = import permits. T = import tariffs. TQ = tariff-rate quota. PACE = Egidio Marketing Support Program. GATT = General Agreement on Tariffs and Trade. PROGAN = Livestock Productivity Improvement Program. Under NAFTA, original agreed quotas were generally not binding or were increased by the government; in 1995, payments were granted for the production of the crops listed in the table, plus safflower and cotton. Under Procampo, since the 1995/96 fall and winter crop season, farmers have been able to devote their land to any crop, livestock, or forestry product or place the land in an approved environmental program. Nonetheless, in 2004, almost half of all farmers thought they still needed to grow basic crops to receive the subsidy.

characteristics of agricultural development through a sectoral view alone, the project's methodology estimates the effects of direct agricultural policy measures (including distortions in the foreign exchange market), and it also generates estimates of distortions in nonagricultural sectors for comparative evaluation, thereby considering the overall policy impact on the incentives for farmers and food consumers.

Our estimates are similar in nature to the producer support estimates and consumer support estimates generated by the Organisation for Economic Co-operation and Development (OECD) for Mexico, but we depart from the OECD methodology in four important ways. First, instead of taking the border price as the relevant international price, we adjust border prices according to the freight, port, insurance, financial, handling, and transportation charges associated with the main domestic markets. Second, taking into account new estimates of the way in which Mexican regional markets operate, we use a weighted average of farmgate prices, adjusted for transportation costs to the main markets, as the relevant domestic price for purposes of comparison (instead of using the simple national average of domestic prices). Third, unlike the OECD study, we do not consider the payments of Procampo and the Egidio Marketing Support Program (Programa de Apoyo a la Comercialización Ejidal) as crop-specific payments. Rather, we classify them as general non-product-specific payments. This is because these payments are similar in nature to decoupled payments. Fourth, our estimates use the international (undistorted) price rather than the domestic price as the basis for the calculation of the rate of distortion. Specifically, the NRA estimates are calculated as the domestic price, minus the border price, divided by the border price. The OECD calculates this distortion, which it calls the market price support, as a percentage of the domestic (distorted) price. Thus, the market price support equals the domestic price, minus the border price, divided by the domestic price.

In this chapter, like the OECD, we use the official exchange rate in all our calculations because, for most of the period we analyze, the black market premium was low. Even between 1990 and 1994, the premium was only about 3 percent, on average, and, since 1995, it has been zero. The premium was about 26 percent between 1983 and 1986 and 6 percent in 1987 and then rose to 17 percent during 1987–89. It is noteworthy that the real exchange rate showed substantial variation during the period covered. By the end of the period, the real exchange rate of the peso, calculated by the Bank of Mexico against a basket of currencies, was about 15 percent below the average level for the previous 20 years. Yet, it was 48 percent above the average in 1986–88, 43 percent above in 1995, 25 percent above in 1996, and only 5 percent above in 1997. We should expect relatively lower levels of protection in those peak years.

Table 8.4. Product Shares in the Total Value of Agricultural Production, Mexico, 1980–2004*(at distorted prices, percent)*

Product	1980–89	1990–99	2000–04
Annual crops	23.5	23.6	19.2
Barley	0.4	0.4	0.5
Beans	1.7	2.6	2.1
Maize	10.8	12.0	9.6
Rice	0.5	0.3	0.1
Sorghum	3.8	3.0	2.8
Soybeans	1.3	0.3	0.1
Tomatoes	1.9	2.8	2.8
Wheat	3.0	2.3	1.3
Perennial crops	6.1	6.6	5.4
Coffee	2.6	2.5	1.1
Sugarcane	3.5	4.1	4.3
Animal products	43.9	38.0	42.5
Milk	9.8	9.2	9.9
Eggs	4.5	4.2	4.9
Beef	13.9	10.8	10.7
Poultry	6.1	7.2	9.9
Pig meat	9.6	6.6	7.1
Total	73.5	68.2	67.1

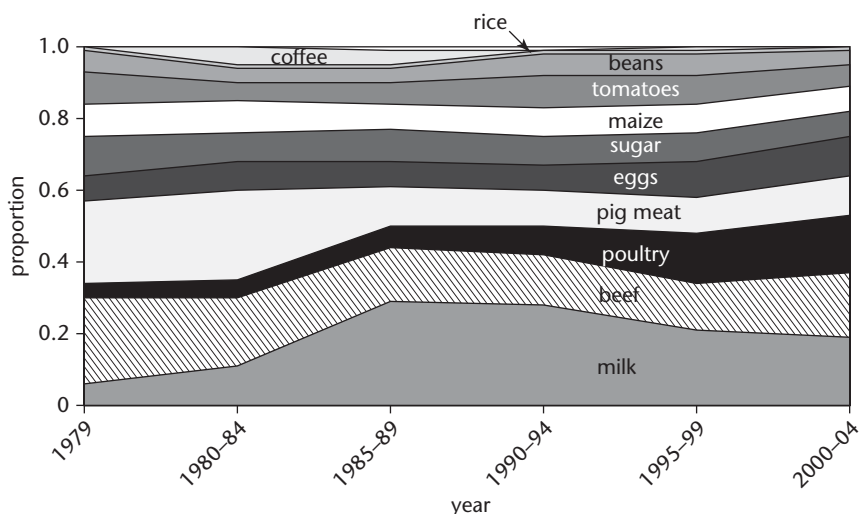
Sources: Author calculations; SIAP Database 2007.***Product coverage***

The goods covered in this study represent more than two-thirds of the total value of agricultural output in Mexico (table 8.4). Annual crops represent 19 to 24 percent of the total; coffee and sugarcane represent 5 to 7 percent; and animal products 38 to 42 percent. Beef, maize, and milk are the most important products in the value of output. The most important products in final household food consumption expenditure are milk and meat (figure 8.4).

NRAs for farmers

Our NRA estimates for 1979–2004 for the products covered here are summarized in table 8.5. (The annual data are shown in appendix B, table B.7.) We show the NRA equivalents of the OECD's producer support estimates since 1986 for comparative purposes. Aggregates for exportables, import-competing products, and all covered products are also shown, using as weights the value of production at

Figure 8.4. Product Shares in Household Food Consumption, Mexico, 1979–2004



Sources: Author calculations; Soloaga and Lara 2007.

undistorted prices. Like the OECD's producer support estimate, the NRA measure incorporates the various types of assistance for inputs received in the sector, such as fertilizers, pesticides, credit, fuel and electricity, seeds, machinery, and miscellaneous payments.

The NRA estimates for exportables are negative over the period we analyze except occasionally for beef, indicating that exportables have generally been taxed. The tax was high on coffee and tomatoes, exceeding 40 percent in some years. The five-year averages of the NRAs for importables are positive over the period, indicating that, overall, import-competing industries have been protected. There is a large degree of variation in the level of assistance to specific products, however. By 2000–04, some major importables showed almost zero or even negative NRAs (barley, maize, sorghum, soybeans, beans, and eggs), while products such as wheat, rice, milk, sugarcane, and chicken meat showed relatively high NRAs (40 to 80 percent).

The NRAs for importables were lowest in 1995–99 following the substantial peso devaluation. They had been relatively high in the first half of the 1990s because of the overvaluation of the currency, but, in 1995–2005, they rose to an average of 9 percent. The difference between assistance for exportables versus assistance for the covered import-competing products is illustrated in summary form on an annual basis in figure 8.5, where one may see that the NRAs have been

Table 8.5. NRAs for Covered Farm Products, Mexico, 1979–2004
(percent)

Commodities and other indicators	Author results					OECD results ^a			
	1979–84	1985–89	1990–94	1995–99	2000–04	1986–89	1990–94	1995–99	2000–04
Exportables ^b	–27.6	–21.3	15.8	–8.2	–12.5	n.a.	n.a.	n.a.	n.a.
Beef	–17.5	–7.6	37.7	11.6	–2.7	–13.7	26.7	7.7	3.3
Coffee	–63.8	–49.7	–23.6	–28.1	–33.8	–52.5	–10.2	–7.2	0.0
Tomatoes	–24.2	–45.8	–23.1	–38.6	–37.1	–8.1	–4.3	–17.1	3.5
Import-competing ^b	14.7	13.9	35.9	3.8	19.5	n.a.	n.a.	n.a.	n.a.
Barley	7.1	–12.7	28.1	–14.3	–6.8	1.3	57.6	12.8	13.5
Beans	44.2	–17.6	–10.8	–13.2	–0.4	–28.4	17.4	–2.7	40.2
Eggs	–1.5	–6.3	2.2	–16.1	–15.7	0.0	2.9	0.0	0.0
Maize	20.1	23.7	27.9	–12.5	–2.9	28.1	62.6	5.6	29.6
Milk	137.3	145.6	175.0	60.5	85.7	209.3	55.7	27.5	38.5
Pig meat	–21.6	–20.4	6.2	–4.4	3.2	–21.6	3.7	–3.1	10.7
Poultry	143.8	96.2	114.2	17.8	47.7	34.1	56.6	15.9	28.1
Rice	–7.3	–5.4	20.1	3.6	37.5	–33.7	4.8	2.0	32.8
Sorghum	–1.0	1.4	–3.9	–14.8	–11.5	21.4	29.2	8.2	16.7
Soybeans	38.5	38.6	26.1	–5.1	–2.7	4.5	17.2	2.5	10.8
Sugarcane	–4.4	1.0	66.1	48.2	81.5	3.8	78.3	47.3	66.6
Wheat	5.2	38.4	61.5	25.0	61.2	–19.3	23.5	4.4	22.4
Total of covered products ^b	0.7	1.1	28.8	0.1	9.2	–2.3	31.9	7.2	21.4
Dispersion of covered products ^b	69.5	65.7	56.0	33.2	41.3	67.0	32.6	20.0	21.3
% coverage at undistorted prices	79	79	72	76	73	74	69	69	68

Sources: Author calculations; Soloaga and Lara 2007; OECD 2007.

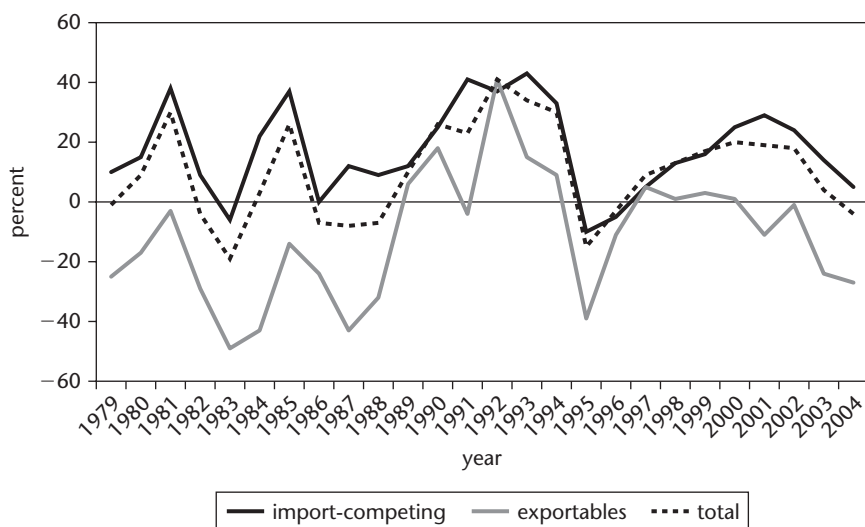
Note: n.a. = not applicable.

a. The producer support estimates of the OECD (2007) have been converted to NRAs. The OECD NRA is defined as $100 \times (\text{NPC} - 1)$, where NPC is the nominal protection coefficient.

b. Including product-specific input subsidies.

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

Figure 8.5. NRAs for Exportable, Import-Competing, and All Covered Farm Products, Mexico, 1979–2004



Sources: Author calculations; Soloaga and Lara 2007.

trending downward in recent years because of falling direct assistance to both importables and exportables.

The inclusion of guesstimates for noncovered products in the weighted average for all covered products alters the numbers a little. They are altered again when the steady increase in non-product-specific subsidies, discussed above, is added to obtain the total NRA for all agriculture. For example, in recent years, Procampo, ASERCA, and the Egidio Marketing Support Program have grown and now account for more than 4 percent of the total undistorted value of agricultural production. Thus, decoupled non-product-specific subsidies have added four percentage points to the aggregate NRA, raising it by one-third. Together, these adjustments bring the estimated NRA for total agriculture to 11.6 percent in 2000–04 (table 8.6).²

The antitrade bias and the relative rate of assistance

The negative sign in the trade bias index in table 8.6 indicates that the composition of assistance to farms has an antitrade bias, and the value of the numbers shows that this bias in agricultural policies has persisted. It was only slightly smaller in 1995–2000 than in the later 1980s. This implies that the country has some way to go before it will be able to exploit fully its comparative advantages within the farm sector.

Table 8.6. NRAs in Agriculture Relative to Nonagricultural Industries, Mexico, 1979–2004

(percent)

Indicator	1979–84	1985–89	1990–94	1995–99	2000–04
Covered products ^a	0.7	1.1	28.8	0.1	9.2
Non-covered products	10.7	9.9	31.4	3.3	2.6
All agricultural products ^a	2.9	3.0	29.5	0.8	7.4
Non-product-specific assistance ^a	0.0	0.0	1.3	3.4	4.2
Total agriculture ^b	2.9	3.0	30.8	4.2	11.6
Trade bias index ^c	–0.45	–0.39	–0.27	–0.23	–0.34
All agricultural tradables ^d	3.0	3.0	31.2	4.2	11.8
All nonagricultural tradables	7.4	4.0	5.8	3.2	6.8
Relative rate of assistance ^e	–4.2	–1.1	24.1	1.0	4.7

Sources: Author calculations; Soloaga and Lara 2007.

a. Including product-specific input subsidies.

b. Including non-product-specific assistance.

c. The trade bias index = $(1 + NRA_{ag,x}/100) / (1 + NRA_{ag,m}/100) - 1$, where $NRA_{ag,x}$ and $NRA_{ag,m}$ are the average percentage NRAs for the exportable and import-competing parts of the agricultural sector.

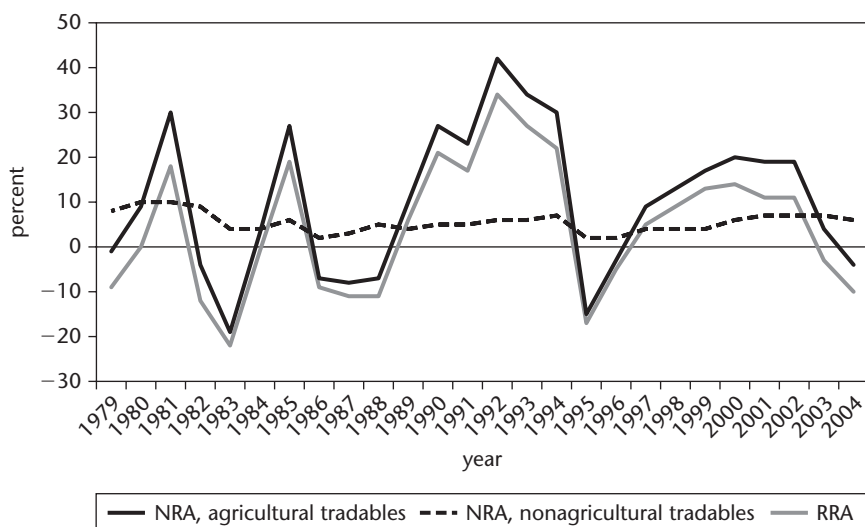
d. Including product-specific input subsidies and non-product-specific assistance.

e. The relative rate of assistance = $100 * [(100 + NRA_{ag}^t) / (100 + NRA_{nonag}^t) - 1]$, where NRA_{ag}^t and NRA_{nonag}^t are the percentage NRAs for the tradables parts of the agricultural and nonagricultural sectors, respectively.

Table 8.6 also shows the weighted average NRAs for agricultural tradables and the NRAs for nonagricultural tradables. Following the Anderson et al. methodology (2008) (see appendix A), the latter have been generated by subdividing nonagricultural industries into exportables, nontradables, and import-competing sectors. We have assumed that the NRA is zero for exportables and nontradables, and we have assumed that the NRAs for import-competing nonagricultural industries are given by the trade restrictiveness index estimated by Kee, Nicita, and Olarreaga (2006). It is then possible to generate estimates of the relative rate of assistance (RRA), shown in the last row of table 8.6 and, in annual form, in figure 8.6. Like the NRA, the RRA has fluctuated considerably. If the period immediately before the 1994 devaluation is ignored, the RRA has gradually risen over the past three decades from slightly negative to slightly positive, with the five-year averages moving from –4 percent in the early 1980s to +5 percent in 2000–04.

The negative correlation discussed elsewhere above between the real exchange rate and the NRA for agricultural tradables is clear in figure 8.7. This suggests that, if the currency were allowed to float and seek its own level, there might be less fluctuation in the NRAs.

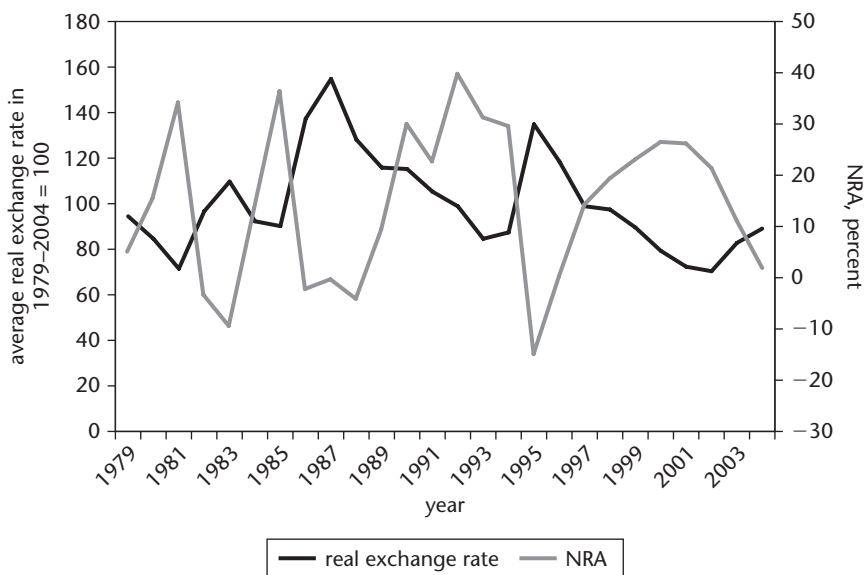
Figure 8.6. NRAs for Agricultural and Nonagricultural Tradables and the RRA, Mexico, 1979–2004



Sources: Author calculations; Soloaga and Lara 2007.

Note: For the definition of the RRA, see table 8.6, note e.

Figure 8.7. NRAs for Agricultural Tradables and the Real Exchange Rate, Mexico, 1979–2004



Sources: Real exchange rate: data of the Central Bank; NRAs: author estimates.

Table 8.7. CTEs for Covered Farm Products, Mexico, 1986–2005
(percent)

Commodity	1986–89	1990–94	1995–99	2000–05
Beef	–14	26	7	3
Coffee	–66	–18	–18	0
Tomatoes	–8	–3	–21	5
Barley	1	44	7	11
Beans	–13	25	–3	32
Eggs	0	3	0	0
Maize	–2	25	–14	13
Milk	129	19	5	26
Pig meat	–21	5	–3	8
Poultry	33	53	15	22
Rice	–51	1	4	4
Sorghum	0	–5	–3	0
Soybeans	–4	8	12	2
Sugar	4	79	86	117
Wheat	–54	–17	–6	1
Total CTE	–8	21	4	17

Sources: Author calculations; OECD 2007.

Note: The CTE is the negative of the OECD (2007) consumer support estimate expressed at undistorted prices.

The consumer tax equivalent for food

Table 8.7 shows the consumer tax equivalents (CTEs) for food products. The CTEs have been derived from the consumer support estimates generated by the OECD. The pattern in the CTEs is somewhat similar to the pattern in the NRAs. The CTEs are generally negative in the later 1980s, slightly positive in the later 1990s, and larger in 2000–05, although they typically fell in 2003–05 because assistance to agriculture moved from market price support to more-direct, somewhat decoupled assistance. As in many countries, sugar is by far the most highly taxed consumer food item.

Conclusions

The development of the economic policies affecting Mexico's agricultural sector since the late 1980s and, particularly, the late 1990s has shown a clear departure from the interventionist schemes of previous years. The NRA was close to zero by the end of our sample period for the agricultural products covered in our study. Although average assistance appears to have increased recently in comparison with the 1995–99 period, the rate is now less than half the rate of 1990–94.

Significantly, by 2004, more than half the assistance to Mexican farmers was non-product-specific assistance. The current farm income support scheme provides assistance to certain commercial producers of grains and oilseeds only if commodity prices decline. Although two comprehensive programs have been launched in the agricultural sector recently, Blindaje agropecuario (Agricultural Armor) in 2002 and the Acuerdo Nacional para el Campo (National Agreement for the Countryside) in 2003, the size and composition of the activities of the Secretariat of Agriculture have not changed much over the years (Zahniser, Young, and Wainio 2005). Even in the face of substantial pressure from producer associations of all stripes, the government has been able to resist raising the budgetary outlays, and the total budget devoted to the government's activities in agriculture and rural development has been held at about 15 percent of total agricultural gross domestic product (crops and livestock). Nonetheless, the persistent anti-trade bias in agricultural policies suggests that the reforms do not yet favor a change in production to benefit from Mexico's comparative advantages.

Notes

1. While the new approach has increased the sector's exposure to market prices, a recent detailed study on Mexican-United States agricultural price convergence shows that the relatively large number of periods required for a domestic price to adjust to 95 percent of a change in an international price (20 months for wheat, 33 months for maize, and 77 months for soybean) have not been reduced under the new agricultural policies (Yúnez-Naude and Barceinas Paredes 2003).

2. The pattern in the distortions we have estimated across time is similar to the pattern calculated by the OECD (compare the left- and right-hand sides of table 8.5), but there are important differences in some goods. In particular, because we add additional costs to the border price, our NRAs have been a little lower than the OECD's during the past 15 years.

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NICARAGUA

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The Nicaraguan economy is small, but open. The country has a population of 5.5 million (in 2004), low levels of income (per capita gross domestic product [GDP] of US\$850 in 2005), and high levels of poverty (48 percent of the population in 2003) (BCN 2005; World Bank 2003a). Since 1990, the country has undergone dramatic changes, including the end of a decade-long civil conflict and the implementation of a series of economic reforms that liberalized prices and privatized most state-owned production.

Almost half the population lives in rural areas and depends on agriculture for earnings. The rural sector has an especially high incidence of poverty: two in every three rural Nicaraguans are poor (World Bank 2003a). Thus, the agricultural sector plays a key role in the country's poverty reduction efforts.

Within Nicaragua's broader policies of structural reform and liberalization, policy makers have sought to liberalize trade by reducing tariffs and nontariff barriers and by promoting exports through fiscal incentives within a strategy based on regional integration agreements. Since agriculture plays a major part in the country's economy and in exports, an understanding of the degree of distortion in agricultural incentives is an important input for current and future policy decisions.

At least two studies, beside ours, have analyzed the distortions in agricultural incentives in Nicaragua. A study by the Ministry of Agriculture and Forestry has generated nominal and effective rates of protection for five exportable products (coffee, sugar, meat, peanuts, and sesame seeds) and six import-competing products (maize, rice, beans, sorghum, soy, and milk) in 1996–98 (MAGFOR 2000).

Fundación Provia and the U.S. Agency for International Development have generated nominal and effective rates of protection for four importable agricultural goods (maize, rice, sorghum, and soy), five exportable agricultural goods (coffee, sugarcane, peanuts, beans, and sesame seeds), and one good from the livestock sector (meat) in 1996–2000 (Fundación Provia and USAID 2002). The latter study finds that importables show high, positive nominal and effective rates of protection, while exportables show negative rates of protection. This constitutes an antitrade bias because the distortion in price signals encourages the production of importable goods at the expense of the production of exportable products.

Our study generates measures of the nominal rates of assistance (NRAs) and the consumer tax equivalents (CTEs) for 12 agricultural products in Nicaragua in 1991–2004 by using the methodology laid out in Anderson et al. (2008) and summarized in the general results below. We analyze five import-competing goods (maize, rice, sorghum, soybeans, and chicken meat) and six exportable goods (coffee, sugar, peanuts, beans, beef, and sesame seeds), plus milk. Together, these products represented more than 80 percent of the agricultural GDP and 20 percent of the total GDP in 2001 (BCN 2005). From the results, we estimate average CTEs and NRAs for import-competing and exportable goods and for the agricultural sector as a whole, and these indicators are compared to protection rates in the nonagricultural sector over the same period.

Among the exportable crops, coffee, beans, and sugar are the main products. In 1991–2004, about 85 percent of coffee production, 13 percent of bean production, and 39 percent of sugar production were exported. Rice and maize are the main products in the importables category. Rice imports account for around one-quarter of domestic consumption, while maize imports add barely 1 percent. Table 9.1 shows the shares of key products in the value of agricultural production, and figure 9.1 shows the importance of these products in domestic consumption.

Our study extends the time series of previous estimates of rates of protection in agriculture, but, unfortunately, it has not been possible to examine reasonably the years before 1991 because of an absence of meaningful data. The 1980s were years of hyperinflation and substantial government intervention in most markets, and the published prices are not representative.

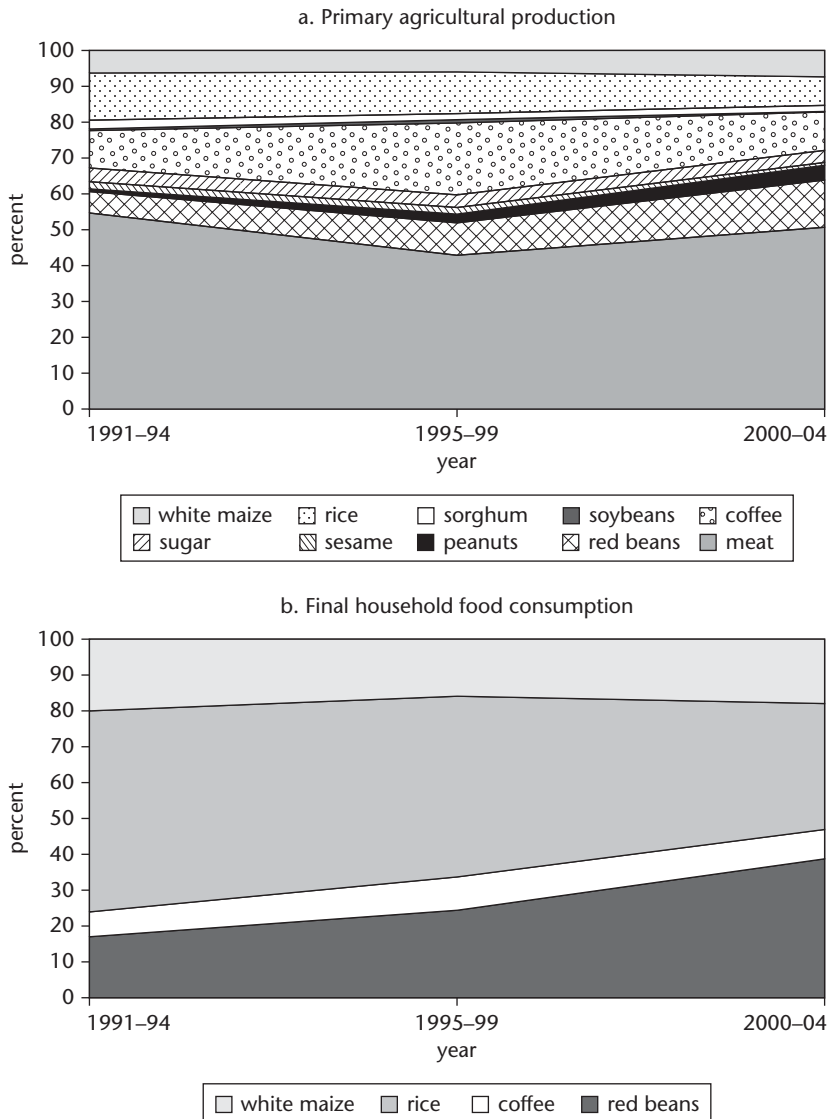
Our study also differs from previous analyses in that it calculates NRAs using observed domestic prices for exportable products, rather than constructed prices. And it is the first study that estimates CTEs for agricultural products in Nicaragua.

We find that agriculture exhibited negative NRAs during 1991–2004. The NRA was –7 percent in 1991–94, –16 percent in 1995–99, and –10 percent in 2000–04. At the same time, nonagricultural products enjoyed a positive average NRA of 7 percent over the same 14-year period. These data reveal an antiagricultural policy bias.

Table 9.1. Product Composition of Agricultural Output, Nicaragua, 1991–2004*(percent, at distorted prices)*

Product	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Exportables	48.0	46.3	44.2	32.3	34.3	36.8	36.2	34.4	38.0	39.3	40.0	36.9	33.6	37.0
Natural sesame	2.1	1.5	1.2	1.2	2.0	1.5	1.9	0.7	0.5	0.5	0.5	0.1	0.4	0.6
Coffee (green)	19.9	17.3	21.9	11.3	11.3	12.1	12.3	15.2	15.8	18.4	18.2	14.1	12.8	14.9
Sugarcane	7.6	8.3	7.0	6.3	6.9	7.1	8.4	8.6	8.4	7.9	7.2	6.7	6.6	7.9
Beans	5.3	5.3	5.1	8.8	8.2	9.7	7.0	4.3	9.0	7.4	8.4	10.4	8.2	8.2
Groundnuts	0.6	0.6	0.5	2.1	2.7	2.3	2.6	2.8	2.7	4.0	4.1	4.0	3.9	3.8
Other	12.4	13.4	8.5	2.7	3.3	4.0	4.0	2.7	1.7	1.2	1.6	1.6	1.6	1.7
Importables	14.8	15.8	15.9	23.1	22.7	22.0	19.7	18.3	15.0	15.7	14.4	15.5	17.6	13.7
Rice	5.3	5.7	5.6	8.6	9.6	7.8	8.1	6.7	6.9	7.2	6.8	7.7	8.2	6.9
Maize	7.6	7.7	7.8	10.9	10.0	10.3	8.8	9.2	6.5	7.4	6.7	6.8	8.3	5.8
Sorghum	0.0	0.4	0.3	2.7	2.3	3.1	1.8	1.4	1.0	0.8	0.9	0.9	0.9	0.8
Soybeans	1.9	2.0	2.1	0.7	0.8	0.8	1.0	1.0	0.6	0.2	0.1	0.1	0.2	0.2
Other	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	0.0
Livestock	37.2	37.9	39.9	44.6	42.9	41.3	44.2	47.3	46.9	45.0	45.6	47.6	48.8	49.3
Beef	20.0	18.2	18.5	17.6	16.8	15.9	16.4	17.4	17.4	15.8	15.8	17.0	17.6	19.0
Milk, chicken, and other	17.2	19.7	21.5	27.0	26.2	25.4	27.7	29.8	29.5	29.2	29.7	30.6	31.2	30.2
Total	100	100	100	100	100	100	100	100	100	100	100	100	100	100

Source: Base de Datos Estadísticos 2007.

Figure 9.1. Product Shares in Agricultural Production and Consumption, Nicaragua, 1991–2004*(percent, at undistorted prices)*

Sources: Author estimates; Berthelon, Kruger, and Saavedra 2007; Base de Datos Estadísticos 2007.

Furthermore, during the period, import-competing products enjoyed a positive average NRA of 19 percent, while exportable primary products faced a negative average NRA of –21 percent. Thus, an antitrade bias also prevailed in this area. However, there are some important differences among the products in the two

categories. The importables maize and rice showed positive average rates of protection, while sorghum and soybeans showed negative rates. And among exportables, one (sugarcane) had a positive NRA.

This chapter is organized as follows. The next section summarizes the evolution of the Nicaraguan economy after 1990. During this period, the economy underwent a transition from substantial government intervention to a freer play of market forces. The subsequent section summarizes the policy trends in the agricultural sector. The following section describes the methodology used to estimate the NRAs and CTEs. The section thereafter discusses our estimates of the degrees of distortion in agriculture. The penultimate section summarizes the political economy of agricultural policies that have been implemented since 1991 that relate to the products we examine. The final section concludes with an appraisal of the prospects for additional reform.

Nicaragua's Economy, 1990 to 2005

After almost two decades of rapid, sustained growth between 1960 and 1977, Nicaragua experienced an economic collapse characterized by a slump in output in 1978 and 1979 that was caused by a revolutionary war (table 9.2). This was followed by negative growth rates during the 1980s, which resulted from inadequate economic policies, adverse external shocks, and a prolonged civil conflict.

By 1990, GDP per capita had fallen to 43 percent of the level in 1977. In 1992, the year of the country's worst foreign trade performance, exports were only slightly above the levels reached in 1971 and were 37 percent of the average in 1976–79. Meanwhile, foreign debt had grown tenfold, reaching US\$2,660 per capita. This was more than six times the average income per capita; to service the debt required 4.7 times the equivalent of the value of annual exports (IMF 1999).

By 1990, the economy was experiencing serious macroeconomic imbalances. The fiscal deficit was almost 18 percent of GDP; the trade and balance of payments deficits were 32 and 42 percent of GDP, respectively; and inflation reached close to 7,500 percent during the year. Production by state-owned enterprises accounted for almost 30 percent of GDP, and nearly 20 percent of the labor force was employed in the public sector (IMF 1999).

In the political arena, Nicaragua returned to democratic government in 1990. The civil conflicts of the previous decade had been resolved, and peace was reestablished. Simultaneously, the new government began to implement economic policies in an effort to stabilize prices and force a return to macroeconomic stability and a shift from a state-directed economy to a market economy.

Fiscal and monetary policies were strengthened, although the public sector deficit remained high. Most price controls were eliminated, and the foreign exchange and trade systems were liberalized. A structural reform program was

Table 9.2. Real Growth in GDP, Nicaragua, 1960–2004*(annual growth rate, percent)*

Sector	1960–69	1970–77	1978–79	1980–89	1990–99	2000–04
Primary sector	7.9	4.6	–15.4	–0.8	4.7	2.4
Crops	8.3	4.9	–13.4	0.1	5.0	—
Livestock	7.0	3.4	–16.6	–1.8	2.4	—
Fisheries	23.8	9.3	–24.3	–10.3	26.2	—
Forestry	–1.1	8.5	–40.1	0.7	2.2	—
Secondary sector	9.7	7.0	–35.3	–2.6	4.2	4.0
Manufacturing	11.3	6.2	–27.4	–2.9	1.8	4.7
Construction	13.0	11.9	–74.2	–0.3	12.8	1.3
Mining	2.8	5.7	–58.0	–1.4	16.6	3.9
Tertiary sector	6.3	5.1	–27.2	–1.2	1.7	4.5
Commerce	7.4	5.6	–37.8	–2.6	3.5	3.2
Central government	4.3	6.6	–6.3	2.4	–3.7	1.6
Communications and transport	7.4	5.6	–21.7	–3.4	3.0	4.5
Finance	13.1	7.3	–12.7	–1.5	2.0	8.1
Energy and water	13.5	4.4	–10.9	1.4	3.3	4.6
Property	2.2	0.0	–26.6	–0.1	2.2	3.7
Other services	4.4	4.6	–31.9	–3.4	3.3	4.1
Total GDP	7.5	5.6	–26.5	–1.5	3.2	3.5

Source: Author calculations; Base de Datos Estadísticos 2007.

Note: — = no data are available. Growth rates are geometrical averages.

initiated by the new government that included the privatization of state-owned firms and a banking system reform involving interest rate liberalization and the creation of an independent bank supervisory function.

One of the main features of the structural reform program was the more limited role of the public sector. This included the privatization of state-owned firms and a reduction in the size of the armed forces, from 83,000 in 1990 to slightly more than 15,000 by 1993 (IMF 1999). As a result of these policies, the unemployment rate rose from 7.6 percent in 1990 to 17.8 percent in 1993; it gradually, but steadily fell to only 6.5 percent in 2004 (Base de Datos Estadísticos 2007).

The maintenance of price stability was a major economic policy focus in the effort to achieve macroeconomic stability and economic growth. This was achieved through an expansion in foreign grants, aid, and loans to finance the country's fiscal and current account deficits. An important downside of this international financial cooperation, however, was the contribution it made to significant trade and current account deficits, which averaged 24 and 21 percent of total GDP, respectively, during 1994–2005.

In March 1991, the government set the exchange rate at 5 córdobas per U.S. dollar, which was maintained through the rest of the year. In 1992, a crawling peg was introduced, and the exchange rate was devalued daily at a preannounced rate. Between 1992 and 1998, the official annual devaluation rate was 12 percent; it was reduced to 10 percent in 1999, 6 percent in 2000–03, and 5 percent in 2004–06.

As a result of these reforms, Nicaragua was able to achieve positive growth rates beginning in the early 1990s. The annual average growth rate was 3.5 percent in 2000–04. Meanwhile, inflation has been falling dramatically (to single digits) since 1999, and unemployment declined from 14.9 percent in 1991 to 6.5 percent in 2004 (Base de Datos Estadísticos 2007).

The economy has also benefited from an increase in worker remittances and a rise in foreign direct investment. However, the country's dependence on foreign aid represents a notable weakness in the external sector, and this contributes to the large fiscal and current account deficits (IMF 2006).

In early 2002, a new government implemented tax reforms, strengthened bank regulations, and attempted to reduce corruption. The program had positive results. GDP growth recovered in 2003 (after a decline in 2002); inflation remained subdued; and the level of international reserves increased, all of which facilitated macroeconomic stability (IMF 2006).

More recent economic developments have been positive as well. The fiscal deficit has declined. GDP growth rates had risen to 5.1 percent by 2004 because of an increase in exports and family remittances, higher commodity prices, and an expansion in credit through the financial sector. Nicaragua reached the completion point of the Enhanced Initiative for Heavily Indebted Poor Countries in

early 2004. This will provide external debt relief and free up resources for human capital investment (IMF 2006).

The country's remaining economic challenges are a reduction in poverty (almost half of the population of Nicaragua is poor), a reduction in the fiscal deficit, the elimination of corruption, and the strengthening of exports.

Agricultural Policy

The sector

Between 1960 and 2000, the composition of production remained virtually unchanged. Agriculture, including livestock, accounted for an average 16 percent of GDP. The average GDP share of other primary sectors was 9 percent. Agriculture's role in the economy was actually greater, of course, because a significant proportion of the secondary sector and the service sector includes agroindustrial production, food processing, the distribution of agricultural products, and other activities dependent on agriculture.

About 50 percent of the population lives in rural areas and relies on agricultural activities for livelihoods. Although the incidence of rural poverty has declined since 1993 (largely because of growth in the agricultural sector), two in every three rural residents continue to live in poverty (World Bank 2003a). The health of the agricultural sector is a key determinant in poverty reduction. The majority of agricultural producers are small impoverished farmers. The sector employs 40 percent of the labor force of the country. The coffee sector alone employs 32 percent of all rural workers (World Bank 2003b).

Land distribution is highly inequitable: 72 percent of all rural households are landless or own small plots of 1.5 hectares or less; they account for only 16 percent of rural landholdings. Medium and large farmers (farms of 3.5 hectares or more) represent 28 percent of all rural households; yet, they own 84 percent of the land (Davis and Murgai 2000).

Agriculture is extensive rather than intensive. About 80 percent of all agricultural land is devoted to the production of staple grains (corn, beans, rice, and sorghum), which account for about 30 percent of agricultural GDP; 20 percent of the land is devoted to export crops (coffee, sesame, sugar, tobacco, and peanuts), which contribute at least 50 percent of agricultural GDP (World Bank 2003a).

Agricultural products are an important share of total exports. In 1994–2005, exports of the country's main agricultural products represented 50 percent of the exports of all goods (Base de Datos Estadísticos 2007). A main factor behind GDP growth after 1991 was growth in exports, driven largely by growth in nonagricultural exports. Total exports, including exports produced in tax-free zones and

purchases at ports, grew at an average annual rate of 14 percent between 1994 and 2005, while agricultural exports grew at an average annual rate of 7.7 percent (Base de Datos Estadísticos 2007).

The agricultural sector has displayed rapid growth over the past 16 years. The growth may ultimately be limited, however. It is now being spurred by high export commodity prices, the uptake of unoccupied land, and the stability since the end of the civil conflict. These characteristics cannot be expected to maintain indefinite growth in the sector (World Bank 2003a).

Agricultural price and trade policies

Between 1992 and 1997, the prices of imported white and yellow corn, sorghum, and rice were regulated through a price band mechanism. The band determined the tariffs linked to these products; it ranged between 5 and 45 percent (WTO 1999). If the international price of a product fell below the lower-bound of the band, a tariff was applied to imports of the product to ensure that the domestic price was always above the minimum band threshold.

The price band mechanism was abandoned in 1997 and replaced by a tariff and import quota system. Imports of several agricultural products have been subject to the scheme. The tariffs on in-quota imports are reduced or, often, eliminated, while the tariffs on imports that exceed the quota are raised. The import quota is renegotiated for each agricultural cycle, and it is a function of the capacity of domestic producers to supply the demand of industry and other local consumers. Table 9.3 shows a list of agricultural products that are subject to the quota-contingent tariff structure, as well as information on the quotas and tariffs

Table 9.3. Import Quota-Contingent Tariff Structure, Nicaragua, 2004

Product	Quota, tons	Tariff, in-quota, %	Tariff, out-of-quota, %
Maize	8,742	40	60
Bovine meat	1,575	40	60
Beans	2,403	40	60
Rice	4,959	40	60
Sorghum	6,244	40	60
Vegetable oil, liters, millions	2	40	60
Sugar, cubic meters	48	60	100
Poultry	851	60	200
Milk	6,068	40	75

Source: MIFIC 2005.

that were negotiated between the government and the World Trade Organization in 2005 (MIFIC 2005).

In the case of grains, the tariff and import quota system provides partial or total import tariff reductions during months when domestic crops are out of season. When domestic crops are in season, an import purchase price is negotiated by the system's administrative commission, which includes producers, industrial consumers, and representatives of the government.

Export promotion has been a goal of governments since 1990. Steps taken to achieve this goal have included the establishment of tax benefits and the signature of regional integration and trade agreements with several countries. The most important of the latter in terms of market potential is the recent Dominican Republic–Central America Free Trade Agreement that went into effect between the Central American countries and the United States in March 2007.

Intermediate and capital goods used in agricultural production have been exempt from import tariffs since 1991. The products that enjoy these benefits are approved by the National Assembly based on a list proposed by the Ministry of Development, Industry, and Trade and the Ministry of Agriculture and Forestry. The current list has not been updated since 1998. It is considered incomplete because it excludes many agricultural inputs that are commonly used by agricultural producers.

Between 1992 and 1997, in an effort to promote nontraditional exports, the government issued tax credit export certificates for nontraditional goods (*certificados de beneficio tribuario* or CBTs). In 1992–94, the certificate value was equivalent to 15 percent of the value of exports. The rate was reduced to 10 percent in 1995–96 and 5 percent in 1997. Since the CBTs were completely transferable to third parties, a secondary market rapidly developed where exporters might sell excess CBTs at a discount. The CBT program also exempted nontraditional exporters from part of their corporate tax obligations.¹ The program was phased out in 1997 and replaced, in 1998, by a tax incentive scheme whereby all exports benefited from a drawback that was equivalent to 1.5 percent of the value of the exports. It is not yet clear if any part of this benefit is being passed on to the producers of the export goods.

Estimating NRAs and CTEs

Our study generates measures of NRAs and CTEs at the farmgate and at wholesale for key agricultural products. The construction of these measures follows the methodology developed in Anderson et al. (2008) (also see appendix A). To obtain NRAs on output, we have compared the wholesale domestic price in Managua with the border price or international reference price converted at the appropriate

exchange rate and adjusted to include the costs to transport the product to the wholesale market.

For importable goods, the international price we use to generate these measures is the reference price calculated by the Development Prospects Group of the World Bank, except in the case of rice, where we use the cost, insurance, and freight price.² For exportable products, we use free on board (fob) prices for coffee, sugar, meat, and processed and unprocessed peanuts, and we use international reference prices for sugarcane, sesame seeds, livestock, and red beans (FAOSTAT Database 2007; data of the Consejo Regional de Cooperación Agrícola). For a product in Managua, we use the equivalent border price. In the case of importables, this is the sum of the international reference price, international transport costs, tariffs, port charges, and domestic transportation costs from the port to Managua. In the case of exportables, it is the international reference price, less these other costs. Our study also measures distortions in consumer incentives. Thus, we estimate the CTEs for import tariffs and consumption taxes and for subsidies on final consumer prices.

If there are distortions in the markets for farm inputs for a particular product, the NRA is adjusted to include the output price equivalent of the input subsidies (or taxes). We accomplish this by subtracting the input CTE, multiplied by the relevant input-output coefficient, from the farm industry's output NRA to obtain the total NRA for the production of the good. We have carried out this calculation for each product, but, because the results alter the NRA by less than two percentage points, we report here only the total NRA.

Given the lack of data on marginal structures for the period we are analyzing, we have assumed there is an equiproportionate pass-through of distortions along the value chain for each product. This means that the NRAs on output at the farmgate are the same as the NRAs we have estimated at wholesale.

Our estimated NRAs for the 13 farm products we cover are summarized in table 9.4 and figure 9.2. (The annual data are shown in appendix B, table B.8.) These covered products account for all but around one-sixth of the country's gross value of production at undistorted prices (see the final row of table 9.4). For most products during most years, producers faced negative rates of protection. The three major exceptions were sugar, white maize, and rice. The rates of protection were positive among producers of these three products. In the case of sugar, the rates may be explained by the concentrated market structure in the country, which gives producers the capacity to influence policies. For white maize and rice, protection is provided largely by import tariffs. The results show that import-competing agriculture experienced positive rates of protection, particularly during the second half of the period (1998–2004), while exportable agriculture experienced negative rates of protection. Figure 9.3 shows that, overall, the country showed

Table 9.4. NRAs for Covered Farm Products, Nicaragua, 1991–2004
(percent)

Product	1991	1992	1993	1994	1991–94	1995	1996	1997	1998	1999	1995–99	2000	2001	2002	2003	2004	2000–04
Exportables ^a	–15	–14	–8	–24	–14.9	–29	–28	–33	–31	–24	–29.1	–19	–20	–18	–19	–14	–18.1
Coffee	–44	–26	–20	–42	–33.1	–62	–37	–53	–59	–43	–50.5	–31	–14	–7	–44	–19	–22.8
Sugar	2	44	43	55	36.0	50	74	62	60	60	61.2	52	35	43	35	35	40.1
Sesame	–39	–42	12	27	–10.6	–38	–31	–15	–45	–42	–34.2	–47	–30	–39	–43	–43	–40.5
Groundnuts	0	–1	–15	–21	–9.1	–30	–18	–35	–37	–15	–27.0	–18	–45	–30	–42	–37	–34.5
Red beans	10	–11	86	–23	15.6	–10	–17	–12	13	–7	–6.7	–16	–31	–17	–34	–4	–20.3
Beef	–10	–15	–19	–27	–17.6	–38	–35	–35	–26	–28	–32.4	–28	–27	–24	–17	–16	–22.4
Milk	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	17	8	–15	7	—	—
Import-competing ^a	12	13	19	6	12.5	22	4	15	30	17	17.5	52	24	31	0	16	24.9
Maize	2	17	30	30	19.9	0	15	26	31	20	18.4	57	12	13	–12	9	15.6
Rice	–10	–6	3	–25	–9.5	16	–5	23	32	28	19.0	71	49	61	21	34	47.0
Sorghum	–33	–13	–14	–19	–19.6	–24	–25	–5	0	–4	–11.5	8	0	–23	–15	–20	–10.0
Soybeans	31	52	8	10	25.1	15	–38	–37	–21	0	–16.2	–5	–2	–21	–30	–53	–22.0
Milk	65	18	12	19	28.6	26	6	–12	39	8	13.5	n.a.	n.a.	n.a.	n.a.	—	—
Chicken	94	97	82	70	85.8	86	33	33	30	22	40.6	32	14	33	—	—	26.2
Total, covered products ^a	–8	–6	1	–15	–7.1	–14	–18	–20	–16	–13	–16.4	–6	–11	–8	–16	–9	–9.9
Dispersion, covered products ^b	42	40	39	40	40.1	42	34	36	41	32	35.7	39	28	31	25	26	29.8
% coverage, at undistorted prices	80	82	87	87	83.9	85	86	87	87	90	86.9	92	89	90	84	76	86.2

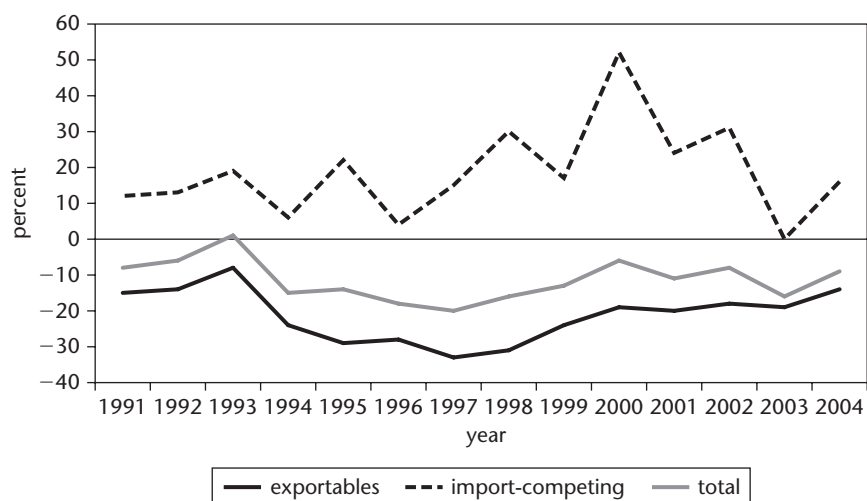
Sources: Author estimates; Berthelon, Kruger, and Saavedra 2007.

Note: n.a. = not applicable. — = no data are available.

a. Including product-specific input subsidies.

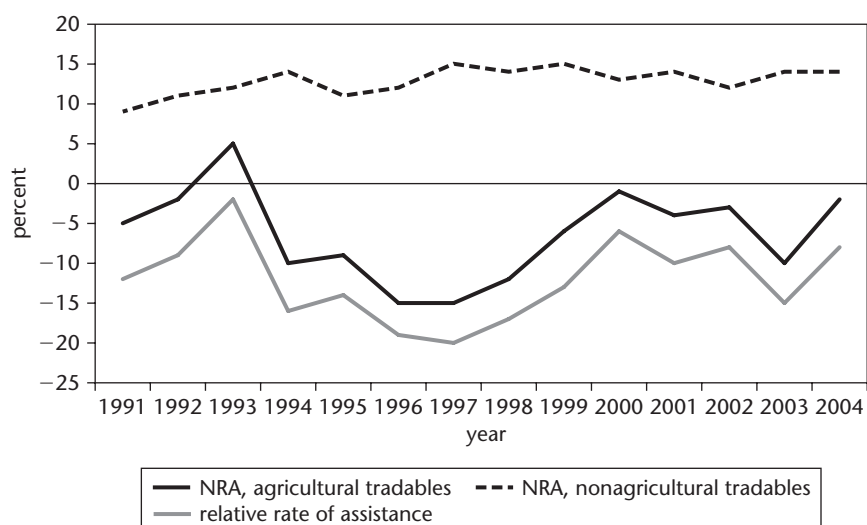
b. Dispersion is a simple five-year average of the annual standard deviations around the weighted mean.

Figure 9.2. NRAs for Exportable, Importable, and All Covered Farm Products, Nicaragua, 1991–2004



Sources: Author estimates; Berthelon, Kruger, and Saavedra 2007.

Figure 9.3. NRAs for Agricultural and Nonagricultural Tradables and the RRA, Nicaragua, 1991–2004



Sources: Author estimates; Berthelon, Kruger, and Saavedra 2007.

Note: The relative rate of assistance is defined as $100 \times [(100 + NRA_{ag}^t) / (100 + NRA_{nonag}^t)] - 1$, where NRA_{ag}^t and NRA_{nonag}^t are the percentage NRAs for the tradables part of the agricultural and nonagricultural sectors, respectively.

negative NRAs. This is because the NRAs for exportables outweighed the positive NRAs for import-competing products. During the period, the NRAs averaged -11 percent for the 13 products listed in table 9.4.

Noncovered farm products have also been affected by government policies. A quantification of the effects via price comparisons has not been possible. Instead, we have divided this residual group into exportables, import-competing products, and nontradables, and we have assumed that the NRAs for the first two of these noncovered product subgroups are the same as the corresponding NRAs for covered products and that the NRA for nontradables is zero. We have generated a weighted average guesstimate for noncovered products for each year; these guesstimates are summarized in table 9.5, row 2. We have also added non-product-specific assistance for the industry—amounting to 4 or 5 percent of the NRA equivalent—to obtain NRA estimates for all agriculture and for the tradables part of the farm sector (shown in table 9.5, rows 5 and 7, respectively). Throughout the period, the NRAs for import-competing farm products remained above the NRAs for exportables, while the antitrade bias lessened somewhat during more-recent years (table 9.5, row 6).

The NRA for agriculture contrasts with the NRA for nonagricultural tradables. The latter has been estimated by dividing each nonfarm sector into exportable, nontradable, and import-competing groups. The nonfarm sectors include nonagricultural primary products, highly processed food, nonfood manufactures, and the service sector. The relevant NRAs are estimated directly from the information on import tariffs (including import surcharges) and export subsidies. The prices of nonagricultural nontradables are assumed to be undistorted, including throughout the service sector. The NRAs for nonagricultural tradables are summarized in table 9.5, row 8. The rate of protection for these tradables averaged around 7 percent during the years under analysis. This is illustrated in figure 9.3, together with the trends in the average NRA for agricultural tradables and the relative rate of assistance (RRA), which is derived from the NRAs for agricultural and nonagricultural tradables (see the note at figure 9.3). The RRA estimates show that, relative to other sectors, the taxing of agriculture reached an extreme of -20 percent in the mid-1990s when international prices were high, but, by 2004, the RRA was somewhat less negative at around -8 percent.

Our CTE estimates are reported in table 9.6. The CTEs show a pattern that is somewhat similar to the pattern of the NRAs for output. Sugar, white maize, and rice were exposed to large, positive tax rates over the period. The same factors that explain the NRAs for output explain the high CTEs. Beef also showed positive CTEs. For most years, the weighted average CTEs for importables were positive. The average CTE for importables was 40 percentage points above the average CTE for exportables (31 and -9 percent, respectively). These large rates of taxation

Table 9.5. NRAs in Agriculture Relative to Nonagricultural Industries, Nicaragua, 1991–2004
(percent)

Indicator	1991	1992	1993	1994	1991–94	1995	1996	1997	1998	1999	1995–99	2000	2001	2002	2003	2004	2000–04
Covered products ^a	–8	–6	1	–15	–7.1	–14	–18	–20	–16	–13	–16.4	–6	–11	–8	–16	–9	–9.9
Noncovered products	–8	–7	–1	–17	–8.2	–19	–21	–23	–20	–15	–19.7	–6	–10	–8	–14	–7	–9.0
All agricultural products ^a	–8	–6	1	–16	–7.2	–15	–18	–21	–16	–13	–16.8	–6	–11	–8	–16	–9	–9.8
Non-product-specific assistance	3	4	5	5	4.1	6	3	6	5	7	5.5	5	6	4	5	7	5.5
Total agriculture ^b	–5	–2	5	–10	–3.2	–9	–15	–15	–12	–6	–11.3	–1	–4	–3	–10	–2	–4.2
Trade bias index ^c	–24	–24	–22	–28	–24	–41	–31	–41	–47	–35	–39	–47	–36	–38	–19	–26	–33
All agricultural tradables ^d	–5	–2	5	–10	–3.2	–9	–15	–15	–12	–6	–11.3	–1	–4	–3	–10	–2	–4.2
All nonagricultural tradables	7	7	7	7	7.1	6	5	6	6	8	6.1	6	6	5	6	6	5.7
Relative rate of assistance ^e	–12	–9	–2	–16	–9.6	–14	–19	–20	–17	–13	–16.4	–6	–10	–8	–15	–8	–9.4

Sources: Author estimates; Berthelon, Kruger, and Saavedra 2007.

a. Including product-specific input subsidies.

b. Including product-specific input subsidies and non-product-specific assistance.

c. The trade bias index = $(1 + NRA_{ag_x}/100) / (1 + NRA_{ag_m}/100) - 1$, where NRA_{ag_x} and NRA_{ag_m} are the average percentage NRAs for the exportable and import-competing parts of the agricultural sector.

d. Assistance to primary factors and intermediate inputs, divided by the total value of primary agricultural production at undistorted prices.

e. For the definition of the relative rate of assistance, see the note at figure 9.3.

Table 9.6. CTEs for Covered Farm Products, Nicaragua, 1991–2004
(percent)

Commodity	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Importables														
White maize	3.6	18.7	32.0	31.1	1.7	16.5	26.9	33.1	21.7	58.0	13.9	14.3	−11.0	10.4
Rice	−8.0	−4.4	5.5	−23.4	18.8	−2.9	25.2	34.5	30.4	73.5	51.4	64.6	23.5	36.9
Sorghum	−29.3	−9.4	−10.6	−16.1	−21.8	−23.9	−5.3	0.1	−5.7	6.0	−0.9	−25.2	−17.5	−20.3
Soybeans	52.8	76.4	25.3	26.6	32.4	−28.7	−28.6	−11.1	12.6	6.8	9.7	−11.6	−21.9	−47.3
Exportables														
Coffee	−34.8	−13.5	−6.9	−32.4	−55.3	−26.6	−45.2	−52.0	−33.1	−19.2	−0.1	8.9	−34.1	−5.0
Sugar	2.1	44.5	43.7	54.9	50.1	74.6	62.4	60.4	59.7	52.2	35.2	43.3	35.5	35.2
Sesame	−38.5	−40.9	13.3	28.9	−37.3	−30.0	−14.5	−43.7	−41.2	−46.4	−29.5	−38.2	−42.1	−41.9
Peanuts	19.4	19.4	3.4	−4.3	−13.6	−1.2	−21.2	−23.0	2.3	−1.6	−30.9	−14.8	−28.3	−23.0
Red beans	13.0	−6.9	88.1	−19.4	−6.2	−15.3	−10.0	15.2	−4.8	−12.4	−27.4	−12.8	−29.0	−1.0
Beef	−5.2	−9.6	−13.7	−22.3	−15.9	−33.3	−31.1	−31.3	−21.4	−23.9	−22.4	−19.8	−13.3	−12.1
Importables	14.1	16.0	21.3	3.2	25.6	5.5	18.6	32.8	20.5	56.6	31.2	42.6	11.1	25.4
Exportables	−2.8	−8.5	57.0	−22.2	−24.5	−17.0	−20.3	−13.0	−11.8	−1.1	−9.3	−12.7	−13.8	−5.3
Total agriculture	10.5	11.8	28.4	−1.5	18.2	0.9	8.2	17.3	9.5	23.5	9.2	10.9	−4.6	11.5

Sources: Author estimates; Berthelon, Kruger, and Saavedra 2007.

Note: The weight is the value of consumption at undistorted prices.

affected mainly low-income and poor families because white maize, rice, and sugar constitute an important share of the basic consumption basket of these households.

Results, by Product

It may be helpful to review, one by one, the distortions in the main products covered.

White maize

White maize is an important agricultural product. It represents 8 percent of total agricultural GDP, and imports of white maize account for an average 13 percent of total final domestic consumption. Among extremely poor households, around 10 percent of food expenditure goes toward the product (World Bank 2003a). Because white maize is exempt from the value added tax, the NRAs for output are equal to the CTEs. In addition, because we are assuming an equiproportionate pass-through of distortions along the value chain, the NRAs for output at the farmgate are equal to the NRAs for output at wholesale.

Producers of white maize enjoyed positive NRAs for output during all but one year in 1991–2004; 2003 was the exception, with an NRA for output at –12 percent. This product is characterized by high and volatile NRAs and CTEs, which may be partly explained by the high volatility of the domestic price.

Kruger (2000) reveals that households are net consumers of this product, including poor and extremely poor households, which, respectively, purchase 62 and 66 percent of the white maize they consume. The high CTEs for white maize therefore imply high welfare costs for all households, but especially for poor households.

Rice

Imports of rice account for an average 31 percent of total final domestic consumption. In 1991–2004, rice represented an average 7.2 percent of total agricultural GDP (table 9.1); it was thus the second most important importable in the agricultural sector after white maize.

As in the case of white maize, rice is exempt from the value added tax. The NRAs for output are therefore equal to the CTEs. The NRAs for output at the farmgate are equal to the NRAs for output at wholesale because of our assumption about the equiproportionate pass-through (see elsewhere above).

Rice producers enjoyed high, positive NRAs for output. The average NRA for output (and the CTE) was 23 percent in 1991–2004. (This is a simple average

estimated from table 9.6.) The peak level of protection was the 71 percent in 2000. The high NRAs for output may be explained generally by policy interventions. For most of the period, the NRAs for output correlated with the levels of tariff protection in place.

The rice industry is oligopsonistic. It is controlled by a few large processors—who purchase the output of small farmers—and a handful of importers. The processors and importers have the ability to lobby the government to implement policies to protect the sector. They are able to influence the import tariffs and the import quota in the quota-contingent tariff mechanism. Between 1991 and 1998, they were able to pressure the government to prohibit rice imports from Vietnam, claiming that this was necessary for sanitary reasons. When the international price began to fall in 1996, domestic rice producers obtained from the government an increase in the rice import tariff, which rose to a maximum 90 percent in 2003. As the tariff increased, so did the NRA.

Toward the later part of 2000, the government applied safeguard measures to protect domestic producers from sudden reductions in the international price of rice. The measures raised the applied tariff from 30 percent to 65 percent.³ In 2001, rice processors and importers negotiated an import quota with the government, which agreed on condition that the processors and importers would convert part of the quota rent into higher domestic producer prices.

The negative welfare effects of the high level of CTEs on consumers are more severe in the case of rice than in the case of white maize because more than 90 percent of the rice consumed by households is purchased on the market (Kruger 2000), while only 2.4 percent is accounted for by household production for personal consumption.

Sorghum

Sorghum is the third most significant importable in terms of agricultural GDP. Its economic importance stems from the role it plays in two important industrial sectors: the poultry sector and the food processing sector.

We have gathered information on the prices paid to sorghum producers at the processing plant. We have added storage costs to construct the wholesale price and subtracted domestic transportation costs to obtain a farmgate equivalent price.

The sorghum industry is highly concentrated on the demand side. Seven firms—four industrial poultry plants and three food processing plants—purchase the entire production; in contrast, there are almost 200,000 sorghum producers (IICA, Fundación Provia, and USAID 2002a).

Under the price band system (1992–97), the domestic price of sorghum was equal to the international price, plus the import tariff, which ensured that the

domestic price was at least equal to the minimum in the price band. After the price band was abandoned in 1997, sorghum and poultry producer associations negotiated with the Ministry of Development, Industry, and Trade on the design of a new trade policy for sorghum whereby (a) producers would first purchase all domestic production, and high tariffs would be used, if necessary, to keep out imports during the early part of the season; (b) once domestic production had been purchased, any additional imports needed would pay zero tariffs; (c) part of the benefit of the new, reduced tariff scheme would be transferred to producers through higher producer prices; and (d) producers and industrial consumers would negotiate prices, volumes, and quality through trade contracts. The Ministry of Development, Industry, and Trade acts as a mediator in these negotiations and enforces any agreement (IICA, Fundación Provia, and USAID 2002a).

Although, in principle, domestic prices are not shielded from changes in the international markets for sorghum and yellow corn, they generally reflect the outcomes of this bargaining process. (Sorghum and yellow corn are taken together because they are treated as perfect substitutes as an input [feed] in the poultry industry.) In 1996, because of pressure from interest groups, the government increased the tariff on sorghum imports, which rose to a maximum of 30 percent in 2000–01. In 2000, safeguard measures were implemented to protect domestic sorghum producers from reductions in the international price of sorghum and yellow corn. The measures increased the tariff applied to sorghum from 15 percent to 30 percent. Despite these policies, the NRAs for sorghum were negative during most of 1991–2004.

Because of these largely negative rates of assistance, one might naturally pose the question: why don't sorghum producers export their product instead of negotiating with large industrial buyers, often under unfavorable conditions? Part of the answer lies in the fact that most sorghum producers are small (80 percent of the farms are each 35 hectares or less) and have little knowledge about exporting. Indeed, three characteristics of sorghum producers have been identified in a study by the World Bank (2003b) as key constraints on the export competitiveness of Nicaragua in this product: limited organization, inadequate access to marketing resources, and (possibly) general lack of quality control systems and sanitary management systems.

Soybeans

Imports of soybeans represent almost 13 times the level of domestic production and over 2 times the level of domestic use in the oil processing industry. The NRAs for soybeans show a generally declining trend. Overall, the NRA fell in 1991–96, when international prices were rising and the price band mechanism

was in place. The NRA began increasing in 1997 and had risen to 0 percent by 1999, only to decline again, to -53 percent in 2004.

The plant wholesale market is duopsonistic: producers sell their output to the soybean oil industry, which consists of only two processing facilities. Soybean producers are small and unorganized and thus have limited capacity for exporting (World Bank 2003b). If domestic soybeans reach a price the oil producers are unwilling to pay, the producers import unprocessed soybean oil and other types of oilseeds. Indeed, in 2000–05, the government reduced the import tariffs on unprocessed cooking oil, and, by 2004, soybean production had fallen to 8,000 tons from the 20,000 tons in 1999 (MIFIC 2005).

Coffee

Coffee is the main agricultural product of Nicaragua. In 2004, it accounted for 15 percent of the country's agricultural production and 17 percent of total exports. Up to 85 percent of production was exported in 1991–2004. However, the share of coffee in merchandise exports peaked at 31 percent in 1998 and has since declined to the current level of around 15 percent.

In the construction of NRAs for output, we have used fob prices, while the domestic wholesale price is equal to the price coffee producers receive at the coffee processing plant. The NRAs for coffee output exhibited wide swings and periods of positive or negative values, particularly in the 1990s. During the entire period, the (unweighted) average NRA for output was -13 percent.

There are thousands of small coffee growers in Nicaragua. A relatively small number of processing and exporting firms (frequently) provide financing for growers, purchase their coffee, process and package it, and then export it. The large differences between the export price and the domestic price received by producers arise because of the industry's structure, which allows processors and exporters to realize a large profit margin for the services they offer. The negative protection rates are not influenced by government interventions because there is almost no government regulation or export taxation in the industry. Changes in the NRA for output are thus caused mainly by movements in the border price.

Sugarcane and processed sugar

We estimate NRAs and CTEs for both sugarcane (a primary good) and sugar (a processed good). As in the case of coffee, the international price used in our estimates is the fob price.

In 1991–2004, the share of sugar in agricultural production remained relatively stable at around 7–8 percent of agricultural GDP (table 9.1). At the same time, the

share of sugar in merchandise exports fluctuated between 4 and 9 percent; the average share of sugar in total exports was 6 percent. Between 30 and 50 percent of all sugar production was exported, and a small share of production was imported (about 2 percent). All sugarcane production is used in the sugar production process.

As in many other countries, sugar is one of the most heavily regulated and protected products. It exhibited high, positive, and increasing rates of protection during the period. The sugar industry is an oligopoly consisting of four sugar mills that have the ability to lobby for protectionist policies.

We find that the rate of protection for the processed good (sugar) is twice the rate for the primary good (sugarcane). This reflects the political economy of the sector and implies that consumers pay a CTE of more than 100 percent on the sugar they purchase.

During the early 1990s, the domestic price of sugar was regulated through a price floor that benefited producers. In addition, between 1991 and 1996, sugar imports were effectively prohibited by administrative decision because sugar importers were required to obtain direct import licenses from the Ministry of Development, Industry, and Trade, and only a handful of the licenses were granted. The import license requirement was eliminated in 1997, and the tariff on sugar imports between 1997 and 2004 was set at 55 percent. Sugar producers sell part of their production in the United States at an agreed quota price, and they sell on the international market. The remaining production is sold domestically. Typically, the quota prices in the U.S. market are much higher than the prices in the international market.

Two nontariff barriers were still in place after 1997. Between 1997 and 1999, sugar imports were prohibited from certain countries under reciprocity rules, and, in 1999, the price at which the sugar tariff would be applied was set at the quota price paid through the U.S. market, not the competitive market price. The latter policy meant that sugar imports were effectively prohibited because of the higher base price for the application of the tariff (MIFIC 2005).

Sesame

Sesame is an export good. All production that meets the quality standards set by importing countries is sold abroad. This covers more than 90 percent of total production. The remaining production is consumed domestically by small and medium enterprises, such as bakeries and small-scale candy producers.

Sesame exhibited negative NRAs during all but two years (1993 and 1994). The average NRA was –30 percent during the period. The negative rates were caused by large increases in the border price that were not reflected in the domestic price.

This may be explained by the fact that there are only five sesame processing plants and thousands of producers.

Groundnuts

The peanut industry expanded rapidly during the period; its share in agricultural GDP increased from less than 1 percent in 1991 to 4 percent in 2004. At the same time, the share in exports rose from 2.9 percent in 1991 to 5.1 percent in 2004. Peanuts thus became one of the main agricultural exports of the country. In 1992–97, the sector benefited from the CBT tax incentive program, which was aimed at promoting nontraditional exports. The program involved a drawback of 15 percent on the export value, which was phased down to 1.5 percent in 1997. In 1991–2004, the peanut industry exported an average 56 percent of total production, and there were no significant imports (Base de Datos Estadísticos 2007).

The two products we analyze in our study are unprocessed peanuts (in the shell), which is the primary product sold to processing plants, and processed peanuts, which is the exported product. In our analysis of the primary good (unprocessed peanuts), the domestic price is the wholesale price paid to producers at the plant. The international price is estimated based on the fob price. For the exported good, the domestic price is the producer price (at the processing plant), plus processing costs, while the international price is the fob price.

The NRAs for output and the CTEs differ for peanuts because of the value added tax of 15 percent paid by consumers. The farmgate NRA for unprocessed peanut production was zero in 1991, but rapidly declined and remained negative in 1992–2004 because domestic prices grew at a slower pace than the international prices obtained by exports. The tax incentive was phased out in 1997, and the peanut sector has not experienced government regulation other than stable and decreasing import tariffs—from 10 percent in 1998 to 5 percent thereafter—and the tax drawback of 1.5 percent enjoyed by all exporters since 1997. Thus, the declining NRAs for output were caused mainly by movements in the international (border) price received by exporters relative to the domestic price.

Red beans

The share of beans in agricultural GDP increased from about 5 percent at the beginning of the 1990s to 8.2 percent in 2004, and thus represented the third most important product in agriculture. In 1994–2004, exports represented almost 15 percent of total production and accounted for 2.1 percent of total exports. Imports represented 3 percent of production.

A turning point was reached in the sector in 1994–96. The international price began a steep and sustained rise, and bean exports soared from 5 percent of

production in 1993 to 26 percent in 1995. According to the Base de Datos Estadísticos (2007) exports of red beans represented 18 percent of total production in 2001–04. However, local authorities and producers claim that the role of bean exports is greater because a substantial amount of production is exported through the black market to other Central American countries. Despite the increase in exports, the domestic market remains the main market for domestic producers.

Accordingly, in 1991–93, when exports were more restrained (5 percent of production), the NRA was above zero, whereas, after 1994, the NRA was negative (except for 1998), averaging –14 percent (table 9.1). The sustained negative rates of protection after 1999 and the flow of imports from neighboring countries (Costa Rica, El Salvador, and Honduras) pushed the government to raise import tariffs to 30 percent in 2003. This may explain the rise in the rates of protection during 2004, when the rate reached –4 percent; domestic prices were increasing more rapidly than international prices.

Livestock and meat

We analyze livestock as a primary good and bovine meat as a processed and exportable product. The domestic prices are taken from Saavedra and Vallecillo (2005), and the international prices are based on the fob price received for exports. Nicaragua exports 47 percent of the total meat production, and there are virtually no imports. Because Nicaragua exports different cuts of meat, we chose the most representative one and then selected a domestic cut of equivalent quality. The domestic price (in U.S. dollars) of the equivalent domestic cut remained stable over the period of our analysis; thus, the international price was the main factor in changes in the NRA.

The Political Economy of Agricultural Policies

In seeking to understand the trends in policy interventions during the reforms, one might fruitfully consider the Sandinista period before the reforms were undertaken in 1991.

The Sandinista government, 1979–90

During the decade prior to our period of analysis, the Sandinista Party governed Nicaragua under the leadership of President Daniel Ortega. The Sandinista Revolution in 1978–79 overthrew the Somoza dictatorship, which had lasted more than 50 years.

The Sandinista period may be characterized as authoritarian in matters of politics and economics. Among the goals of the government was a reduction in

the high incidence of poverty and the significant inequalities inherited from previous governments. This goal was to be achieved through direct intervention by the state in the economy.

Thus, the state played an active role in the economy during the 1980s both as a regulator and through direct ownership of the means of production. The financial sector was nationalized, as were key industries in almost all other economic sectors.

In agriculture, the government implemented a thoroughgoing land reform program that involved land confiscations from large landowners, usually political adversaries or absentee owners who had emigrated. To stimulate agricultural production, the state-owned Banco de Desarrollo subsidized loans for small farmers and cooperatives. The government also participated in the distribution of agricultural goods. The sale of nontraded goods was regulated through price controls, and a government agency was created to distribute and coordinate the sale of basic staples. The marketing of the country's main agricultural exportables was centralized in government-owned and managed firms.

One of the most important aspects of the international trade activities of the country during the 1980s was the total trade embargo by the United States and isolation by the international financial community following the government's default on Nicaragua's foreign debt. Trade policy was characterized by active government controls such as the mandatory sale of foreign reserves to the Central Bank, multiple exchange rates, high and discretionary import tariffs, export taxes, and the limited issue of export licenses to firms or individuals affiliated with or friendly toward the government.

Domestic economic policy toward the end of the 1980s resorted to an expansion in the money base that was not supported by foreign reserves, as well as large fiscal deficits, which were partly a result of the U.S. trade embargo and the isolation by the international financial community. This led to hyperinflation and economic recession that lasted from the mid-1980s until 1991.

The reforms after 1990

The government's trade policies after 1990 focused on trade liberalization and the promotion of exports. They included tariff reductions, free trade agreements and regional integration agreements, and fiscal incentives to benefit the export sector. The policies were effective. The average tariff rate fell from 43 percent in 1990 to 5 percent in 2000 (WTO 1999).

The current import tariff rate is the common external tariff of the Central American Common Market, of which Nicaragua is a member. Under its agreements with the World Trade Organization, the country consolidated its general trade tariffs to a maximum rate of 40 percent, except for sensitive agricultural and

industrial products, which are subject to high import tariffs. The importables and two of the exportables analyzed in this study—sugar and meat—are in the category of sensitive products. Thus, while the overall tariff reduction has been successful, the country's tariff policies contain many exceptions to the general tariff rules, and there were numerous reforms after 1990 (WTO 1999).

The broad tax reform law of 1997 was intended to eliminate the bias against the agricultural sector by simplifying the tariff structure for agricultural goods. The number of tariffs was trimmed by more than 50 percent, and tariff dispersion was reduced to between 0 and 15 percent. There were fewer exceptions for sensitive goods, including basic grains (corn, beans, rice, and sorghum), milk, poultry, and sugar. The argument used to defend the use of the higher tariffs was based on the protection the tariffs offered domestic producers from unfair international competition, given that international producers usually received some sort of subsidy (WTO 1999).

The three government administrations after 1990 implemented market reforms that expanded economic liberalization. Many of the reforms were the result of conditionality clauses in agreements with international financial institutions or foreign governments. Examples include the privatization of the telecommunications and energy sectors, a major reform of the public pension system, and the privatization of state-owned banks.

In the case of the protection of agricultural products, the abandonment of the price band mechanism is an example of a policy implemented because of foreign pressure: aid was conditioned on abandonment of the band; so, the government abandoned it. However, a more arbitrary mechanism was established in its place: the import quota-contingent tariff system, whereby quotas and tariffs are set through negotiations between representatives of the government and producers.

Most agricultural policies were the outcome of successful lobbying by interest groups, especially producers or industrial consumers. Several of the industries we have analyzed are uncompetitive; market power is concentrated among a few key players who sometimes gain sufficient economic and political influence to affect important policy decisions. The rice and sugar industries are clear examples.

Large producers, industrial consumers, and agroindustrial food processing companies were the beneficiaries of protectionist measures. For instance, the explicit objective of the government regulation that established the price band mechanism was to ensure sufficient food for the population and to protect the interests of domestic producers of basic grains (Republic of Nicaragua 1992). Despite the intentions to benefit consumers and isolate them from volatile price fluctuations, tariffs and import restrictions protected domestic producers and hurt consumers and small producers by raising the domestic price (Kruger 2000).

Prospects for Further Reform

A report by the World Bank (2003b) summarizes the key issues, problems, and bottlenecks in Nicaraguan agriculture, some of which are important in explaining and understanding the high rates of protection in the products that we have analyzed. The report also proposes some avenues for reform to increase the competitiveness of the agricultural sector.

The report recommends, first and foremost, that the protection provided by discretionary policies to some sectors of agricultural production should be eliminated and replaced by transparent and consistent rules that do not discriminate in favor of a handful of products. This would reduce the possibility that interest groups might succeed in influencing measures that affect their sectors. The report also recommends that all forms of price regulation through import tariffs (or any other measure) should be suppressed to allow markets to provide clear signals to domestic producers and to allow the domestic producers to respond appropriately to the signals.

Policies that promote competition or improve the efficiency of marketing channels would help reduce and, perhaps, eliminate the oligopsonistic power firms enjoy, at the expense of small producers, in the markets for several of the country's key products. Such policies might include the promotion of public-private partnerships that lower the dependency of small producers on domestic purchasers by improving the export capacity of the small producers so that they are able to sell their output on international markets.

Notes

1. The corporate tax exemption rates were gradually reduced from 80 percent in 1992 to 60 percent in 1997, the last year of the program (BCN 2004).

2. We have used the international reference price if the average ratio of imports to total domestic production is 1 or 2 percent or nonexistent, rendering the implicit price (the total value of imports, divided by the total volume of imports) unreliable for the generation of a relevant international price series.

3. Obtaining consistent data on tariff rates is difficult in Nicaragua. The Central Bank; the Ministry of Agriculture and Forestry; the Customs Service; the Ministry of Development, Industry, and Trade; and others each report different rates. In many cases, the differences are large, and the series are therefore not comparable. In cases in which we have been uncertain about the accuracy of the data, we have generally preferred the information reported by the Customs Service.

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APPENDIX A

METHODOLOGY FOR MEASURING DISTORTIONS TO AGRICULTURAL INCENTIVES

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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 those border and domestic measures that arise exclusively from government actions, that, as such, may be altered by a political decision, and that have an immediate effect on consumer choices, producer resource allocations, and net farm incomes. Most commonly, these measures include 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 the direct protection or taxation of primary agricultural industries, but also indirectly via policies assisting nonagricultural industries, given that the latter may have an offsetting effect by drawing resources away from farming. This appendix begins by outlining what theory suggests should be measured directly and indirectly. It then outlines the way the theory is put into practice through this study.

Thanks for invaluable comments are due to many project participants, including Bruce Gardner, Tim Josling, Will Masters, Alan Matthews, Johan Swinnen, Alberto Valdés, and Alex Winter-Nelson, plus Ibrahim Elbadawi. The information in this appendix is also available in Anderson et al. 2008a and 2008b.

What, According to Theory, Should Be Measured

The key objective of this study—obtaining a long time series on a wide range of countries that are at different stages of development—requires that the indicators be simple. If the indicators are simple, this also means that it would be easier to update the indicators subsequently for policy monitoring. Throughout, we have followed the concept of Bhagwati (1971) and Corden (1997) whereby a market policy distortion is, by definition, imposed by a government to create a gap between the marginal social return to a seller and the marginal social cost to a buyer in a transaction. The distortion creates an economic cost to society that may be estimated using welfare measurement techniques such as those pioneered by Harberger (1971). As Harberger notes, this focus allows for great simplification in the evaluation of the marginal costs of a set of distortions: changes in economic costs may be evaluated by taking into account the changes in volumes directly affected by the distortions and 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 the incentives facing producers and consumers may include flow-on consequences of the distortion, but these should not be confused with the direct price distortion that we aim to estimate. If, for instance, a country is large in world trade for a given commodity, the imposition of an export tax may raise the price in international markets, thereby 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 is of immediate concern, however, because, if the direct distortions are accurately estimated, they may be incorporated as price wedges into an appropriate country or global economy-wide computable general equilibrium model, which, in turn, will be able to capture the full general equilibrium impacts (inclusive of the 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 only on the size of the direct *agricultural* policy measures, but also on the magnitude of distortions generated by direct policy measures that alter the incentives in *nonagricultural* sectors. It is the *relative* prices and, hence, the relative rates of government assistance that affect producer incentives. In a two-sector model, an import tax has the same effect on the export sector as an export tax: this is 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 the sectors produce only nontradables (Vousden 1990). The symmetry theorem is

therefore also relevant in the consideration of distortions *within* the agricultural sector. In particular, if import-competing farm industries are protected, such as through import tariffs, then this has similar effects on the incentives to produce exportables as does an explicit tax on agricultural exports; and, if both measures are in place, this represents a double imposition on farm exporters.

In what follows, we begin by focusing on direct distortions to agricultural incentives before turning to those distortions affecting the sector indirectly through nonagricultural policies.

Direct agricultural distortions

Consider a small, open, perfectly competitive national economy that encompasses many firms producing a homogeneous farm product with only primary factors. In the absence of externalities, processing, and producer-to-consumer wholesale marketing, plus retail marketing margins, exchange rate distortions, and domestic and international trading costs, such a country would maximize national economic welfare by allowing both the domestic price of the farm product and the consumer price of the farm product to equal E , times P , where E is the domestic currency price of foreign exchange, and P is the foreign currency price of the identical product in the international market. Thus, any government-imposed diversion from this equality, in the absence of any market failures or externalities, would be welfare-reducing in the small economy.

Price-distorting trade measures at the national border

The most common 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, both at rate t_m . If this tariff on the imported primary agricultural product is the only distortion, its effect on producer incentives may be measured as the *nominal rate of assistance* (NRA) to farm output conferred by the 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, as follows:¹

$$NRA_{BS} = \frac{E \times P(1 + t_m) - E \times P}{E \times P} = t_m. \quad (A.1)$$

The effect of this import tariff on consumer incentives in this simple economy is to generate a *consumer tax equivalent* (CTE) on the agricultural product for final consumers:

$$CTE = t_m. \quad (A.2)$$

The effects of an import subsidy are identical to those in equations (A.1) and (A.2) for an import tax, but t_m would have a negative value in that case.

Governments sometimes also intervene through an export subsidy, s_x (or an export tax, in which case s_x would be negative). If this is the only intervention, then:

$$NRA_{BS} = CTE = s_x. \quad (A.3)$$

If any of these trade taxes or subsidies are specific rather than ad valorem (for example, US\$ per kilogram rather than z percent), the ad valorem equivalent may be calculated using slight modifications of equations (A.1), (A.2), and (A.3).

Domestic producer and consumer price-distorting measures

Governments sometimes intervene through a direct production subsidy for farmers, s_f (or a production tax, in which case s_f is negative, including through informal taxes in kind by local and provincial governments). In that case, if only this distortion is present, the effect on producer incentives may be measured as the NRA to farm output conferred by the domestic price support (NRA_{DS}), which is as above except that s_f replaces t_m or s_x , but the CTE is zero in this case. Similarly, if the government imposes only a consumption tax, c_c , on this product (or a consumption subsidy, in which case c_c is negative), the CTE is as above except that c_c replaces t_m or s_x , but the NRA_{DS} is zero in this case.

The combination of domestic and border price support provides the total rate of assistance to output and domestic consumer tax equivalent:

$$NRA_o = NRA_{BS} + NRA_{DS}, \quad CTE = NRA_{BS} + c_t \quad (A.4)$$

What if the exchange rate system is also distorting prices?

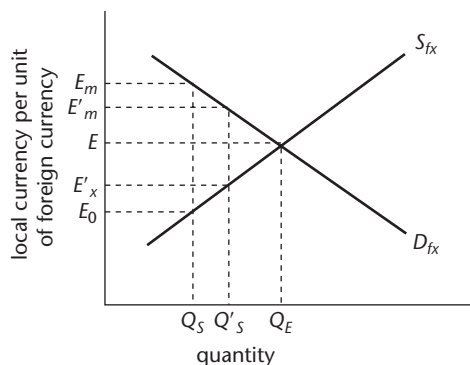
Should a multitier foreign exchange rate regime be in place, then another policy-induced price wedge exists. A simple two-tier exchange rate system creates a gap between the price received by all exporters and the price paid by all importers for foreign currency, thereby changing both the exchange rate received by exporters and the exchange rate paid by importers relative to 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 we consider 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 the level of the exchange rate in a market without government intervention. This implicit tax reduces the incentive of exporters to

export and, hence, the supply of foreign currency flowing into the country. With less foreign currency, demanders are willing to bid up the purchase price. This provides a potential rent for the government that may 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 it is assumed that the overall domestic price level is fixed, perhaps by holding the money supply constant (Derviş, 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 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.² 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 an importable and lowers the domestic price of an 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.³ If the demand and supply curves in figure A.1 had the same slope, then $e_m = e_x$ and $(e_m = e_x)$ is the secondary market premium or proportional rent extracted by the government or its agents.⁴

Figure A.1. A Distorted Domestic Market for Foreign Currency



Sources: Martin 1993. See also Derviş, de Melo, and Robinson 1981; Kiguel and O'Connell 1995; Kiguel, Lizondo, and O'Connell 1997; Shatz and Tarr 2000.

If the government chooses to allocate the limited foreign currency to different groups of importers at different rates, this is called a multiple exchange rate system. Some lucky importers may even be able to purchase foreign currency at the low official rate. The more 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 less-unscrupulous 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 a right to exporters to retain and sell a portion of foreign exchange receipts increases their incentives to export and thereby reduces the shortage of foreign exchange and, thus, 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 are 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 tax and import tax resulting from this regime would each be equal to half the secondary market premium.

In the absence of a secondary market and in the presence of multiple rates for importers below E_m and for exporters below E_0 , a black market often emerges. The rate for buyers in this market will rise above E , the more the government sells its foreign currency to demanders whose marginal valuation is below E_m , and the more active the government is in catching and punishing exporters selling in the illegal market. If the black market were 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 our present purposes, since the black market is not likely to be completely frictionless, it may be considered 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 this and E_0 would be the return going to exporters. Calculating E'_x in this situation (and thereby 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 not only knowledge about E_0 and the black market premium, but also a guess about the proportion, r , of sales in the black market.

In short, if a country exhibits distortions in its domestic market for foreign currency, the exchange rate relevant for calculating the NRA_o or the 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 the 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 may arise for many different reasons, including changes in the availability of capital inflows, macroeconomic policy adjustments, or changes in the international terms of trade. If the economy receives a windfall, such as a greater inflow of foreign exchange from remittances, foreign aid, or a commodity boom, the community moves to a higher indifference curve (Collier and Gunning 1998). While net imports of tradables may 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 so as to bring the demand into line with supply (Salter 1959).

While this type of alteration in the real exchange rate affects the incentive to produce tradables, it is quite different in two respects from the distortions in the market for foreign currency analyzed above. First, this real exchange rate appreciation reduces the incentives to produce importables and exportables to the same degree. In contrast with the case of the multiple-tier exchange rate, the 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 surplus 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, the symmetric treatment of any such overvaluation during periods of high foreign borrowing would require that one take into account exchange rate undervaluation during periods of low foreign borrowing or the repayment of foreign debt. For these reasons, we do not follow Krueger, Schiff, and Valdés (1988) or Orden et al. (2007) in including deviations of real exchange rates from benchmark values unless these deviations arise from direct exchange rate distortions such as multiple-tier exchange rates.⁵

What if trade costs are too high for a product to be 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 import

price and the free on board export price. Then, any trade policy measure (t_m or s_x) or the product-specific exchange rate distortion (for example, e_m or e_x) is redundant. In this case, in the absence of other distortions, $NRA_o = 0$, and the $CTE = 0$. 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).

Thus, for example, suppose only a production tax is imposed on farmers producing a particular nontradable, so that $s_f < 0$ and $t_c = 0$. In this case:

$$NRA_{DS} = \frac{s_f}{1 + \frac{\varepsilon}{\eta}} \quad (\text{A.5})$$

and

$$CTE = \frac{-s_f}{1 + \frac{\eta}{\varepsilon}}, \quad (\text{A.6})$$

where ε is the price elasticity of supply, and η is the (negative of the) price elasticity of demand.⁶

What if farm production involves primary factors, but also intermediate inputs?

Where intermediate inputs are used in farm production, any taxes or subsidies on the production, consumption, or trade of these inputs would 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, but also a tariff on fertilizer imports. In other situations, there will be farm input subsidies, but an export tax on the final product.⁷ In principle, all these items might be brought together to calculate an effective rate of direct assistance to farm value added (the effective rate of assistance). The nominal rate of direct assistance to farm output, NRA_o , is a component of this, as is the sum of the nominal rates of direct assistance to all farm inputs, call it NRA_i . In principle, all three rates may be positive or negative.

The participants in this project have not been required to estimate effective rates of assistance because to do so requires a knowledge of each product's value added share of output. Such data are not available for most developing countries for every year in the time series nor even for every few years. And, in most developing countries, distortions to farm inputs are small compared with distortions to farm output prices, and these purchased inputs are a small fraction of the value of output. However, where there are significant distortions to input costs, the ad

valorem equivalent is accounted for by summing each input's NRA, multiplying this by the input-output coefficient to obtain the combined NRA_i , and adding this to the farm industry's nominal rate of direct assistance to farm output, NRA_o , to obtain the total NRA in farm production, call it simply NRA .⁸

$$NRA = NRA_o + NRA_i \quad (A.7)$$

What about postfarmgate costs?

If a state trading corporation is charging 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 the excess should be treated as if it were 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 this case, the effect of these interventions on the price received by farmers for the primary product also needs to be taken into account. Before we explain how, it may be helpful first to review the possible role the marketing and distribution margins of the value chain may play in the calculation of distortions in primary agricultural activities so as to ensure that nondistortionary price wedges are not inadvertently included in any distortion calculations.

Nondistortionary price wedges

So far, it has been assumed that there are no divergences among farmer, processor-wholesaler, consumer, and border prices other than those arising because of subsidies or taxes on production, consumption, trade, or foreign currency. In practice, this is not so, and these costly value chain activities need to be explicitly recognized and netted out in using comparisons of domestic and border prices to derive estimates of government policy-induced distortions.⁹ Such recognition also offers the opportunity to compare the size of the NRA with wedges associated with, for instance, trade and processing costs (used in trade facilitation and value chain analyses, respectively). It may also expose short-term situations where the profits of importers or exporters are amplified by less-than-complete adjustment by agents in the domestic value chain.

Domestic trading costs

Trading costs may be nontrivial both intra- and internationally, especially in developing countries with poorly developed infrastructure.¹⁰ For example, domestic trading costs are involved in delivering farm products to port or to domestic wholesalers (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, for instance, that domestic transport costs are equal to the fraction T_f of the price received by the farmer.

Processor-wholesaler costs

Domestic processing costs and wholesale and retail distribution margins may represent a large share of the final retail price. Indeed, Reardon and Timmer (2007) argue that these costs and margins are an increasingly important part of the value chain in developing countries because consumers desire more postfarm processing and services added to their farm products, aided by the contribution of the supermarket revolution to globalization.¹¹ We denote the increases in the consumer price caused by these processing and wholesaling activities, over and above the farmgate price plus domestic trade costs, as m_p and m_w , respectively (or simply m_u above the price of the imported processed product if the processing must be done before the product is 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 the distortions calculations if the international price used is the cost, insurance, and freight import unit value for an importable or the free on board export unit value for an exportable. But these costs are relevant if there is no trade (because of, say, a prohibitive trade tax on the product) or if the border prices are unrepresentative (because of low trade volumes, for example). In these instances, it is recommended that one select an international indicator price series (such as those of the World Bank or the International Monetary Fund) and account for international trading costs (ocean or air freight, insurance, and so on).¹² We denote T_m as the proportion by which the domestic price of the import-competing product is raised above what it would otherwise be at the country's border, or, equivalently, we denote T_x as the fraction of the free on board price by which the price abroad of the exported product is greater.

Product quality and variety differences

The quality of a product traded internationally is usually considered to differ from the quality of the domestically sold substitute, and consumers typically have a home-country bias.¹³ Whenever 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.¹⁴ We denote q_m as the deflating fraction for the adjustment for product quality and variety differences in the case of importables.

The situation is similar for exported goods. Especially if an international indicator price has to be used in lieu of the free on board export unit value (for example, if

exports are close to zero and unrepresentative), the international price needs to 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. We denote q_x as the deflating fraction to adjust for product quality and variety differences in the case of exportables.

Net effect of nondistortionary influences

If one takes into consideration all these influences and so long as the product is still traded internationally, the relationships between the price received by domestic farmers and the international price, in the absence of government-imposed price and trade policies, are described by the following for an importable:

$$E \times P = \frac{P_f(1 + T_f)(1 + m_p)(1 - q_m)}{1 + T_m}, \quad (\text{A.8})$$

and for an exportable it is the following:

$$E \times P = \frac{P_f(1 + T_f)(1 + m_p)(1 + T_x)}{1 - q_x}, \quad (\text{A.9})$$

while the urban consumer price is above the producer price to the following extent:

$$P_c = P_f(1 + T_f)(1 + m_p)(1 + m_u), \quad (\text{A.10})$$

where P_f is the farmgate price.

The impact of distortions in 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 they have been lightly processed, and the downstream processing industry may also be subject to government interventions. In this 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 the primary product should be classified as tradable.

Some analysts have assumed that any protection to processors, if it is passed back fully to primary agriculture (as may be the case with a farmer-owned cooperative processing plant, for example), effectively raises the farmer price by the amount of the rise in the processor price, divided by the proportional contribution of the primary product to the value of the processed product. Another equally extreme, but opposite assumption is that there is zero pass-through by the processor back down the value chain to the farmer. This is likely to be the case if

the raw material may 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 that there is a proportional pass-through by the processor down the value chain to farmers and their transporters or up the value chain to consumers. This would be 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 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, the consequences for the NRAs in primary agricultural and processing activities.¹⁵

The above examples involving processors may also be generalized to any participants in the value chain. In particular, state trading enterprises and parastatal marketing boards may intervene significantly, especially if they have been granted monopoly status by the government. Such interventions by domestic institutions may explain the low econometrically estimated degree of transmission of price changes at a border to farmgate domestic prices even following a significant reform of more-explicit price and trade policies (see Baffes and Gardner 2003 and the references cited therein). Where reform has also involved the freeing up of previously controlled parts of the marketing chain, the lowered marketing margin may provide a benchmark against which to compare the prereform margin (as in Uganda beginning in the mid-1990s; see Matthews and Opolot 2006).

The mean and standard deviation of agricultural NRAs

We need to generate a weighted average NRA for covered products in each country because only then will we be able to add the NRA for noncovered products to obtain the NRA for all agriculture. If one wishes to average across countries, 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 the distortions in agriculture in a whole region, a weighted average is needed. The weighted average NRA for covered primary agriculture may be generated by multiplying the value share of each primary industry in production (valued at farmgate equivalent undistorted prices) by the corresponding NRA and then adding across industries.¹⁶ The overall sectoral rate, which we denote as *NRA_{ag}*, may be obtained by also adding the actual or assumed information for the commodities not covered and, where it exists, the aggregate value of non-product-specific assistance to agriculture.

A weighted average may be similarly generated for the tradables part of agriculture—including those industries producing products such as milk and sugar that require only light processing before they are traded—by assuming that the share of the non-product-specific assistance goes to producers of tradables. Call this $NRAag^t$.

In addition to the mean, it is important also to provide a measure of the dispersion or variability of the NRA estimates across the covered products. The cost of government policy distortions in incentives in terms of resource misallocation tends to be greater, the greater the degree of substitution in production (Lloyd 1974). In the case of agriculture involving 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 these market interventions. A simple indicator of dispersion is the standard deviation of industry NRAs within agriculture.¹⁷

Trade bias in agricultural assistance

A trade bias index also is needed to indicate the extent to which a country's policy regime has an antitrade bias within the agricultural sector. This is important because, as the Lerner (1936) symmetry theorem demonstrates, a tariff that assists import-competing farm industries has an effect on farmer incentives that is the same as the effect of a tax on agricultural exports (see elsewhere above), and, if both measures are in place, this is a double imposition on farm exports. The higher the NRA for import-competing agricultural production ($NRAag_m$) relative to the NRA for exportable farm activities ($NRAag_x$), the more incentive producers in the subsector will have to bid for mobile resources that would otherwise have been employed in export agriculture, all else being equal.

Once each farm industry has been classified as import-competing, as a producer of exportables, or as a producer of a nontradable (the status may sometimes change over the years; see below), it is possible to generate, for each year, the weighted average NRAs for the two different groups of tradable farm industries. These may then be used to generate an agricultural trade bias index, TBI , which is defined as follows:

$$TBI = \left[\frac{1 + NRAag_x}{1 + NRAag_m} - 1 \right], \quad (A.11)$$

where $NRAag_m$ and $NRAag_x$ are the average NRAs, respectively, for the import-competing and exportable parts of the agricultural sector (their weighted average is $NRAag^t$). This index has a value of zero whenever 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 through nonagricultural distortions

In addition to direct assistance to or taxation of farmers, the Lerner (1936) symmetry theorem also demonstrates that farmer incentives are affected indirectly by government assistance to nonagricultural production in the national economy. The higher the NRA for nonagricultural production (NRA_{nonag}), the more incentive producers in other sectors will have to bid up the value of mobile resources that would otherwise have been employed in agriculture, all else being equal. If NRA_{ag} is below NRA_{nonag} , one might expect there to be fewer resources in agriculture than there would be under free-market conditions in the country, notwithstanding any positive direct assistance to farmers, and, conversely, if NRA_{ag} is greater than NRA_{nonag} . A weighted average may be generated for the tradables part of nonagriculture, too; call it NRA_{nonag}^t .

One of the most important negative effects on farmers arises from protections for industrialists from import competition. Tariffs are part of this, but so too (especially in past decades) are nontariff barriers to imports. Other primary sectors (fishing, forestry, and minerals, including the extraction of energy raw materials) tend, on average, to be subject to fewer direct distortions than either agriculture or manufacturing, but there are important exceptions. One example is a ban on logging; however, if such a ban is instituted for genuine reasons of natural resource conservation, it should be ignored. Another example is a resource rent tax on minerals. Unlike an export tax or quantitative restriction on the 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, may be fairly benign in terms of resource reallocation and, so, may be ignored (see Garnaut and Clunies Ross 1983).

The largest part of most economies is the services sector. This sector produces mostly nontradables, many of which are provided through the public sector. Distortions in service markets have been extraordinarily difficult to measure, and no systematic estimates across countries are available over time or even for a recent period. The only feasible way to generate time series estimates of NRA_{nonag} in this project has therefore involved the assumption that all services are nontradable, and that they, along with other nonagricultural nontradables, face no distortions. All the other nonagricultural products may be separated into exportables and import-competing products for purposes of estimating correctly their weighted average NRAs, ideally using production valued at border prices as weights (although, in practice, most of our authors have had to use shares of gross domestic product).

Foreign exchange rate misalignment relative to the value of a country's currency—as suggested by the fundamentals—will be ignored (see elsewhere above). 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; the converse is true for a real devaluation. If a change in the exchange rate has been caused by aid or foreign investment inflows, then the excess of tradables consumption over tradables production leads to a new equilibrium. Certainly, such a new inflow of funds would reduce the incentives among farmers producing tradable products, but this is not a welfare-reducing policy distortion. Thus, it is only the exchange rate distortions caused by 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 NRA_{nonag}^t , and this should be accomplished in the same way discussed above for the inclusion of these distortions in the calculation of NRA_{ag}^t .

Assistance to agricultural production relative to nonagricultural production

Given the calculation of NRA_{ag}^t and NRA_{nonag}^t as above, it is possible to reckon a relative rate of assistance (RRA), defined as follows:

$$RRA = \left[\frac{1 + NRA_{ag}^t}{1 + NRA_{nonag}^t} - 1 \right]. \quad (A.12)$$

Since an NRA cannot be less than -1 if producers are to earn anything, then neither can the RRA. The RRA is a useful indicator in undertaking international comparisons over time of the extent to which a country's policy regime has an anti- or proagricultural bias.

The Ways the Theory Is Put into Practice in This Study

Making the theory described above operational in the real world, where data are often scarce, especially over a long time period, is as much an art as a science.¹⁸ Thankfully, for many countries, we have not had to start from scratch. NRAs are available from as early as 1955 in some cases and at least from the mid-1960s to the early or mid-1980s for the 18 countries included in Krueger, Schiff, and Valdés (1988, 1991a) and Anderson and Hayami (1986). Much has been done to provide detailed estimates since 1986 of direct distortions in farmer incentives (though not in food processing) in the high-income countries that are now members of the Organisation for Economic Co-operation and Development (OECD) and, since the early to mid-1990s, in selected European transition economies and Brazil, China, and South Africa (OECD 2007a, 2007b). At least for direct distortions, the Krueger, Schiff, and Valdés measures (1988, 1991a) have been updated to the mid-1990s for some Latin American countries (Valdés 1996) and have also

been provided for some countries in Eastern Europe (Valdés 2000), and a new set of estimates of simplified producer support estimates for a few key farm products in China, India, Indonesia, and Vietnam since 1985 is now available from the International Food Policy Research Institute (Orden et al. 2007). The methodology described above is, in some sense, a variation on each of these studies, and the basic price data, at least, as well as the narratives attached to the estimates in these studies, are invaluable springboards for our study.¹⁹

Time period coverage of the study

For Europe's transition economies, it is difficult to find meaningful data on the situation prior to 1992. For the same reason, estimates are not particularly useful before the 1980s for China and Vietnam. For all other countries, the target start date has been 1955, especially if this date includes years before and after a year of independence so that one might examine the effects of independence, although, for numerous developing countries, the data simply are not available. The target end date has been 2004, but, where available, 2005 data have also been included. In most cases, the most recent few years offer the highest quality data.

Farm product coverage of the study

The agricultural commodity coverage includes all the major food items (rice, wheat, maize or other grains, soybeans or other temperate oilseeds, palm oil or other tropical oils, sugar, beef, sheep and goat meat, pork, chickens 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, one-third of the value added in all agriculture and food industries has been highly processed food, beverages, and tobacco (GTAP Database; Dimaranan 2006). We have also addressed these products briefly, in the same cursory way we have addressed nonagricultural products. Fruits and vegetables are another one-sixth; so, the rest 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 slightly more than one-fifth. If the high-income countries are excluded, these shares change quite sharply. Then, highly processed food, beverages, and tobacco are only half as important; fruits and vegetables are somewhat more important, and, if these 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 of our project

reaches the target of 70 percent of the value added of most countries in agriculture and lightly processed food. Priority has been assigned to the most distorted industries because the residual will then have not only a low weight, but also a low degree of distortion.

If highly processed food, beverages, and tobacco are excluded, then fruits and vegetables account for almost one-quarter of household food expenditure in developing countries. If fruits and vegetables are also excluded, three groups each then 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 the coverage outlined above from a production viewpoint.

Each product is explicitly identified as import-competing, exporting, or nontradable. For many products, this categorization changes over time. In some cases, products move monotonically through these three categories, and, in others, they fluctuate in and out of nontradability. Hence, an indication of a product's net trade status is given for each year rather than for only one categorization for the whole time series. In large-area countries with high internal and coastal shipping costs, some regions 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 in our project has depended on the degree of distortions in that country's input markets. In addition to fertilizer, the large inputs and distortions are likely to involve electrical or diesel power, pesticides, and credit (including, occasionally, large-scale debt forgiveness, as in Brazil and Russia, although how this is spread out beyond the year of forgiveness is an issue).²⁰ There are also distortions revolving around water, but the task of measuring water subsidies is especially controversial and complex; so, these distortions have not been included in the NRA calculations. (The OECD has also ignored them in its producer support estimates.) Similarly, distortions in land and labor markets have been excluded, apart from qualitative discussions in the analytical narratives in some of the country case studies.

Trade costs

For the calculation of distortions in international trading costs, T_m and T_x , the free on board–cost, insurance, and freight gap in key bilateral trade in products during

years when the products have been traded in significant quantities is used. Both international and domestic trading costs are a function of the quality of hard infrastructure (roads, railways, ports) and soft infrastructure (business regulations and customs clearance procedures at state and national borders), each of which may be affected by government actions. However, because it is difficult to allocate these 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.²¹

Classifying farm products as import-competing, exportable, or nontradable

The criteria used in classifying farm industries as import-competing (*M*), exporting (*X*), or nontrading (*H*) are not straightforward. Apart from the complications raised above about whether a product is not traded simply because of trade taxes or nontariff barriers, there will be cases where trade is minimal, or the trade status has been reversed because of policy distortions, or the industry is characterized by significant imports *and* exports. A judgment has to be made for each sector each year as to whether it should be classified as *M*, *X*, or *H*. In the case of the two tradable classifications (that is, leaving out nontradables), this judgment will determine which exchange rate distortion to use. If trade is minimal for reasons of trade cost rather than reasons of trade policy, then a product 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 situations (for example, rice in China) in which the product is clearly an exportable year after year even though the self-sufficiency rate is rarely above 101 percent. Otherwise, if the share of production exported is substantially above (below) the share of consumption imported, the product is classified as exportable (importable).

In cases in which the trade status has been reversed because of a policy distortion (for instance, an export subsidy, in combination with a prohibitive import tariff, is large enough to encourage sufficient production to generate an export surplus), the product should be given the classification of the trade status that would prevail without the intervention (that is, import-competing). The same applies if tariff preferences reverse a country's trade status with respect to a product. The exports of many countries enjoy preferential access into the protected markets of other countries. In some cases, these arrangements are based on bilateral or plurilateral free trade agreements or customs unions. In other cases, the preferences are unilaterally offered by higher-income countries to developing countries through schemes such as the generalized system of preferences, the Cotonou Agreement (between the Africa, Caribbean, and Pacific group and the

European Union), and the European Union's Everything But Arms Initiative. 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 (such as sugar in the Philippines), the product should nonetheless be classified as import-competing because the developing country's import-restrictive policy is allowing the domestic price of the product to equal the price reached in exporting to the preference-providing country.

If there are significant exports *and* imports 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 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 represent an encouragement for the production earlier in the year in the presence of high credit or storage costs.

If trade or 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 required to drive that trade to zero: any trade taxes that exceed this requirement have an element of redundancy. If there are trade policy distortions, but no trade passes over them (that is, they are prohibitive), there may still be policy effects that need to be measured, but they will differ from those involved in the other cases above. An example would be a prohibitive tariff that is high enough to take the price of imported goods above the autarchy price and thus results in no imports. The NRA would therefore be less than the prohibitive tariff rate. Another common example is an import tariff in a context in which the world price is sufficiently high so that the country is freely exporting the product at issue. In this case, the domestic price would be determined by the world price, less the export trade costs; the import tariff would be irrelevant, and there would be no distortion despite the presence of the import tariff.

Similar conditions apply to exportable goods in a context in which a prohibitive export tax creates a distortion at a level lower than the tax rate. Then, the distortion wedge would be equal to the difference between the autarchy price and the world price, less the export trade costs; 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. The choice of the international price to be compared with domestic prices is therefore not based only on the actual trading status of a country (Byerlee and Morris 1993). Moreover, different prices may be needed for different regions of a large country that simultaneously exports and imports because internal trading costs (including coastal shipping) are so high relative to international trading

costs (Koester 1986). In this case, the value of production is split according to the regional production shares in the country. 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 the NRA is zero for the other part of the sector; these different NRAs are then included in the weighted average calculations of the NRAs for the import-competing and exportable subsectors of agriculture.

The transmission of assistance and taxation along the agricultural value chain

A crucial aspect of the NRA calculation for agricultural products is the way 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 the pass-through of distortions along the value chain, parameters have been identified as follows (although the default is an equiproportionate pass-through):

- θ_f , the extent to which any distortion to a primary farm product at the wholesale level is passed back to farmers
- 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

The CTEs of farm products

Many farm products are processed and are used as ingredients in the additional processing of food products before the food products are purchased by final consumers. (For example, wheat is ground to flour and then mixed with other ingredients before baking, slicing, and packaging for sale as bread.) Other farm products are used as inputs in various farm activities, often after the farm products have undergone some processing. (Thus, soybeans are crushed, and the meal is mixed with maize or other feed grains 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 these value chains, the OECD expresses its consumer support estimate simply at the level at which a product is first traded (for example, as wheat, or soybeans, or beef). This practice has been adopted here, too, to generate a consistent set of CTEs across countries to use in the analysis in chapter 1 (even though our authors of individual country studies may report CTEs that they have estimated in a more-sophisticated way farther along the value chain). In the absence of any domestic production or consumption taxes or subsidies directly affecting a product, the CTE at the point at which the product

is first traded will be the same as the NRA_o . (Also recall that the NRA_o in this case also equals the NRA if NRA_i is zero.)

Key required information

A template spreadsheet has been designed to aid in the management of individual country information and ensure a consistent comparison across regions and periods. The precise ways in which parameters and exogenous variables have entered each country spreadsheet to generate the NRAs and CTEs endogenously are detailed in Anderson et al. (2008a, 2008b). Most are straightforward; the main exception is the treatment of exchange rate distortions that is described below.

The key exogenous variables needed are the agricultural quantities produced and consumed (or imported and exported if the proxy for consumption is production, plus net imports); the wholesale and border prices of primary and lightly processed agricultural goods (along with, where relevant, a quality adjustment to match border prices); agricultural domestic input and output subsidies and taxes (the default is zero); if there are distorted farm input markets, the share of the input in the value of farm output at border prices (and, if there are only farmgate prices rather than wholesale prices for a primary good, the proportion of the farmgate value in the value at the wholesale level measured at the border price); the final domestic food consumer 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 the 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 is worth spelling out since it differs from the method used by Krueger, Schiff, and Valdés (1988, 1991a).

If there are no exchange rate distortions, the official exchange rate is used. However, in the presence of a parallel market rate (which might 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 is the formal retention rate if a formal dual exchange regime is in place; otherwise, it is based on a guesstimate of the proportion traded on the black market. (The black market premiums are provided in Cowitt, various years; Cowitt, Edwards, and Boyce, various years; and the Global Development Network Growth Database). The spreadsheet is then used to compute an estimate for the equilibrium exchange rate for the economy; this is the rate at which international prices are converted into local currency for the computation of each NRA.

Relevant exchange rates for importers and exporters are also then computed endogenously. If they are distorted away from the official exchange rate, the relevant exchange rate 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 this 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 this industry-specific rate.

Guesstimates of NRAs for agricultural products not covered

In the calculation of the weighted average rates of assistance for a subsector or sector, NRAs must be guesstimated for the agricultural products that are not covered (30 percent or so) and for which price comparisons are not calculated. The OECD, in its work on producer support estimates, assumes that the part not measured enjoys the same market price support as the average of the measured part. Another default is the assumption that the rates are zero. Orden et al. (2007) show that these two alternatives produce significantly different results for India. It is therefore preferable to make informed judgments about the import-competing, exportable, 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 among this set if there is no evidence of the existence of explicit production, consumption, or export taxes or subsidies. Even though this approach will miss the nontariff trade barriers affecting these residual products, the bias will be small if the weight is small.

Non-product-specific assistance to agriculture

If, in addition to the product-specific subsidies or taxes, there are non-product-specific forms of agricultural subsidies or taxes that one is unable to allocate among importables, exportables, and nontradables, these are included in the *NRAag* using the same method (as a percentage of the total value of production) used for these types of interventions in the OECD's calculations of its total support estimate (see OECD 2007a, 2007b).

No attempt is made to estimate the discouraging effects of underinvestment in rural infrastructure or underdevelopment among pertinent institutions. The structure of the related expenditure within the rural sector is also important. This may well be a nontrivial part of the distortions in agricultural incentives, but, unfortunately, it is not captured in the measures of distortions outlined above.

In some higher-income countries, governments also assist farm households through payments that are purported to be decoupled from production incentives.

An example is the single farm payment in the European Union. We do not count such payments as part of *NRA_{ag}* because the latter refers specifically to measures that alter producer incentives. However, we do include the ad valorem equivalent of these payments in discussing assistance to farmers as a social group so as to be able to compare the order of magnitude of this equivalent with the support provided through measures that alter production incentives.

Assistance to nonagricultural sectors

If nonagricultural sectors are assisted only through import tariffs on manufactures or export taxes on minerals, it is a relatively easy task to estimate a weighted average *NRA_{nonag}* once the shares of import-competing, exporting, and nontradable production have been determined. In practice, however, non-tariff trade measures must also be considered among the measures affecting tradables (Dee and Ferrantino 2005; OECD 2005), and most economies have myriad regulations affecting the many service industries. These regulations may be complex (see Findlay and Warren 2000). Because most of the outputs of service industries (including the public sector) are nontradable, the default in this study is to assume that the average rate of government assistance, along with that of nontradable nonagricultural goods, is zero. Then, the task of estimating the *NRA_{nonag}* is reduced to obtaining only the NRAs for the producers of import-competing products and of export-oriented nonagricultural goods, plus the shares of these products and goods in the undistorted value of the production of nonagricultural tradables, so as to derive the weighted average *NRA_{nonag}*^t to be entered into the RRA calculations.

The use of percentages in the chapters

To simplify the presentation in the chapters, the *NRA_o*, *NRA_i*, *NRA*, *CTE*, and *RRA* are expressed there as percentages rather than proportions.

Dollar values of farmer assistance and consumer taxation

For chapter 1, we have taken the country authors' estimate of *NRA* and multiplied it by the gross value of production at undistorted prices to obtain an estimate in current US dollars of the direct gross subsidy equivalent of assistance to farmers (*GSE*). This can then simply 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 countries. To get an aggregate estimate for the rest of the region, we assume the weighted average *NRA* for nonstudied countries is the same as the weighted average *NRA* for the studied countries, and that the nonstudied countries' share of the region's gross value of farm production at undistorted prices each year is the same as its share of the region's agricultural GDP measured at distorted prices.

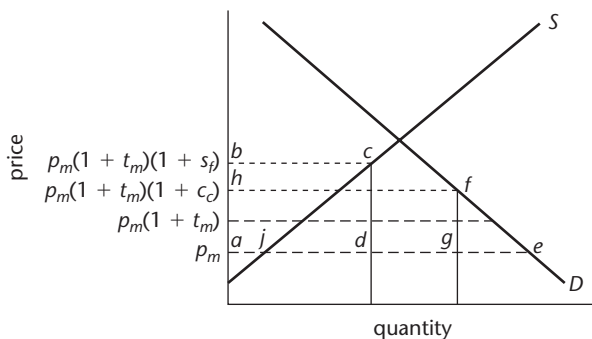
All current US dollar values are then converted to constant 2000 dollars using the GDP deflator for the United States.

To obtain comparable dollar value estimates of the consumer transfer, we have taken the *CTE* estimate at the point at which a product is first traded and multiplied it by the gross value of consumption at undistorted prices (proxied by production at undistorted prices plus net imports) to obtain an estimate in current US dollars of the tax equivalent to consumers of primary farm products (*TEC*). This too can then 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 countries and converted to US dollars again using the GDP deflator. We do not attempt to get an aggregate estimate for noncovered products in the studied countries nor for the region's nonstudied countries.

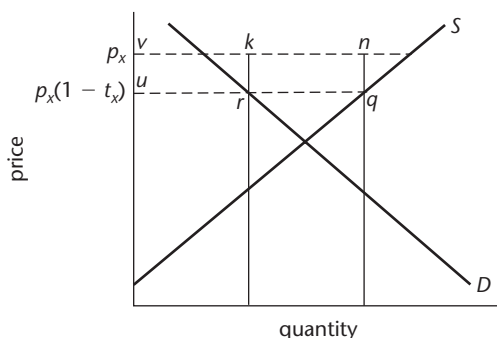
The *GSE* and *TEC* dollar values can be illustrated in a supply-demand diagram for a distorted domestic market for a farm product (see figure A.2). In the case of an import-competing product subjected to an import tariff t_m plus a production subsidy s_f and a consumption tax c_c , the *GSE* is the 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. The NRA therefore differs from the producer support estimate calculated by the Organisation for Economic Co-operation and Development (OECD) in that the producer support estimate is expressed as a fraction of the distorted value (see the OECD PSE-CSE Database). 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.

2. Equilibrium here refers to the situation that would prevail without the distortion in the domestic market for foreign currency. In figure A.1 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 may 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 of the results would carry through, and any exogenous change in the capital flows or transfers would imply a shift in the D_{fx} or S_{fx} curves.

3. From the viewpoint of using the NRA_o and CTE estimates later as parameters in a computable general equilibrium model, it does not matter which assumptions are made here about these elasticities because the 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; this is 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, the distinction is drawn between traded and nontraded goods (using the Armington [1969] assumption of differentiation between products sold on the domestic market and products sold on the international market), in contrast to the distinction between tradable and nontradable products made below in the text.

4. Note that this same type of adjustment might be made if the government forces exporters to surrender all foreign currency earnings to the domestic commercial banking system and importers to buy all foreign currency needs from that banking system and if that system is allowed by regulation to charge excessive fees. This apparently occurs in, for example, Brazil, where the spread is reputedly 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 might be treated as the equivalent of a 5 percent export tax and a 5 percent import tax applying to all tradables (although, as with nontariff barriers, there would be no government tariff revenue, but rather rent, which, in this case, would accrue to commercial banks instead of to the central bank). This is an illustration of the point made by Rajan and Zingales (2004) about the power of financial market reform to expand opportunities.

5. The results of a multicountry research project that has had macropolicy as its focus are reported in Little et al. (1993).

6. As in the case of the two-tier exchange rate, the elasticities are used merely to identify the incidence of these measures; as long as both the NRA_o 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 .

7. On this general phenomenon of offsetting distortions for outputs and inputs (and even direct payments or taxes), see Rausser (1982).

8. Bear in mind that a fertilizer plant or livestock feed mix plant might be enjoying import tariff protection that raises the domestic price of fertilizer or feed mix to farmers by more than any consumption subsidy (as was the situation with respect to fertilizer in Korea; see Anderson 1983). In such a case, the net contribution of this set of input distortions to the total NRA for agriculture would be negative.

9. This is not to say that there is no interest in comparisons across countries or over time in, for example, the farmgate price as a proportion of the free on board export price, which summarizes the extent to which the producer price is depressed by the sum of internal transport, processing, and marketing costs, plus items such as explicit or implicit production or export taxes. Prominent users of this proportion—which may be less than half in low-income countries even if 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.

10. On the basic economics of trading costs as affected by, for example, infrastructure within the country, at the border (ports, airports), and, in the case of landlocked countries, in transit countries, as well as international freight costs and so on, and their impact on both the aggregate volume and product structure of international trade, see Limão and Venables (2001), Venables and Limão (2002), and Venables (2004). See also the survey by Anderson and van Wincoop (2004), where it is reported that the tax equivalent of trading costs are estimated at more than 170 percent in high-income countries and higher in developing and transition economies, especially those that are small, poor, and remote. By lowering these trading costs (for example, by streamlining customs clearance procedures), trade facilitation may be the result not only of technological changes, but also of government policy choices such as restrictions on the ships that may be used in bilateral trade. For example, Fink, Mattoo, and Neagu (2002) estimate that the policy contribution to the cost of shipping goods from developing countries to the United States is greater than the border import barriers. More generally, on imperfect competition in services markets, including cartelized international shipping, see Francois and Wooten (2001, 2006).

11. The costs of processing and of wholesale and 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 may 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 our project's measurement of distortions.

12. 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 international trading costs, the domestic price of importables (exportables) would change less (more) than proportionately with P . The *ad valorem* assumption is preferable to the specific one in situations where international price and exchange rate changes are less than those that are fully passed through 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 this to calculate the margin each year.

Trading costs include the storage costs that would be incurred to hold domestic products until the 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 Khandker, Balkht, and Koolwal (2006) on Bangladesh; Moser, Barrett, and Minten (2005) on Madagascar; and Diop, Brenton, and Asarkaya (2005) on Rwanda.

13. On the how and the why of the variation by country of origin in the quality and variety of traded goods, see Hummels and Klenow (2005).

14. We assume that the quality difference arises because one good provides more effective units of service than another, so that the relative price is a constant proportion of the value of the first good. If products are simply differentiated, without such a quality dimension (as in Armington 1969), there will be no fixed relationship between the two prices.

15. In using the NRA and the CTE estimates later as parameters in a computable general equilibrium model, as in the case of the incidence of the exchange rate distortion discussed elsewhere above, the assumptions made here about the extent of pass-through along the value chain may not greatly affect the model's results for real variables such as prices, output, and value added.

16. Corden (1971) proposed that free trade volumes be used as weights, but, because these 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 $(1 + \text{NRA})$. If estimates of own- and cross-price elasticities of demand and supply are available, a partial equilibrium estimate of the quantity at undistorted values might then be generated, but, if these estimated elasticities are unreliable, this may introduce additional error over and above the error one seeks to correct.

17. The mean and standard deviations might be captured by a single measure, namely, the trade restrictiveness index developed by Anderson and Neary (2005). Calculating this index even in its simplest partial equilibrium mode requires that one know the own- and cross-price elasticities of demand and supply (or, at least, the elasticity of import demand, but this shortcut is only usable if the NRA and CTE are identical).

18. In addition to the methodologies of Krueger, Schiff, and Valdés (1988, 1991a) and the OECD (2007a, 2007b) for estimating agricultural distortion and producer support indicators, see the recent review by Josling and Valdés (2004) of methodologies in earlier studies.

19. Other trade policy studies have also been of great help, particularly studies on trade and exchange rate distortions. These include 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).

20. For an analysis of input subsidies in Indian agriculture, see Gulati and Narayanan (2003).

21. That these costs vary hugely across countries and often dwarf trade taxes has now been clearly established. See, for example, World Bank (2006a, 2006b), the Doing Business Database, and the governance and anticorruption indicators in the WGI Database. Also now available is a database on information and communications cost indicators for 144 countries; see the ICT at a Glance Database. In some settings, price bands induced by trading costs arising because of missing or imperfect markets in rural areas lead poor farmers to forgo cash crops to ensure sufficient food production for survival (de Janvry, Fafchamps, and Sadoulet 1991; Fafchamps 1992). This contributes to the low supply responsiveness among poor producers to international price changes for the cash crops.

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APPENDIX B

ANNUAL ESTIMATES OF LATIN AMERICAN DISTORTIONS TO AGRICULTURAL INCENTIVES

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This appendix summarizes the estimates of the key distortion indicators defined in appendix A for the focus countries of this study on Latin America and the Caribbean. Specifically, three tables are provided for each country that cover the following indicators: (a) the nominal rate of assistance (NRA) for the individual farm products covered in the study and the weighted average NRA; (b) the relative rate of assistance (RRA) for producers of agricultural (relative to nonagricultural) tradables, including the component parts of the RRA calculations; and (c) the weights for individual covered farm products and for the residual noncovered group of products; production valued at undistorted prices has been used as weights and is shown in percent figures that sum to 100 percent.

If the only distortion caused by government policies involves the output price, the NRA of a product is the percentage by which the domestic producer price exceeds the price that would prevail under free markets, that is, the border price appropriately adjusted to account for differences in product quality, transport costs, processing costs, and so on. A negative value indicates that the domestic price is below the comparable border price. The producers of the product may also be affected by distortions in product-specific input prices. In this case, the ad valorem equivalent of the total NRA for the production of the farm product

is obtained by multiplying the ad valorem input price subsidy (or tax) by the input-output coefficient and then adding (subtracting) the total to (from) the farm industry's output NRA.

The RRA is defined as follows:

$$100 * [(100 + NRA_{ag}^t) / (100 + NRA_{nonag}^t) - 1], \quad (B.1)$$

where NRA_{ag}^t and NRA_{nonag}^t are the percentage NRAs for agricultural and nonagricultural tradables, respectively.

The sources of these tables are the working paper versions of the chapters in this volume (and their associated spreadsheets), each of which is downloadable in the working paper section of the project's Web site, at <http://www.worldbank.org/agdistortions>. The complete global distortions database (Anderson and Valenzuela 2008) is also available at that Web site. The specific references are provided following the tables.

Table B.1. Annual Distortion Estimates, Argentina, 1960–2005*(percent)***a. NRAs for covered products**

Year	Wheat	Maize	Soybeans	Sunflowers	Beef	Milk	All
1960	–36	–32	—	—	–40	—	–38
1961	–23	–17	—	—	–40	—	–33
1962	–21	–3	—	—	–44	—	–33
1963	–13	4	—	—	–39	—	–27
1964	–2	1	—	—	–23	—	–13
1965	–18	–9	—	—	–35	—	–26
1966	–6	10	—	—	–25	—	–15
1967	8	–35	—	—	–38	—	–30
1968	–25	–20	—	—	–38	—	–32
1969	–16	–7	—	—	–39	—	–28
1970	–16	–20	—	—	–25	—	–22
1971	–11	–17	—	—	–13	—	–14
1972	–30	–28	—	—	–31	—	–30
1973	–42	–25	—	—	–35	—	–35
1974	–63	–28	—	—	–28	—	–39
1975	–36	–44	—	—	–42	—	–41
1976	–40	–58	—	—	–19	—	–34
1977	–9	–20	–16	–24	–32	—	–24
1978	–19	–11	–15	–36	–14	—	–17
1979	–13	–12	–12	–23	–3	—	–8
1980	–11	6	–7	–25	–4	—	–6
1981	–4	–15	–13	–9	–36	—	–26

(Table continues on the following page.)

Table B.1. Annual Distortion Estimates, Argentina, 1960–2005 (*continued*)

a. NRAs for covered products

Year	Wheat	Maize	Soybeans	Sunflowers	Beef	Milk	All
1982	–12	–14	–14	–26	–35	—	–27
1983	–27	–28	–27	–33	–31	—	–30
1984	–21	–22	–24	–24	–21	—	–22
1985	–26	–20	–24	–25	–18	—	–22
1986	–21	–32	–33	–32	–7	—	–21
1987	–11	–25	–22	–22	–7	—	–14
1988	–2	–2	–17	–14	–6	—	–11
1989	–25	–30	–38	–39	–22	–3	–25
1990	–30	–31	–36	–39	–19	1	–27
1991	–6	–7	–12	–13	–5	1	–8
1992	–3	–3	–9	–10	–1	0	–4
1993	2	3	–5	–4	3	1	0
1994	–12	1	–6	–14	4	2	–3
1995	–2	–5	–9	–23	4	6	–5
1996	–8	–6	–5	–17	2	5	–4
1997	–14	–4	–5	–11	2	5	–4
1998	–14	–8	–10	–18	2	5	–7
1999	–10	–2	–8	–29	2	5	–6
2000	–14	–7	–8	–27	2	6	–6
2001	–3	–6	–3	–20	2	6	–3
2002	–19	–25	–30	–41	–4	–4	–24
2003	–23	–25	–28	–36	–5	–4	–23
2004	–24	–27	–30	–35	–5	–4	–23
2005	–26	–29	–29	–40	–7	–9	–24

b. Agricultural NRAs and RRAs: all products, tradables, and relative to nonagricultural tradables

Year	NRAs, total agriculture ^a				NRAs, agricultural tradables			NRA, nonagricultural tradables	RRA
	Covered products		Noncovered products	All products, including NPS	Exportables ^b	Import- competing ^b	All		
	Inputs	Outputs							
1960	0	-38	-19	-33	-33	—	-33	66	-60
1961	0	-33	-16	-29	-29	—	-29	63	-57
1962	0	-33	-17	-29	-29	—	-29	61	-56
1963	0	-27	-14	-24	-24	—	-24	59	-52
1964	0	-13	-8	-12	-12	—	-12	58	-44
1965	0	-27	-14	-23	-23	—	-23	56	-51
1966	0	-15	-8	-13	-13	—	-13	54	-44
1967	0	-30	-13	-26	-26	—	-26	53	-52
1968	1	-32	-16	-28	-28	—	-28	50	-52
1969	-1	-27	-15	-23	-23	—	-23	48	-48
1970	-1	-21	-11	-18	-18	—	-18	43	-42
1971	0	-14	-6	-11	-11	—	-11	38	-36
1972	0	-30	-15	-25	-25	—	-25	35	-44
1973	0	-35	-17	-29	-29	—	-29	31	-46
1974	0	-39	-18	-32	-32	—	-32	28	-47
1975	1	-42	-20	-34	-34	—	-34	24	-47
1976	0	-34	-14	-27	-27	—	-27	21	-40
1977	1	-25	-13	-20	-20	—	-20	21	-34
1978	0	-16	-8	-14	-14	—	-14	20	-28
1979	0	-8	-3	-6	-6	—	-7	19	-22
1980	-1	-5	-4	-5	-5	—	-5	19	-20
1981	0	-26	-13	-23	-23	—	-23	19	-35
1982	1	-28	-14	-24	-24	—	-24	17	-35

(Table continues on the following page.)

Table B.1. Annual Distortion Estimates, Argentina, 1960–2005 (continued)

b. Agricultural NRAs and RRAs: all products, tradables, and relative to nonagricultural tradables

Year	NRAs, total agriculture ^a				NRAs, agricultural tradables			NRA, nonagricultural tradables	RRA
	Covered products		Noncovered products	All products, including NPS	Exportables ^b	Import- competing ^b	All		
	Inputs	Outputs							
1983	1	−31	−16	−26	−26	—	−26	17	−36
1984	1	−23	−12	−19	−19	—	−19	16	−31
1985	2	−23	−13	−19	−19	—	−19	16	−30
1986	0	−21	−8	−18	−18	—	−18	16	−29
1987	−1	−13	−6	−12	−12	—	−12	16	−24
1988	0	−11	−4	−9	−9	—	−9	17	−22
1989	0	−25	−11	−21	−21	—	−21	15	−31
1990	0	−27	−13	−23	−23	—	−23	12	−32
1991	0	−8	−3	−6	−6	—	−6	11	−16
1992	0	−4	−1	−3	−3	—	−3	11	−13
1993	−1	1	1	0	0	—	0	10	−9
1994	−4	1	0	−3	−3	—	−3	11	−12
1995	−4	−1	0	−4	−4	—	−4	11	−13
1996	−3	−1	0	−3	−3	—	−3	10	−12
1997	−4	0	0	−3	−3	—	−3	10	−12
1998	−4	−2	0	−5	−5	—	−5	11	−15
1999	−6	−1	0	−5	−5	—	−5	11	−14
2000	−4	−2	0	−5	−5	—	−5	10	−13
2001	−5	3	0	−2	−2	—	−2	9	−10
2002	−1	−23	−20	−23	−23	—	−23	3	−25
2003	−2	−21	−20	−22	−22	—	−22	3	−25
2004	−1	−22	−20	−22	−22	—	−22	4	−25
2005	−1	−22	−20	−23	−23	—	−23	3	−25

c. Value shares of the primary production of covered and noncovered products^c

Year	Wheat	Maize	Soybeans	Sunflowers	Beef	Milk	Noncovered	Total
1960	20	12	—	—	43	—	25	100
1961	16	13	—	—	50	—	20	100
1962	15	12	—	—	48	—	25	100
1963	17	11	—	—	47	—	25	100
1964	23	10	—	—	41	—	25	100
1965	22	10	—	—	43	—	25	100
1966	13	14	—	—	48	—	25	100
1967	11	21	—	—	43	—	25	100
1968	20	13	—	—	42	—	25	100
1969	12	12	—	—	38	—	37	100
1970	13	16	—	—	36	—	35	100
1971	8	16	—	—	38	—	38	100
1972	9	11	—	—	46	—	34	100
1973	17	15	—	—	36	—	33	100
1974	22	15	—	—	30	—	33	100
1975	10	12	—	—	44	—	34	100
1976	11	19	—	—	37	—	33	100
1977	12	11	8	2	34	—	33	100
1978	8	13	9	7	31	—	32	100
1979	9	8	9	4	37	—	33	100
1980	15	8	8	4	37	—	28	100
1981	7	12	8	3	43	—	27	100
1982	9	8	9	5	42	—	27	100
1983	13	10	9	5	34	—	29	100
1984	8	9	17	7	31	—	27	100

(Table continues on the following page.)

Table B.1. Annual Distortion Estimates, Argentina, 1960–2005 (continued)c. Value shares of the primary production of covered and noncovered products^c

Year	Wheat	Maize	Soybeans	Sunflowers	Beef	Milk	Noncovered	Total
1985	7	15	17	11	24	—	26	100
1986	9	11	16	9	28	—	27	100
1987	7	8	17	5	35	—	27	100
1988	5	8	29	8	23	—	27	100
1989	1	5	16	7	38	8	25	100
1990	10	5	23	8	23	7	24	100
1991	9	6	22	8	23	6	25	100
1992	9	7	18	5	25	12	25	100
1993	9	7	18	5	24	13	24	100
1994	9	7	21	9	18	13	23	100
1995	13	8	19	11	16	11	23	100
1996	12	9	21	9	15	11	23	100
1997	14	8	19	8	16	11	23	100
1998	9	9	23	9	16	11	24	100
1999	9	7	23	10	16	12	24	100
2000	11	7	24	7	17	10	24	100
2001	11	6	27	8	13	10	24	100
2002	13	8	36	6	9	5	23	100
2003	9	7	40	5	9	7	23	100
2004	9	6	39	4	11	7	23	100
2005	9	7	36	4	12	9	23	100

Source: Sturzenegger and Salazni 2007.

Note: — = no data are available.

a. Including assistance for nontradables and non-product-specific assistance (NPS).

b. Including product-specific input subsidies.

c. Product shares are calculated at undistorted farmgate prices in U.S. dollars.

Table B.2. Annual Distortion Estimates, Brazil, 1966–2005*(percent)***a. NRAs for covered products**

Year	Rice	Wheat	Maize	Soybeans	Sugar	Cotton	Coffee	Beef	Pig meat	Poultry	All
1966	—	44	−9	0	—	−16	—	—	—	—	−8
1967	—	41	−9	0	—	−5	—	—	—	—	−6
1968	—	38	−9	0	—	−9	—	—	—	—	−6
1969	—	43	−9	0	—	−6	—	—	—	—	−5
1970	—	69	−9	−3	−35	4	—	—	—	—	−9
1971	—	53	7	7	−45	−6	—	—	—	—	−8
1972	—	4	20	0	−78	−7	—	—	—	—	−35
1973	19	−30	−5	−24	−82	1	—	—	—	—	−36
1974	−3	5	−12	−3	−89	8	—	—	—	—	−49
1975	−4	39	0	−6	−84	−9	—	—	—	—	−37
1976	1	81	−5	−16	−36	−9	—	—	—	—	−11
1977	−13	115	−3	−23	−55	−29	—	—	—	—	−22
1978	−32	80	−17	−14	−40	−9	—	—	—	—	−21
1979	−7	14	−35	−19	−47	−30	—	—	—	—	−27
1980	−28	17	−37	−10	−68	−17	−43	1	—	−21	−32
1981	−25	76	−35	−15	−61	−27	−43	14	—	6	−29
1982	51	107	22	1	−60	−11	−41	19	7	4	−10
1983	2	4	−26	−17	−64	−25	−57	7	−7	−20	−35
1984	−4	3	−48	−17	−66	−23	−53	36	1	−10	−34
1985	18	3	−45	−28	−59	−14	−27	−23	−9	−37	−33

(Table continues on the following page.)

Table B.2. Annual Distortion Estimates, Brazil, 1966–2005 (*continued*)

a. NRAs for covered products

Year	Rice	Wheat	Maize	Soybeans	Sugar	Cotton	Coffee	Beef	Pig meat	Poultry	All
1986	60	29	−14	30	−56	−15	5	35	−13	34	−2
1987	−12	−4	−49	−23	−50	−32	−43	−21	−15	−29	−34
1988	5	−23	−38	−28	−63	−16	−46	−34	−52	−40	−38
1989	−52	−34	−23	−56	−48	−67	−14	55	−8	3	−31
1990	4	−7	−23	−26	−54	−35	−19	22	−48	18	−21
1991	9	−14	−29	−34	−49	−36	−23	−38	12	−24	−30
1992	11	−21	−31	−32	−30	18	20	−47	24	−28	−26
1993	7	42	−15	−24	−40	−6	26	−40	24	−21	−19
1994	−6	25	−18	62	−38	−23	53	−18	55	−11	7
1995	25	4	−5	−3	−25	9	3	6	2	0	−1
1996	15	6	4	−6	−12	8	5	4	2	2	0
1997	19	1	3	2	−2	8	10	4	5	4	4
1998	19	25	15	1	1	4	10	2	−4	−7	4
1999	7	5	2	−1	−13	4	6	6	1	6	2
2000	10	9	5	−2	10	12	4	−1	−5	−1	2
2001	16	−2	−14	−3	3	13	5	6	1	6	1
2002	11	−1	5	−14	−4	8	19	1	4	4	−1
2003	20	−3	−1	0	−1	22	3	6	2	1	2
2004	23	0	3	7	2	1	4	5	0	2	5
2005	19	−1	16	−2	0	7	2	2	3	2	3

b. Agricultural NRAs and RRAs: all products, tradables, and relative to nonagricultural tradables

Year	NRAs, total agriculture ^a				NRAs, agricultural tradables			NRA, nonagricultural tradables	RRA
	Covered products		Noncovered products	All products, including NPS	Exportables ^b	Import- competing ^b	All		
	Inputs	Outputs							
1966	0	-8	-8	-8	-10	44	-8	—	—
1967	0	-6	-6	-6	-8	41	-6	—	—
1968	0	-6	-6	-6	-8	38	-6	—	—
1969	0	-5	-5	-5	-7	43	-5	—	—
1970	0	-9	-9	-9	-14	69	-9	35	-33
1971	0	-8	-8	-8	-13	53	-8	35	-32
1972	0	-35	-35	-35	-38	4	-35	36	-52
1973	0	-36	-36	-36	-44	8	-36	34	-52
1974	0	-49	-49	-49	-57	-1	-49	35	-62
1975	0	-37	-37	-37	-48	4	-37	34	-53
1976	0	-11	-11	-11	-17	12	-11	34	-33
1977	0	-22	-22	-22	-29	11	-22	33	-41
1978	0	-21	-21	-21	-24	-17	-21	39	-43
1979	0	-27	-27	-27	-32	-20	-27	38	-47
1980	5	-36	-32	-29	-33	-28	-29	39	-49
1981	5	-34	-29	-28	-32	-22	-28	35	-46
1982	4	-14	-10	-6	-19	49	-6	32	-29
1983	4	-39	-35	-33	-39	0	-33	31	-49
1984	4	-38	-34	-33	-35	-32	-33	30	-48
1985	3	-35	-33	-31	-35	-26	-31	30	-47
1986	10	-12	-2	2	-6	7	2	38	-26

(Table continues on the following page.)

Table B.2. Annual Distortion Estimates, Brazil, 1966–2005 (continued)

b. Agricultural NRAs and RRAs: all products, tradables, and relative to nonagricultural tradables

Year	NRAs, total agriculture ^a				NRAs, agricultural tradables			NRA, nonagricultural tradables	RRA
	Covered products		Noncovered products	All products, including NPS	Exportables ^b	Import- competing ^b	All		
	Inputs	Outputs							
1987	3	−37	−34	−28	−35	−31	−28	38	−48
1988	11	−49	−38	−28	−41	−29	−28	24	−42
1989	−15	−17	−31	−21	−30	−33	−21	18	−32
1990	3	−24	−21	−13	−22	−20	−13	13	−23
1991	3	−33	−30	−20	−33	−21	−20	11	−28
1992	8	−34	−26	−20	−28	−21	−20	7	−25
1993	5	−24	−19	−14	−25	−3	−14	5	−18
1994	4	2	7	10	14	−14	10	6	4
1995	2	−3	−1	5	−3	4	5	7	−2
1996	5	−4	0	4	−1	8	4	7	−2
1997	4	0	4	11	3	7	11	9	2
1998	5	−1	4	9	1	16	9	9	0
1999	5	−3	2	11	2	4	11	8	3
2000	3	−1	2	6	1	7	6	9	−3
2001	2	−1	1	3	1	13	3	5	−2
2002	3	−3	−1	1	−1	7	1	4	−3
2003	2	0	2	4	2	14	4	4	0
2004	2	4	5	7	4	16	7	4	3
2005	−3	6	3	4	2	14	4	4	1

c. Value shares of the primary production of covered and noncovered products^c

Year	Rice	Wheat	Maize	Soybeans	Sugar	Cotton	Coffee	Beef	Pig meat	Poultry	Noncovered
1966	—	1	20	2	—	9	—	—	—	—	67
1967	—	1	22	2	—	7	—	—	—	—	69
1968	—	2	19	2	—	10	—	—	—	—	67
1969	—	2	21	3	—	10	—	—	—	—	64
1970	—	4	27	6	19	11	—	—	—	—	32
1971	—	5	22	6	21	15	—	—	—	—	31
1972	—	4	14	6	33	10	—	—	—	—	32
1973	9	2	13	11	28	7	—	—	—	—	30
1974	7	3	10	8	36	5	—	—	—	—	31
1975	12	3	10	10	29	3	—	—	—	—	33
1976	13	2	17	17	13	6	—	—	—	—	31
1977	10	2	11	23	16	8	—	—	—	—	32
1978	15	2	15	16	16	6	—	—	—	—	31
1979	11	4	17	16	15	6	—	—	—	—	30
1980	11	2	9	9	14	2	12	10	—	3	27
1981	5	2	11	9	12	3	23	8	—	3	24
1982	6	1	8	9	18	3	9	9	2	3	32
1983	4	1	7	9	19	2	13	8	2	3	32
1984	3	1	12	11	18	3	9	6	2	2	32
1985	3	1	11	11	14	3	14	7	2	1	32
1986	4	2	9	6	13	3	4	7	2	3	46
1987	3	2	9	8	13	2	13	11	2	3	32

(Table continues on the following page.)

Table B.2. Annual Distortion Estimates, Brazil, 1966–2005 (continued)c. Value shares of the primary production of covered and noncovered products^c

Year	Rice	Wheat	Maize	Soybeans	Sugar	Cotton	Coffee	Beef	Pig meat	Poultry	Noncovered
1988	4	3	10	12	13	3	10	11	2	3	31
1989	6	2	7	16	7	4	6	6	1	2	42
1990	3	2	9	10	13	3	6	9	5	4	37
1991	5	1	11	9	11	4	6	14	2	6	32
1992	3	1	13	9	10	2	4	15	2	6	35
1993	4	2	11	13	9	1	4	15	2	6	33
1994	4	1	10	9	8	2	8	9	2	5	43
1995	3	1	9	9	10	1	5	18	3	7	33
1996	4	1	9	13	11	2	7	18	3	6	27
1997	4	1	9	16	11	1	7	14	3	7	29
1998	4	1	7	14	10	1	10	13	2	8	30
1999	5	1	9	14	7	2	8	15	3	9	28
2000	3	1	9	16	7	2	7	17	3	8	26
2001	3	1	10	16	7	2	5	15	3	10	27
2002	3	1	9	20	7	2	5	14	3	10	28
2003	4	1	10	24	7	2	3	13	3	9	24
2004	4	2	8	23	6	3	5	14	3	9	23
2005	5	2	6	23	7	2	5	15	4	8	24

Source: Lopes et al. 2007.

Note: — = no data are available.

a. Including assistance for nontradables and non-product-specific assistance (NPS).

b. Including product-specific input subsidies.

c. Product shares are calculated at undistorted farmgate prices in U.S. dollars.

Table B.3. Annual Distortion Estimates, Chile, 1960–2005*(percent)***a. NRAs for covered products**

Year	Wheat	Maize	Sugar	Apples	Grapes	Beef	Milk	All
1960	35	–28	—	4	6	–18	209	12
1961	20	–42	—	0	1	–13	204	9
1962	6	–5	—	–1	–2	0	198	16
1963	–7	–18	—	33	34	3	198	13
1964	–3	–4	—	17	18	–16	198	3
1965	22	–2	—	14	11	–21	81	4
1966	52	–27	—	–2	–9	–26	34	1
1967	–7	1	—	37	37	–27	17	–8
1968	–12	–9	—	33	30	–30	15	–14
1969	–19	3	—	31	30	–25	3	–14
1970	–1	–8	—	31	33	–19	39	–2
1971	17	–16	—	49	39	–16	13	1
1972	–6	–9	—	75	57	–38	–15	–16
1973	–68	31	—	11	3	–32	13	–16
1974	–39	–48	—	13	32	–18	13	–19
1975	–35	–51	69	–1	3	–1	25	–13
1976	–23	–19	–9	–1	–1	0	23	–6
1977	96	–17	10	–2	–1	0	0	15
1978	6	2	71	–1	–1	23	9	13
1979	–16	–8	55	–2	–1	0	54	3
1980	1	–13	26	–2	–1	8	17	6
1981	7	–9	–17	–2	–1	–1	–3	–3

(Table continues on the following page.)

Table B.3. Annual Distortion Estimates, Chile, 1960–2005 (continued)

a. NRAs for covered products

Year	Wheat	Maize	Sugar	Apples	Grapes	Beef	Milk	All
1982	6	6	52	−1	−1	−1	−1	3
1983	3	−6	52	−3	−2	−1	−1	2
1984	22	−31	27	−4	−3	30	22	13
1985	20	−28	91	−2	−1	43	80	27
1986	41	−7	63	−1	−1	49	47	36
1987	24	−3	44	−1	−1	27	60	25
1988	−10	5	26	−1	−1	28	27	11
1989	−4	−19	21	−1	−1	18	13	5
1990	8	−28	12	−1	−1	−12	−1	−5
1991	40	−8	24	0	−1	20	10	15
1992	30	2	27	0	−1	31	23	20
1993	25	−4	35	0	−1	21	36	19
1994	35	5	6	0	−1	23	43	20
1995	17	5	−4	0	−1	26	18	13
1996	0	1	4	0	−1	16	9	6
1997	26	−4	13	0	−1	10	22	12
1998	42	3	35	0	−1	3	18	12
1999	40	6	63	0	−1	7	11	13
2000	35	4	54	0	0	6	22	15
2001	1	0	36	0	0	2	10	6
2002	3	3	41	0	0	10	0	6
2003	18	0	26	0	0	3	5	6
2004	2	0	15	0	0	−2	−2	0
2005	4	−2	15	0	0	0	−1	1

b. Agricultural NRAs and RRAs: all products, tradables, and relative to nonagricultural tradables

Year	NRAs, total agriculture ^a				NRAs, agricultural tradables			NRA, nonagricultural tradables	RRA
	Covered products		Noncovered products	All products, including NPS	Exportables ^b	Import- competing ^b	All		
	Inputs	Outputs							
1960	5	6	8	23	5	15	12	22	−9
1961	3	6	6	21	0	13	9	22	−11
1962	1	15	6	24	−1	20	13	44	−21
1963	1	11	21	35	34	11	18	40	−15
1964	1	2	10	25	17	2	7	40	−24
1965	1	3	9	26	13	5	8	37	−21
1966	−4	4	1	12	−4	3	1	28	−21
1967	−5	−4	17	17	37	−9	6	25	−16
1968	−5	−9	14	14	33	−13	2	26	−20
1969	−7	−8	13	12	30	−14	0	14	−12
1970	−2	0	17	17	32	−2	8	14	−5
1971	−3	4	23	22	48	−2	14	19	−4
1972	−9	−7	24	19	71	−16	11	38	−20
1973	−2	−14	0	2	10	−16	−7	60	−42
1974	−1	−19	10	−1	16	−20	−8	29	−29
1975	−4	−9	0	−4	−1	−11	−8	18	−22
1976	−2	−3	0	0	−1	−5	−4	14	−16
1977	−2	18	3	10	−2	14	9	10	−1
1978	−2	16	4	10	−1	13	8	6	2
1979	−3	6	4	7	−2	7	4	7	−3
1980	−3	9	5	8	−2	9	6	6	0
1981	−3	1	4	3	−2	3	2	5	−3

(Table continues on the following page.)

Table B.3. Annual Distortion Estimates, Chile, 1960–2005 (continued)

b. Agricultural NRAs and RRAs: all products, tradables, and relative to nonagricultural tradables

Year	NRAs, total agriculture ^a				NRAs, agricultural tradables			NRA, nonagricultural tradables	RRA
	Covered products		Noncovered products	All products, including NPS	Exportables ^b	Import- competing ^b	All		
	Inputs	Outputs							
1982	−3	6	4	5	−1	7	4	5	0
1983	−5	7	7	6	−2	9	5	8	−3
1984	−7	21	11	14	−3	21	13	12	1
1985	−7	34	10	18	−2	28	18	12	5
1986	−6	42	8	19	−1	31	20	10	9
1987	−6	31	8	15	−1	25	16	10	6
1988	−5	15	5	8	−1	13	8	7	2
1989	−5	10	5	5	−1	9	6	7	−1
1990	−5	0	5	1	−1	1	0	7	−6
1991	−5	20	5	9	0	16	9	6	3
1992	−4	23	4	10	0	18	10	5	5
1993	−4	23	5	10	−1	17	10	6	4
1994	−2	22	4	10	−1	17	10	6	5
1995	−2	15	4	8	−1	13	8	5	3
1996	−2	8	5	6	−1	9	6	5	0
1997	−2	14	5	8	−1	13	8	5	2
1998	−2	15	4	9	−1	13	8	6	2
1999	−2	15	4	10	0	13	8	5	3
2000	−2	17	5	10	0	15	8	4	4
2001	−1	7	2	6	0	6	3	3	0
2002	−1	7	1	5	0	5	3	2	0
2003	−1	8	1	5	0	5	3	2	1
2004	−1	1	0	3	0	1	0	1	−1
2005	−1	2	0	3	0	1	0	1	0

c. Value shares of the primary production of covered and noncovered products^c

Year	Wheat	Maize	Sugar	Apples	Grapes	Beef	Milk	Noncovered	Total
1960	14	4	—	1	1	28	4	48	100
1961	15	5	—	2	1	27	4	46	100
1962	16	3	—	4	1	27	4	45	100
1963	23	4	—	3	1	29	4	36	100
1964	21	4	—	3	1	31	4	36	100
1965	14	4	—	2	1	26	5	48	100
1966	10	4	—	4	1	22	7	53	100
1967	13	4	—	2	1	21	8	52	100
1968	12	3	—	2	1	21	7	54	100
1969	14	1	—	3	1	22	8	51	100
1970	13	3	—	4	1	24	6	50	100
1971	11	3	—	3	1	24	9	50	100
1972	8	2	—	2	1	17	7	62	100
1973	5	3	—	4	1	17	9	61	100
1974	13	5	—	2	0	30	8	41	100
1975	20	8	3	2	1	13	8	45	100
1976	16	3	7	2	1	18	8	46	100
1977	7	3	4	3	1	17	9	56	100
1978	8	2	1	2	1	13	8	64	100
1979	10	4	1	2	1	17	5	60	100
1980	7	3	1	2	1	13	7	65	100
1981	5	3	3	2	1	13	7	65	100
1982	4	3	1	2	1	13	7	69	100
1983	5	5	2	2	1	14	7	64	100
1984	8	8	5	2	2	14	7	55	100

(Table continues on the following page.)

Table B.3. Annual Distortion Estimates, Chile, 1960–2005 (continued)c. Value shares of the primary production of covered and noncovered products^c

Year	Wheat	Maize	Sugar	Apples	Grapes	Beef	Milk	Noncovered	Total
1985	9	7	3	2	2	9	4	64	100
1986	10	4	5	3	2	8	4	64	100
1987	10	3	4	3	3	9	4	64	100
1988	12	3	4	2	2	10	5	62	100
1989	11	5	4	2	2	11	7	57	100
1990	7	5	3	3	3	14	8	57	100
1991	5	3	3	4	2	10	6	66	100
1992	5	3	3	4	4	8	6	68	100
1993	4	3	3	2	4	9	6	69	100
1994	4	3	4	3	3	8	6	69	100
1995	4	3	4	3	3	9	7	67	100
1996	5	4	3	4	4	9	8	64	100
1997	4	2	2	3	5	9	7	67	100
1998	4	2	2	2	5	9	7	68	100
1999	3	2	2	3	5	7	7	71	100
2000	4	1	2	3	4	7	6	73	100
2001	6	2	2	2	3	7	8	70	100
2002	6	2	2	3	4	5	7	71	100
2003	5	3	1	3	4	5	6	72	100
2004	6	3	1	3	4	5	7	70	100
2005	4	3	1	3	5	6	8	69	100

Source: Valdés and Jara 2007.

Note: — = no data are available.

a. Including assistance for nontradables and non-product-specific assistance (NPS).

b. Including product-specific input subsidies.

c. Product shares are calculated at undistorted farmgate prices in U.S. dollars.

Table B.4. Annual Distortion Estimates, Colombia, 1960–2005*(percent)***a. NRAs for covered products**

Year	Rice	Wheat	Maize	Sorghum	Soybeans	Palm oil	Sugar	Cotton	Coffee	Beef	Milk	All
1960	77	37	−19	−4	10	−4	19	6	−20	−2	−3	−6
1961	75	47	8	−4	−1	−4	35	−5	−4	−2	−3	2
1962	48	31	−14	−4	10	−4	45	−13	−3	−2	−3	0
1963	36	18	−7	−4	4	−4	19	2	−16	−2	−3	−4
1964	83	71	19	−4	12	−4	55	8	−18	−2	−3	−2
1965	100	74	−12	−4	12	−4	80	−11	−25	17	−3	1
1966	45	44	−19	−4	0	−4	62	18	−32	−3	−3	−11
1967	6	47	−14	−4	5	−4	79	4	−29	8	−3	−8
1968	10	49	−10	−4	8	−4	82	3	−25	5	−3	−6
1969	0	50	−19	−4	13	−4	6	−2	−22	5	−3	−7
1970	15	48	−22	−4	16	−5	−3	−3	−26	−10	−4	−14
1971	20	25	−19	−6	4	−7	−20	−11	−23	−3	−5	−10
1972	−5	40	−3	15	−9	−3	−38	−10	−22	−14	−4	−14
1973	−38	−6	−12	−4	−41	−4	−55	−10	−21	−12	−4	−18
1974	−50	−14	−35	−15	−17	2	−80	−9	−17	−11	−2	−25
1975	−37	13	−30	−16	−8	0	−79	0	−17	1	−3	−22
1976	−20	11	−25	−16	−4	−3	−53	3	−28	9	−4	−15
1977	19	52	24	23	8	−1	16	−1	−34	19	−4	−17
1978	−12	86	−3	9	8	−3	26	−2	−23	12	−4	−9
1979	3	39	12	26	9	−3	39	1	−35	11	44	−10
1980	−5	32	28	26	17	−1	−53	5	−21	10	49	−5
1981	3	35	20	28	33	−1	−32	11	−20	5	92	2

(Table continues on the following page.)

Table B.4. Annual Distortion Estimates, Colombia, 1960–2005 (*continued*)

a. NRAs for covered products

Year	Rice	Wheat	Maize	Sorghum	Soybeans	Palm oil	Sugar	Cotton	Coffee	Beef	Milk	All
1982	53	43	26	41	56	−2	101	20	−22	9	110	12
1983	41	40	4	20	35	−3	68	20	−21	6	121	9
1984	51	23	−7	15	57	−5	82	7	−27	−4	112	2
1985	55	19	8	25	53	−4	143	19	−30	4	70	2
1986	49	31	13	18	33	−4	59	36	−24	15	25	−2
1987	30	52	37	49	25	−2	17	7	−5	8	33	9
1988	56	53	7	16	12	−2	23	0	−28	3	−1	−7
1989	18	39	6	11	38	−4	−12	1	−10	−19	−1	−7
1990	10	64	3	5	35	80	−20	−13	−3	−25	−7	−8
1991	4	70	−12	0	19	21	−4	−7	−3	2	0	−1
1992	22	40	−16	4	13	23	3	13	17	47	3	18
1993	29	30	1	8	6	39	51	41	−5	10	35	16
1994	51	21	18	15	14	4	67	1	−36	11	60	6
1995	32	5	3	0	7	6	38	−7	−30	−1	49	1
1996	43	−12	−8	21	−11	20	57	5	−17	29	37	17
1997	79	13	12	18	−10	6	72	3	−26	5	57	8
1998	69	19	24	20	5	3	70	14	−19	5	51	11
1999	64	40	44	51	28	33	94	20	−14	−6	27	12
2000	66	57	39	35	27	51	119	3	−11	−20	113	20
2001	115	22	26	26	23	65	88	22	18	−24	103	25
2002	80	9	4	16	12	41	149	−3	25	−6	134	41
2003	78	4	8	7	−4	45	104	−1	9	17	76	38
2004	66	7	8	18	−26	34	99	7	−4	−11	57	19
2005	55	21	28	40	—	32	78	34	1	−13	84	22

b. Agricultural NRAs and RRAs: all products, tradables, and relative to nonagricultural tradables

Year	NRAs, total agriculture ^a				NRAs, agricultural tradables			NRA, nonagricultural tradables	RRA
	Covered products		Noncovered products	All products, including NPS	Exportables ^b	Import- competing ^b	All		
	Inputs	Outputs							
1960	-2	-4	-2	-5	-16	13	-7	19	-22
1961	-2	4	6	4	-3	34	8	20	-9
1962	-2	2	2	1	-3	16	3	19	-14
1963	-2	-2	-2	-3	-12	10	-4	19	-20
1964	-2	0	4	0	-14	41	3	19	-14
1965	-2	3	5	3	-5	34	5	20	-13
1966	-2	-9	-3	-8	-17	11	-9	37	-34
1967	-2	-6	-5	-7	-11	-2	-8	32	-30
1968	-2	-4	-3	-5	-9	4	-5	26	-25
1969	-2	-5	-5	-7	-8	-6	-8	26	-26
1970	-3	-11	-8	-12	-18	-3	-14	29	-33
1971	-3	-7	-6	-9	-13	-1	-10	28	-30
1972	-2	-12	-7	-12	-18	-2	-14	24	-31
1973	-1	-17	-15	-17	-18	-26	-21	23	-35
1974	0	-26	-23	-24	-22	-42	-30	19	-41
1975	-1	-21	-18	-20	-22	-31	-25	18	-36
1976	-2	-14	-12	-14	-16	-20	-17	17	-29
1977	0	-16	-3	-14	-21	21	-16	20	-30
1978	-2	-8	-6	-9	-11	-6	-10	20	-25
1979	-1	-9	-1	-8	-18	21	-8	19	-23
1980	-1	-4	2	-3	-13	24	-3	19	-19
1981	-1	3	7	3	-10	43	4	18	-12

(Table continues on the following page.)

Table B.4. Annual Distortion Estimates, Colombia, 1960–2005 (continued)

b. Agricultural NRAs and RRAs: all products, tradables, and relative to nonagricultural tradables

Year	NRAs, total agriculture ^a				NRAs, agricultural tradables			NRA, nonagricultural tradables	RRA
	Covered products		Noncovered products	All products, including NPS	Exportables ^b	Import- competing ^b	All		
	Inputs	Outputs							
1982	−2	13	13	12	−5	72	14	22	−6
1983	−2	11	11	9	−6	64	11	29	−13
1984	−3	5	6	3	−13	60	5	31	−20
1985	−3	4	6	3	−11	51	4	26	−17
1986	−3	2	3	0	−8	27	0	23	−19
1987	−2	11	8	9	2	34	11	23	−10
1988	−2	−4	−1	−5	−13	13	−5	24	−24
1989	−3	−4	−3	−6	−14	7	−6	22	−23
1990	−3	−6	−3	−4	−15	4	−4	17	−18
1991	−2	2	0	1	−2	1	2	9	−7
1992	−2	19	7	16	25	4	20	6	13
1993	−1	17	10	17	10	28	22	7	13
1994	−1	7	8	10	−9	46	13	8	5
1995	−1	2	5	6	−11	34	8	8	0
1996	−1	19	11	21	12	29	26	8	17
1997	−1	10	10	13	−7	51	16	8	7
1998	−2	13	11	13	−3	50	17	9	8
1999	−2	14	9	13	0	36	16	7	9
2000	−1	21	17	20	16	49	25	7	17
2001	−2	27	21	26	20	67	34	7	24
2002	−2	42	21	34	41	40	45	8	34
2003	−2	39	20	31	37	40	40	7	31
2004	−2	21	14	18	16	35	23	6	16
2005	−1	24	16	20	20	42	28	6	20

c. Value shares of the primary production of covered and noncovered products^c

Year	Rice	Wheat	Maize	Sorghum	Soybeans	Palm oil	Sugar	Cotton	Coffee	Beef	Milk	Noncovered
1960	2	1	6	0	0	0	1	3	26	21	6	34
1961	3	1	5	0	0	0	1	4	22	21	7	36
1962	4	1	4	0	0	0	1	5	23	22	7	33
1963	3	1	5	0	0	0	1	3	21	20	7	39
1964	3	0	5	0	0	0	1	2	25	20	6	37
1965	3	1	5	0	0	0	1	3	23	19	7	38
1966	4	1	5	0	0	0	1	2	25	17	6	38
1967	5	0	4	0	1	0	1	3	22	16	6	41
1968	5	1	4	1	1	0	1	4	23	18	6	37
1969	4	0	4	0	1	0	1	4	22	19	6	37
1970	3	0	4	0	1	0	1	4	27	20	8	32
1971	3	0	4	1	1	0	2	4	21	22	8	34
1972	4	0	3	1	1	0	2	5	19	23	7	34
1973	6	0	4	1	1	0	3	3	20	20	6	35
1974	10	0	3	1	1	0	5	5	12	16	6	41
1975	7	0	3	1	1	0	8	3	15	14	5	41
1976	5	0	3	1	0	0	3	4	26	15	7	35
1977	3	0	2	1	1	0	1	4	52	13	6	16
1978	5	0	2	1	1	0	1	2	37	16	7	26
1979	5	0	3	1	1	1	1	2	37	17	5	28
1980	6	0	3	1	1	1	5	3	31	18	6	26
1981	6	0	3	1	0	1	4	3	28	21	6	28
1982	4	0	3	1	0	1	2	1	29	23	7	30
1983	4	0	3	2	1	1	2	1	31	22	6	28

(Table continues on the following page.)

Table B.4. Annual Distortion Estimates, Colombia, 1960–2005 (continued)c. Value shares of the primary production of covered and noncovered products^c

Year	Rice	Wheat	Maize	Sorghum	Soybeans	Palm oil	Sugar	Cotton	Coffee	Beef	Milk	Noncovered
1984	3	0	3	1	0	1	2	2	28	22	6	31
1985	3	0	2	1	0	1	2	2	31	20	7	30
1986	2	0	2	1	1	1	2	2	38	16	8	27
1987	3	0	2	1	0	1	3	2	26	19	8	33
1988	3	0	2	1	0	1	3	3	27	16	9	34
1989	5	0	3	1	1	1	4	2	17	19	10	36
1990	6	0	3	2	1	1	5	3	18	19	11	30
1991	3	0	3	1	1	1	6	3	18	13	9	43
1992	3	0	2	1	0	1	5	2	14	12	10	49
1993	3	0	2	1	0	1	4	1	14	14	10	50
1994	2	0	2	1	0	1	4	1	21	13	8	48
1995	2	0	2	1	0	1	5	1	21	14	8	46
1996	3	0	2	1	0	1	5	1	16	16	11	44
1997	2	0	1	0	0	1	3	1	21	14	8	47
1998	3	0	1	0	0	2	3	0	20	15	9	47
1999	4	0	2	0	0	2	3	1	16	17	12	45
2000	3	0	2	0	0	1	3	1	16	18	7	48
2001	3	0	2	0	0	1	4	1	12	23	9	45
2002	4	0	3	0	0	2	3	0	12	19	8	48
2003	4	0	3	1	0	2	4	1	14	15	11	45
2004	4	0	3	0	0	2	3	1	13	19	12	42
2005	2	0	2	0	—	1	3	1	11	14	7	59

Source: Guterman 2007.

Note: — = no data are available.

a. Including assistance for nontradables and non-product-specific assistance (NPS).

b. Including product-specific input subsidies.

c. Product shares are calculated at undistorted farmgate prices in U.S. dollars.

Table B.5. Annual Distortion Estimates, Dominican Republic, 1955–2005*(percent)***a. NRAs for covered products**

Year	Rice	Sugar	Coffee	Bananas	Beans	Garlic	Onions	Tomatoes	Poultry	All
1955	87	–43	–69	–37	14	566	159	–21	163	–22
1956	131	–28	–65	–27	57	221	260	–18	170	–9
1957	99	–48	–69	–24	28	100	197	–25	159	–22
1958	60	–21	–71	–22	48	192	193	–11	178	–3
1959	43	–10	–65	–23	17	84	136	–35	172	1
1960	51	–34	–63	–21	39	344	246	–18	171	–7
1961	62	–29	–39	–28	28	390	161	–24	177	1
1962	150	–29	–33	–26	37	383	127	17	150	–8
1963	116	–42	–32	–29	37	200	153	–24	141	–17
1964	100	–7	–32	–31	91	246	158	33	121	5
1965	37	36	–32	–30	39	225	161	20	89	13
1966	11	6	–30	–43	64	129	72	–23	91	1
1967	19	7	–36	–28	61	164	76	60	78	6
1968	37	–1	–35	–38	55	146	215	86	34	6
1969	26	–6	–36	–18	47	164	276	60	24	0
1970	27	–2	–64	–44	127	10	26	123	184	–14
1971	21	0	–45	–18	17	29	53	82	40	–2
1972	13	–8	–55	–31	–9	33	20	79	21	–14
1973	–26	–27	–49	24	–9	51	70	113	72	–22
1974	–9	–53	–35	51	–2	57	16	–20	101	–37
1975	–4	–60	–1	109	63	44	54	251	82	–43
1976	–6	–11	–41	21	50	29	12	191	–10	–14
1977	30	16	–75	–34	65	110	83	30	–11	–20

(Table continues on the following page.)

Table B.5. Annual Distortion Estimates, Dominican Republic, 1955–2005 (*continued*)

a. NRAs for covered products

Year	Rice	Sugar	Coffee	Bananas	Beans	Garlic	Onions	Tomatoes	Poultry	All
1978	8	26	–65	–32	53	152	30	25	–11	–17
1979	16	18	–64	–36	40	89	217	120	–16	–13
1980	–13	–35	–47	–54	28	130	209	58	–19	–26
1981	45	–53	–25	–53	129	224	162	182	65	–21
1982	41	–32	–44	–49	84	123	66	39	–6	–14
1983	–12	–58	–67	–59	20	12	30	–14	–11	–41
1984	5	–76	–72	–53	71	14	42	–33	–25	–52
1985	68	–64	–61	–29	82	204	180	26	4	–25
1986	12	–68	–65	–48	49	130	268	83	–25	–41
1987	–28	–69	–48	–51	14	19	67	91	–49	–43
1988	–12	–58	–37	–58	54	145	128	119	–21	–25
1989	29	–82	–61	–63	9	198	–3	86	–41	–48
1990	86	–74	–42	–67	65	–19	108	103	–30	–20
1991	142	–74	–15	–54	110	239	77	60	–18	–12
1992	249	–66	–10	–52	132	374	253	123	–5	13
1993	204	–64	0	–44	206	260	214	98	–20	16
1994	72	9	–46	–45	210	285	334	93	–21	–1
1995	87	7	–27	–18	143	250	109	156	–23	9
1996	62	2	–14	–44	97	97	58	8	32	13
1997	53	15	–30	–15	90	246	177	8	28	8
1998	60	10	–19	–35	83	72	149	42	14	10
1999	77	–7	–15	–42	7	384	68	–53	8	6
2000	115	18	–11	–61	82	528	73	–38	6	20
2001	125	6	–43	–68	105	552	98	–8	3	9
2002	95	18	–36	–69	69	418	59	–34	5	3
2003	16	–21	–41	–80	31	108	42	–16	–15	–24
2004	61	–3	–2	–65	113	204	98	6	5	5
2005	105	73	–13	–57	197	306	276	1	36	28

b. Agricultural NRAs and RRAs: all products, tradables, and relative to nonagricultural tradables

Year	NRAs, total agriculture ^a				NRAs, agricultural tradables			NRA, nonagricultural tradables	RRA
	Covered products		Noncovered products	All products, including NPS	Exportables ^b	Import- competing ^b	All		
	Inputs	Outputs							
1955	0	-22	-22	-22	-50	96	-23	8	-29
1956	0	-9	-9	-9	-39	134	-10	8	-16
1957	0	-22	-22	-22	-50	107	-24	7	-29
1958	0	-3	-3	-3	-33	94	-3	8	-10
1959	0	1	1	1	-25	70	1	8	-6
1960	0	-7	-7	-7	-35	86	-8	8	-14
1961	0	1	1	1	-30	92	1	8	-6
1962	0	-8	-8	-8	-30	134	-9	8	-15
1963	0	-17	-17	-17	-39	115	-18	8	-24
1964	0	5	5	5	-19	111	5	8	-3
1965	0	13	13	13	-7	54	14	9	5
1966	0	1	1	1	-15	35	1	9	-8
1967	0	6	6	6	-7	39	7	9	-2
1968	0	6	6	6	-11	43	6	9	-3
1969	0	0	0	0	-14	33	-1	9	-9
1970	0	-14	-14	-14	-30	46	-15	9	-22
1971	0	-2	-2	-2	-11	24	-2	9	-10
1972	0	-14	-14	-14	-23	11	-15	9	-22
1973	0	-22	-22	-22	-28	-11	-23	9	-30
1974	0	-37	-37	-37	-49	3	-39	9	-44
1975	0	-43	-43	-43	-54	20	-44	9	-48
1976	0	-14	-14	-14	-21	0	-14	10	-22
1977	0	-20	-20	-20	-42	30	-22	11	-30
1978	0	-17	-17	-17	-33	15	-18	11	-25

(Table continues on the following page.)

Table B.5. Annual Distortion Estimates, Dominican Republic, 1955–2005 (*continued*)

b. Agricultural NRAs and RRAs: all products, tradables, and relative to nonagricultural tradables

Year	NRAs, total agriculture ^a				NRAs, agricultural tradables			NRA, nonagricultural tradables	RRA
	Covered products		Noncovered products	All products, including NPS	Exportables ^b	Import- competing ^b	All		
	Inputs	Outputs							
1979	0	−13	−13	−13	−31	14	−13	11	−22
1980	0	−26	−26	−26	−40	−4	−27	11	−34
1981	0	−21	−21	−21	−48	65	−22	9	−28
1982	0	−14	−14	−14	−37	38	−14	11	−22
1983	0	−41	−41	−41	−60	−6	−42	12	−48
1984	0	−52	−52	−52	−74	9	−53	9	−57
1985	0	−25	−25	−25	−62	59	−26	9	−32
1986	0	−41	−41	−41	−65	11	−42	10	−47
1987	0	−43	−43	−43	−58	−26	−44	10	−49
1988	0	−25	−25	−25	−47	0	−26	10	−33
1989	0	−48	−48	−48	−73	−11	−49	12	−54
1990	0	−20	−20	−20	−61	36	−21	11	−28
1991	0	−12	−12	−12	−52	61	−13	10	−21
1992	0	13	13	13	−46	111	13	9	4
1993	0	16	16	16	−40	94	17	9	7
1994	0	−1	−1	−1	−25	47	−1	8	−8
1995	0	9	9	9	−14	45	9	8	1
1996	0	13	13	13	−11	56	13	7	6
1997	0	8	8	8	−13	54	9	7	2
1998	0	10	10	10	−10	44	11	4	7
1999	0	6	6	6	−19	43	6	4	2
2000	0	20	20	20	−12	59	21	4	16
2001	0	9	9	9	−33	63	10	5	5
2002	0	3	3	3	−32	51	3	4	−1
2003	0	−24	−24	−24	−49	4	−25	4	−28
2004	0	5	5	5	−22	41	5	4	1
2005	0	28	28	28	−10	81	30	4	25

c. Value shares of the primary production of covered and noncovered products^c

Year	Rice	Sugar	Coffee	Bananas	Beans	Cassava	Garlic	Onions	Tomatoes	Poultry	Noncovered
1955	3	17	10	4	2	2	0	0	0	2	60
1956	3	15	9	6	1	4	0	0	0	2	60
1957	3	19	8	4	1	3	0	0	0	2	60
1958	5	15	7	6	1	3	0	0	0	2	60
1959	6	14	6	8	2	2	0	0	0	2	60
1960	5	17	5	8	1	2	0	0	0	2	60
1961	6	14	5	9	1	2	0	0	0	2	60
1962	2	22	7	5	1	2	0	0	0	2	60
1963	2	22	7	4	1	2	0	0	0	2	60
1964	3	15	11	4	1	2	0	0	0	2	60
1965	8	8	11	5	2	3	0	0	0	3	60
1966	8	12	9	4	1	3	0	0	1	2	60
1967	7	13	9	2	1	2	0	0	2	2	60
1968	7	12	9	3	1	2	0	0	2	3	60
1969	7	15	9	2	1	2	0	0	1	3	60
1970	6	13	14	3	1	2	0	0	1	1	60
1971	6	15	9	2	1	2	0	0	2	1	60
1972	5	15	11	2	2	2	0	0	2	1	60
1973	7	16	10	1	2	2	0	0	1	1	60
1974	6	26	4	0	1	1	0	0	0	1	60
1975	3	31	3	0	1	1	0	0	0	1	60
1976	8	15	10	1	1	2	0	0	0	3	60
1977	5	9	16	1	1	4	0	0	0	3	60
1978	7	9	16	0	2	2	0	0	0	3	60
1979	8	9	14	1	2	2	0	0	0	5	60
1980	8	14	10	0	2	2	0	0	0	4	60

(Table continues on the following page.)

Table B.5. Annual Distortion Estimates, Dominican Republic, 1955–2005 (continued)c. Value shares of the primary production of covered and noncovered products^c

Year	Rice	Sugar	Coffee	Bananas	Beans	Cassava	Garlic	Onions	Tomatoes	Poultry	Noncovered
1981	6	24	5	1	1	1	0	0	0	2	60
1982	6	15	11	1	2	1	0	0	0	3	60
1983	9	18	7	1	2	1	1	0	0	3	60
1984	6	23	5	1	1	1	0	0	0	2	60
1985	7	17	9	1	2	2	0	0	0	3	60
1986	6	13	13	1	1	1	0	0	0	4	60
1987	8	11	10	2	2	1	1	0	0	5	60
1988	5	7	11	4	2	1	0	1	0	9	60
1989	5	14	7	2	2	1	0	0	0	9	60
1990	7	11	9	3	2	1	0	1	0	7	60
1991	5	14	8	3	1	2	0	0	0	6	60
1992	5	12	7	5	2	2	0	0	0	7	60
1993	6	11	6	4	2	2	0	1	0	8	60
1994	5	9	12	4	1	2	0	0	0	6	60
1995	6	7	14	2	1	2	0	1	0	7	60
1996	7	10	11	3	1	2	0	1	0	4	60
1997	6	9	14	2	1	2	0	0	0	4	60
1998	6	8	14	1	1	2	0	0	0	7	60
1999	6	7	10	5	2	2	0	1	1	7	60
2000	7	7	9	4	1	2	0	1	0	9	60
2001	6	7	7	6	1	2	0	1	0	9	60
2002	6	6	9	7	1	2	0	1	1	8	60
2003	6	6	8	7	1	1	0	1	0	9	60
2004	8	6	9	7	1	2	0	1	0	7	60
2005	8	4	11	6	1	2	0	0	0	7	60

Source: Los Santos and Peña 2007.

Note: Cassava had a zero NRA throughout the period.

a. Including assistance for nontradables and non-product-specific assistance (NPS).

b. Including product-specific input subsidies.

c. Product shares are calculated at undistorted farmgate prices in U.S. dollars.

Table B.6. Annual Distortion Estimates, Ecuador, 1966–2003*(percent)***a. NRAs for covered products**

Year	Rice	Maize	Soybeans	Sugar	Coffee	Cocoa	Bananas	Beef	Pig meat	Poultry	Milk	All
1966	−5	26	42	1	−20	25	−31	0	2	289	−22	−12
1967	−26	26	51	−5	−17	13	−35	−13	15	322	−25	−16
1968	1	42	58	−7	−16	7	−35	−13	17	289	−4	−11
1969	4	19	52	−28	−23	−23	−38	−20	−9	240	−5	−20
1970	16	−15	20	−45	−37	−26	−38	−22	−7	189	17	−22
1971	6	53	−43	−38	−43	−18	−56	−21	19	239	−26	−32
1972	8	83	3	−34	−45	−15	−56	−24	−16	266	−47	−35
1973	−31	39	−43	−57	−35	7	−48	−31	−31	160	−46	−32
1974	−38	39	25	−61	−48	−29	−45	−49	−34	289	−39	−37
1975	−26	52	41	−63	−49	5	−54	96	−28	223	1	−26
1976	7	57	34	−28	−72	4	−54	99	−21	262	19	−24
1977	10	87	15	19	−79	−41	−52	96	−5	277	21	−32
1978	−4	89	35	59	−54	−21	−50	101	2	257	11	−12
1979	4	64	24	120	−56	−14	−52	−16	6	251	61	−10
1980	−10	63	27	−31	−23	−1	−56	−15	18	220	68	−7
1981	−5	50	23	−29	−43	−15	−62	58	47	440	80	4
1982	38	62	23	40	−54	−1	−20	125	40	446	63	25
1983	46	91	15	−27	−47	21	−35	83	29	249	39	17
1984	55	47	−28	−30	−30	−24	−22	59	32	222	41	11
1985	94	55	16	70	−46	−12	−40	97	45	218	54	15

(Table continues on the following page.)

Table B.6. Annual Distortion Estimates, Ecuador, 1966–2003 (continued)

a. NRAs for covered products

Year	Rice	Maize	Soybeans	Sugar	Coffee	Cocoa	Bananas	Beef	Pig meat	Poultry	Milk	All
1986	81	39	40	30	-29	-7	-46	76	0	99	29	6
1987	-18	72	16	-42	-1	-10	-42	35	-19	120	19	0
1988	-23	27	-39	-28	-54	-21	-51	-14	-18	58	40	-16
1989	-6	4	-10	-35	-13	-18	-9	13	16	33	-22	-9
1990	-16	7	7	-32	5	-20	-7	-19	-22	26	-25	-12
1991	-30	10	1	-15	-22	-18	-11	-11	-27	30	17	-9
1992	-17	9	-5	-35	-25	-33	-15	-21	-31	6	-4	-16
1993	-3	28	-5	-15	1	-8	-3	23	-11	15	24	5
1994	35	38	-7	21	-37	-4	-7	-4	-9	24	35	0
1995	31	23	-2	0	14	-17	-11	-2	-8	43	19	6
1996	37	5	-16	42	-6	-9	-7	7	-31	41	-7	0
1997	73	29	-1	33	-40	-3	-22	5	-34	38	2	-7
1998	54	51	-12	41	-40	-13	-24	35	14	24	32	7
1999	-19	42	-6	28	-36	-17	-19	-19	5	-4	-13	-15
2000	28	48	-6	22	-30	-4	-35	1	12	9	-4	-4
2001	92	55	35	-15	13	-11	-3	49	39	29	16	19
2002	12	56	26	38	13	-3	8	53	93	90	7	28
2003	27	41	-6	7	4	-9	1	24	58	-30	16	6

b. Agricultural NRAs and RRAs: all products, tradables, and relative to nonagricultural tradables

Year	NRAs, total agriculture ^a				NRAs, agricultural tradables			NRA, nonagricultural tradables	RRA
	Covered products		Noncovered products	All products, including NPS	Exportables ^b	Import- competing ^b	All		
	Inputs	Outputs							
1966	0	-12	0	-7	-14	-5	-12	2	-13
1967	0	-16	0	-10	-21	-8	-16	1	-18
1968	0	-11	0	-7	-19	6	-11	2	-13
1969	0	-20	0	-13	-28	-1	-20	-1	-19
1970	0	-22	0	-15	-34	7	-22	1	-22
1971	0	-32	0	-23	-44	-6	-32	-2	-30
1972	0	-35	0	-25	-41	-25	-35	-4	-32
1973	0	-32	0	-23	-35	-27	-32	-5	-28
1974	0	-37	0	-26	-46	-21	-37	-6	-33
1975	0	-26	0	-18	-47	8	-26	-1	-25
1976	0	-24	0	-17	-49	28	-24	3	-26
1977	0	-32	0	-24	-56	36	-32	6	-36
1978	0	-12	0	-9	-33	31	-12	7	-18
1979	0	-10	0	-7	-32	29	-10	9	-17
1980	0	-7	0	-5	-28	30	-7	2	-9
1981	0	4	0	2	-46	61	4	11	-6
1982	0	25	0	15	-26	80	25	16	8
1983	0	17	0	10	-29	51	17	8	8

(Table continues on the following page.)

Table B.6. Annual Distortion Estimates, Ecuador, 1966–2003 (continued)

b. Agricultural NRAs and RRAs: all products, tradables, and relative to nonagricultural tradables

Year	NRAs, total agriculture ^a				NRAs, agricultural tradables			NRA, nonagricultural tradables	RRA
	Covered products		Noncovered products	All products, including NPS	Exportables ^b	Import- competing ^b	All		
	Inputs	Outputs							
1984	0	11	0	7	-27	47	11	9	2
1985	0	15	0	10	-27	76	15	15	0
1986	0	6	0	5	-28	45	6	12	-5
1987	0	0	0	0	-17	11	0	6	-6
1988	0	-16	0	-12	-45	7	-16	6	-21
1989	0	-9	0	-7	-14	-5	-9	3	-12
1990	0	-12	0	-10	-8	-16	-12	-1	-11
1991	0	-9	0	-8	-14	-5	-9	3	-12
1992	0	-16	0	-14	-20	-12	-16	-1	-15
1993	0	5	0	4	-3	13	5	4	1
1994	0	0	0	0	-10	15	0	7	-7
1995	0	6	0	5	1	11	6	7	-1
1996	0	0	0	0	0	0	0	5	-5
1997	0	-7	-2	-6	-15	7	-8	5	-12
1998	0	7	-3	4	-14	30	4	9	-4
1999	0	-15	-3	-13	-18	-9	-15	3	-18
2000	0	-4	-4	-1	-19	7	-3	5	-8
2001	0	19	-3	15	2	32	17	10	7
2002	0	28	-3	22	5	41	26	13	12
2003	0	6	-3	5	-1	10	5	7	-1

c. Value shares of the primary production of covered and noncovered products^c

Year	Rice	Maize	Soybeans	Sugar	Coffee	Cocoa	Bananas	Beef	Pig meat	Poultry	Milk	Noncovered
1966	4	1	0	7	10	5	18	4	3	0	12	36
1967	4	1	0	6	9	5	19	4	3	0	13	36
1968	3	1	0	8	8	6	20	4	3	1	11	36
1969	4	1	0	7	7	7	22	5	3	1	11	33
1970	3	1	0	6	9	7	23	5	3	1	11	31
1971	2	2	0	7	8	6	27	5	3	1	14	26
1972	2	1	0	6	8	7	21	4	3	1	16	30
1973	4	3	0	5	7	8	18	5	5	1	16	29
1974	6	3	0	11	8	8	14	5	3	1	13	29
1975	7	3	0	14	7	7	16	2	4	1	11	28
1976	5	2	0	5	19	8	15	2	4	1	9	30
1977	4	1	0	4	24	16	12	2	3	1	8	25
1978	3	1	1	3	15	18	12	2	4	1	10	29
1979	4	2	1	3	18	14	11	6	4	1	8	28
1980	6	2	1	8	11	12	13	5	4	1	7	32
1981	7	2	1	4	11	4	13	5	4	1	9	40
1982	4	2	1	3	13	4	10	4	5	1	11	42
1983	4	2	0	4	14	5	6	5	5	2	12	41
1984	4	3	1	3	15	12	5	5	5	2	11	33
1985	3	2	1	2	18	15	5	4	5	2	10	33
1986	5	2	1	3	21	8	8	4	5	3	11	29
1987	8	2	2	4	12	7	9	5	6	3	13	29

(Table continues on the following page.)

Table B.6. Annual Distortion Estimates, Ecuador, 1966–2003 (continued)c. Value shares of the primary production of covered and noncovered products^c

Year	Rice	Maize	Soybeans	Sugar	Coffee	Cocoa	Bananas	Beef	Pig meat	Poultry	Milk	Noncovered
1988	11	2	3	3	20	7	5	6	4	3	15	23
1989	9	2	2	4	12	5	17	5	4	3	17	21
1990	7	2	2	4	10	5	21	6	5	3	17	19
1991	7	2	2	3	8	4	27	11	7	4	10	16
1992	8	2	2	4	6	4	27	10	6	4	14	15
1993	8	2	2	3	6	3	25	9	6	4	14	18
1994	6	1	1	2	15	3	23	9	4	4	12	19
1995	6	2	1	3	13	3	24	10	4	4	14	16
1996	5	2	1	2	11	3	26	8	5	5	15	17
1997	4	2	0	1	7	3	35	7	5	6	12	18
1998	5	0	0	3	4	2	28	9	5	5	14	23
1999	7	1	0	2	5	3	32	10	4	7	14	16
2000	7	2	1	3	5	3	18	12	7	10	15	17
2001	3	2	1	3	2	2	29	11	6	8	17	16
2002	4	1	1	2	1	4	25	13	5	6	18	20
2003	4	1	1	2	1	4	23	13	5	15	14	18

Source: Valenzuela, Wong, and Sandri 2007.

a. Including assistance for nontradables and non-product-specific assistance (NPS).

b. Including product-specific input subsidies.

c. Product shares are calculated at undistorted farmgate prices in U.S. dollars.

Table B.7. Annual Distortion Estimates, Mexico, 1979–2004*(percent)***a. NRAs for covered products**

Year	Rice	Wheat	Maize	Sorghum	Barley	Soybeans	Sugar	Coffee	Beans	Tomatoes	Beef	Pig meat	Poultry	Eggs	Milk	All
1979	−9	−13	−10	−25	−40	−2	0	−12	15	−55	−17	−13	188	−10	115	−3
1980	−16	−6	14	8	−9	25	−52	−7	15	−52	−9	−11	156	24	144	5
1981	−17	17	58	4	18	44	−2	−84	−12	−20	16	−6	178	32	220	26
1982	−4	−7	39	14	−48	29	0	−93	2	−43	−8	−33	158	−10	83	−3
1983	−30	−3	1	−20	51	31	4	−93	244	24	−50	−50	101	−16	59	−21
1984	31	42	19	12	71	104	22	−95	1	2	−38	−18	82	−29	204	0
1985	89	121	16	11	11	73	21	7	46	−51	−2	−9	108	−5	324	22
1986	−33	20	18	6	7	30	21	−68	−29	−35	−15	−57	44	−21	165	−8
1987	−22	18	64	18	−42	60	−5	−70	−31	−55	−33	−51	122	−1	105	−10
1988	−44	29	4	−13	−11	10	−19	−84	−21	−35	−13	4	99	10	40	−8
1989	−17	4	16	−14	−28	20	−13	−33	−53	−53	26	10	108	−15	93	10
1990	−11	48	27	−13	−21	7	18	−6	−17	−27	34	−6	161	−11	265	23

(Table continues on the following page.)

Table B.7. Annual Distortion Estimates, Mexico, 1979–2004 (continued)

a. NRAs for covered products

Year	Rice	Wheat	Maize	Sorghum	Barley	Soybeans	Sugar	Coffee	Beans	Tomatoes	Beef	Pig meat	Poultry	Eggs	Milk	All
1991	9	77	42	4	50	73	85	-13	4	-57	32	1	136	-11	129	24
1992	15	47	30	0	47	30	88	-26	-11	39	43	16	81	2	116	38
1993	55	64	30	5	40	26	86	-28	-10	-31	48	4	103	15	195	34
1994	33	72	10	-16	25	-6	54	-45	-20	-41	30	17	90	15	170	25
1995	4	0	-14	-1	-40	-15	-15	-55	-45	-72	-20	-23	10	-15	24	-19
1996	8	30	-20	-21	-12	-10	33	-22	-21	-45	13	-22	10	-11	34	-7
1997	-4	17	-17	-19	-13	-16	41	-32	7	-32	31	-10	28	-6	63	5
1998	-1	40	-5	-15	4	-4	56	-32	-2	-33	24	9	24	-22	87	10
1999	12	38	-7	-18	-11	19	126	1	-4	-11	10	23	16	-27	95	12
2000	27	60	9	-6	-4	-8	105	-35	12	-18	12	-2	55	-21	85	17
2001	60	86	11	-11	2	21	97	-34	41	-41	-1	4	42	-13	96	16
2002	69	60	-6	-9	-8	-6	69	-28	-13	-39	14	23	72	-20	107	17
2003	17	51	-11	-11	-23	5	67	-27	-15	-47	-16	5	42	-16	79	1
2004	14	49	-18	-22	-1	-25	70	-45	-27	-40	-23	-13	27	-9	61	-6

b. Agricultural NRAs and RRAs: all products, tradables, and relative to nonagricultural tradables

Year	NRAs, total agriculture ^a				NRAs, agricultural tradables			NRA, nonagricultural tradables	RRA
	Covered products		Noncovered products	All products, including NPS	Exportables ^b	Import- competing ^b	All		
	Inputs	Outputs							
1979	4	-7	7	-1	-28	13	-1	8	-9
1980	6	-1	24	9	-23	23	9	10	0
1981	11	15	39	30	-18	48	30	10	18
1982	7	-11	-8	-4	-38	13	-4	9	-12
1983	6	-27	-9	-19	-50	-3	-19	4	-22
1984	9	-8	11	3	-47	26	3	4	-1
1985	9	13	43	26	-21	46	27	6	19
1986	5	-13	-3	-7	-29	3	-7	2	-9
1987	5	-15	-1	-8	-46	15	-8	3	-11
1988	4	-11	-2	-7	-38	13	-7	5	-11
1989	4	5	12	10	-6	19	10	4	6
1990	8	15	35	26	6	35	27	5	21

(Table continues on the following page.)

Table B.7. Annual Distortion Estimates, Mexico, 1979–2004 (continued)

b. Agricultural NRAs and RRAs: all products, tradables, and relative to nonagricultural tradables

Year	NRAs, total agriculture ^a				NRAs, agricultural tradables			NRA, nonagricultural tradables	RRA
	Covered products		Noncovered products	All products, including NPS	Exportables ^b	Import- competing ^b	All		
	Inputs	Outputs							
1991	3	20	20	23	−17	46	23	5	17
1992	3	35	48	41	38	43	42	6	34
1993	6	28	33	34	2	51	34	6	27
1994	6	19	21	30	−6	40	30	7	22
1995	2	−22	−15	−15	−45	−7	−15	2	−17
1996	2	−9	−3	−3	−18	−2	−3	2	−5
1997	1	4	7	9	−6	10	9	4	5
1998	1	8	11	13	−9	19	13	4	9
1999	1	10	16	17	−1	21	17	4	13
2000	1	16	15	20	−5	28	20	6	14
2001	2	14	9	19	−20	31	19	7	11
2002	2	15	4	18	−13	26	19	7	11
2003	3	−2	−4	4	−30	16	4	7	−3
2004	2	−9	−10	−4	−31	6	−4	6	−10

c. Value shares of the primary production of covered and noncovered products^c

Year	Rice	Wheat	Maize	Sorghum	Soybeans	Barley	Sugar	Coffee	Beans	Tomatoes	Beef	Pig meat	Poultry	Eggs	Milk	Noncovered
1979	1	4	11	4	2	1	3	1	3	7	23	14	2	4	6	17
1980	1	4	14	4	1	1	7	0	3	5	19	11	2	3	5	22
1981	1	4	13	5	1	1	4	3	5	4	15	11	1	3	4	26
1982	1	5	8	3	1	1	3	4	2	6	17	17	2	4	6	20
1983	1	3	13	4	1	0	3	4	1	3	22	16	2	4	5	20
1984	0	4	13	4	1	0	2	4	2	3	18	15	3	5	3	23
1985	1	3	16	5	1	1	3	1	2	6	17	13	3	5	3	22
1986	1	4	11	4	1	1	3	2	4	6	19	13	4	7	3	18
1987	1	3	8	4	1	1	4	3	3	10	20	12	3	5	3	19
1988	1	3	10	5	0	0	4	7	2	5	21	9	2	5	5	21
1989	1	5	10	4	2	1	5	1	3	6	20	7	3	6	4	24
1990	0	3	13	4	1	1	4	1	6	5	16	8	3	6	2	27

(Table continues on the following page.)

Table B.7. Annual Distortion Estimates, Mexico, 1979–2004 (continued)c. Value shares of the primary production of covered and noncovered products^c

Year	Rice	Wheat	Maize	Sorghum	Soybeans	Barley	Sugar	Coffee	Beans	Tomatoes	Beef	Pig meat	Poultry	Eggs	Milk	Noncovered
1991	0	3	11	3	1	0	2	1	4	11	16	8	3	5	4	28
1992	0	3	16	4	1	0	3	0	3	5	16	7	4	5	5	29
1993	0	3	16	2	1	0	3	0	5	10	14	6	3	5	3	29
1994	0	3	15	2	1	0	4	1	4	6	16	6	4	5	4	29
1995	0	3	16	3	0	1	5	1	4	9	16	6	5	5	5	20
1996	0	3	17	5	0	1	3	1	4	8	11	7	6	6	6	21
1997	0	3	15	4	0	1	4	1	3	7	12	8	6	6	5	25
1998	0	2	13	4	0	0	3	1	4	7	13	6	8	6	5	27
1999	0	2	13	3	0	0	2	1	3	7	15	5	8	7	5	28
2000	0	2	11	3	0	1	2	1	2	7	15	7	7	7	6	28
2001	0	2	11	3	0	1	3	0	2	6	16	7	8	7	5	28
2002	0	2	13	3	0	1	3	0	4	6	15	6	7	7	5	28
2003	0	2	12	3	0	1	3	0	3	6	18	6	7	7	5	26
2004	0	1	13	3	0	1	3	0	3	7	20	7	8	6	5	24

Source: Soloaga and Lara 2007.

a. Including assistance for nontradables and non-product-specific assistance (NPS).

b. Including product-specific input subsidies.

c. Product shares are calculated at undistorted farmgate prices in U.S. dollars.

Table B.8. Annual Distortion Estimates, Nicaragua, 1991–2004*(percent)***a. NRAs for covered products**

Year	Rice	Maize	Sorghum	Soybeans	Groundnuts	Sesame	Sugar	Coffee	Beans	Beef	Poultry	Milk	All
1991	−10	2	−33	31	0	−39	2	−44	10	−10	94	65	−8
1992	−6	17	−13	52	−1	−42	44	−26	−11	−15	97	18	−6
1993	3	30	−14	8	−15	12	43	−20	86	−19	82	12	1
1994	−25	30	−19	10	−21	27	55	−42	−23	−27	70	19	−15
1995	16	0	−24	15	−30	−38	50	−62	−10	−21	86	26	−14
1996	−5	15	−25	−38	−18	−31	74	−37	−17	−38	33	6	−18
1997	23	26	−5	−37	−35	−15	62	−53	−12	−35	33	−12	−20
1998	32	31	0	−21	−37	−45	60	−59	13	−35	30	39	−16
1999	28	20	−4	0	−15	−42	60	−43	−7	−26	22	8	−13
2000	71	57	8	−5	−18	−47	52	−31	−16	−28	32	17	−6
2001	49	12	0	−2	−45	−30	35	−14	−31	−27	14	8	−11
2002	61	13	−23	−21	−30	−39	43	−7	−17	−24	33	−15	−8
2003	21	−12	−15	−30	−42	−43	35	−44	−34	−17	—	7	−16
2004	34	9	−20	−53	−37	−43	35	−19	−4	−16	—	—	−9

(Table continues on the following page.)

Table B.8. Annual Distortion Estimates, Nicaragua, 1991–2004 (continued)

b. Agricultural NRAs and RRAs: all products, tradables, and relative to nonagricultural tradables

Year	NRAs, total agriculture ^a				NRAs, agricultural tradables			NRA, nonagricultural tradables	RRA
	Covered products		Noncovered products	All products, including NPS	Exportables ^b	Import- competing ^b	All		
	Inputs	Outputs							
1991	−3	−5	−8	−5	−15	12	−5	7	−12
1992	−3	−2	−7	−2	−14	13	−2	7	−9
1993	−3	4	−1	5	−8	19	5	7	−2
1994	−3	−12	−17	−10	−24	6	−10	7	−16
1995	−3	−12	−19	−9	−29	22	−9	6	−14
1996	−2	−15	−21	−15	−28	4	−15	5	−19
1997	−2	−18	−23	−15	−33	15	−15	6	−20
1998	−2	−14	−20	−12	−31	30	−12	6	−17
1999	−2	−11	−15	−6	−24	17	−6	8	−13
2000	−2	−3	−6	−1	−19	52	−1	6	−6
2001	−3	−8	−10	−4	−20	24	−4	6	−10
2002	−3	−5	−8	−3	−18	31	−3	5	−8
2003	−3	−13	−14	−10	−19	0	−10	6	−15
2004	−3	−6	−7	−2	−14	16	−2	6	−8

c. Value shares of the primary production of covered and noncovered products^c

Year	Rice	Maize	Sorghum	Soybeans	Groundnuts	Sesame	Sugar	Coffee	Beans	Beef	Poultry	Milk	Noncovered
1991	8	4	2	0	0	2	3	11	4	40	2	3	20
1992	10	5	2	0	0	2	3	7	4	42	2	4	18
1993	12	6	2	0	1	1	3	6	4	44	3	5	13
1994	11	4	2	1	1	1	3	9	6	43	3	4	13
1995	10	5	1	1	2	3	3	17	4	33	3	4	15
1996	9	7	2	1	2	2	3	11	8	33	3	5	14
1997	10	4	1	1	2	1	3	16	6	36	3	4	13
1998	10	4	1	1	2	1	2	17	9	34	3	3	13
1999	7	4	1	0	3	0	2	18	9	33	4	8	10
2000	6	5	1	0	3	1	2	14	11	36	4	8	8
2001	6	5	1	0	3	0	2	7	11	37	6	10	11
2002	7	6	2	0	3	0	2	6	9	40	5	11	10
2003	5	6	1	0	3	1	3	8	10	38	—	9	16
2004	5	5	1	0	4	1	3	6	8	41	—	—	24

Source: Berthelon, Kruger, and Saavedra 2007.

Note: — = no data are available.

a. Including assistance for nontradables and non-product-specific assistance (NPS).

b. Including product-specific input subsidies.

c. Product shares are calculated at undistorted farmgate prices in U.S. dollars.

Table B.9. Annual Distortion Estimates, Latin America, 1955–2005
(percent)

a. NRAs for covered products

Year	Rice	Wheat	Maize	Sorghum	Barley	Soybeans	Groundnuts	Palm oil	Sunflowers	Sesame	Sugar	Cotton	Coffee
1955	87	—	—	—	—	—	—	—	—	—	-43	—	-69
1956	131	—	—	—	—	—	—	—	—	—	-28	—	-65
1957	99	—	—	—	—	—	—	—	—	—	-48	—	-69
1958	60	—	—	—	—	—	—	—	—	—	-21	—	-71
1959	43	—	—	—	—	—	—	—	—	—	-10	—	-65
1960	70	-22	-27	-4	—	10	—	-4	—	—	-22	6	-21
1961	72	-9	-12	-4	—	-1	—	-4	—	—	-11	-5	-6
1962	61	-12	-6	-4	—	10	—	-4	—	—	-18	-13	-5
1963	48	-11	0	-4	—	4	—	-4	—	—	-33	2	-17
1964	86	-1	6	-4	—	12	—	-4	—	—	10	8	-19
1965	83	-11	-9	-4	—	12	—	-4	—	—	53	-11	-26
1966	29	14	-6	-4	—	0	—	-4	—	—	14	-11	-31
1967	2	9	-16	-4	—	1	—	-4	—	—	14	-3	-28
1968	14	-15	-12	-4	—	1	—	-4	—	—	11	-6	-25
1969	5	-8	-9	-4	—	2	—	-4	—	—	-9	-5	-23
1970	18	4	-14	-4	—	-1	—	-5	—	—	-31	2	-30
1971	19	15	-3	-6	—	7	—	-7	—	—	-39	-7	-26
1972	0	-11	6	15	—	-1	—	-3	—	—	-72	-8	-27
1973	4	-41	-11	-4	—	-25	—	-4	—	—	-78	-1	-25
1974	-16	-43	-19	-15	—	-4	—	2	—	—	-87	4	-22
1975	-10	-7	-15	-16	—	-6	—	0	—	—	-80	-7	-19
1976	-2	2	-16	-16	—	-16	—	-3	—	—	-34	-7	-35
1977	-8	44	-5	23	—	-22	—	-1	-24	—	-49	-24	-40

Year	Rice	Wheat	Maize	Sorghum	Barley	Soybeans	Groundnuts	Palm oil	Sunflowers	Sesame	Sugar	Cotton	Coffee
1978	-28	19	-14	9	—	-14	—	-3	-36	—	-33	-8	-27
1979	-5	-5	-22	-18	-40	-16	—	-3	-23	—	-33	-25	-37
1980	-25	-2	-10	10	-9	-8	—	-1	-25	—	-62	-11	-34
1981	-16	23	0	6	18	-11	—	-1	-9	—	-50	-20	-41
1982	48	13	21	19	-48	-1	—	-2	-26	—	-48	-8	-40
1983	8	-14	-13	-14	51	-16	—	-3	-33	—	-54	-19	-48
1984	10	8	-22	13	71	-16	—	-5	-24	—	-56	-19	-48
1985	34	35	-17	12	11	-22	—	-4	-25	—	-45	-10	-28
1986	48	11	-6	7	7	6	—	-4	-32	—	-41	-9	-23
1987	-8	3	-12	22	-42	-18	—	-2	-22	—	-40	-25	-33
1988	5	-2	-17	-9	-11	-22	—	-2	-14	—	-48	-12	-47
1989	-39	-16	-11	-11	-28	-50	—	-4	-39	—	-38	-62	-14
1990	7	1	-3	-10	-21	-27	—	80	-39	—	-41	-31	-13
1991	9	24	1	3	50	-20	0	21	-13	-39	-27	-30	-14
1992	18	13	-2	0	47	-20	-1	23	-10	-42	-9	16	13
1993	17	31	8	5	40	-17	-15	39	-4	12	-10	3	8
1994	7	23	-4	-11	25	36	-21	4	-14	27	-11	-20	9
1995	28	1	-8	-2	-40	-5	-30	6	-23	-38	-15	6	-18
1996	22	4	-8	-19	-12	-6	-18	20	-17	-31	1	7	-6
1997	32	-2	-6	-16	-13	0	-35	6	-11	-15	11	7	-13
1998	30	7	3	-14	4	-3	-37	3	-18	-45	14	5	-5
1999	17	8	-1	-16	-11	-4	-15	33	-29	-42	23	5	-5
2000	29	9	6	-4	-4	-4	-18	51	-27	-47	36	11	-6
2001	48	14	-1	-9	2	-3	-45	65	-20	-30	29	13	5
2002	32	-2	-4	-8	-8	-21	-30	41	-41	-39	26	7	16
2003	28	-4	-8	-10	-23	-13	-42	45	-36	-43	19	21	0
2004	31	-7	-9	-21	-1	-8	-37	34	-35	-43	22	1	0
2005	27	-15	3	40	—	-13	—	32	-40	—	8	9	1

(Table continues on the following page.)

Table B.9. Annual Distortion Estimates, Latin America, 1955–2005 (*continued*)

a. NRAs for covered products

Year	Cocoa	Apples	Bananas	Grapes	Beans	Garlic	Onions	Tomatoes	Beef	Pig meat	Poultry	Eggs	Milk
1955	—	—	–37	—	14	566	159	–21	—	—	163	—	—
1956	—	—	–27	—	57	221	260	–18	—	—	170	—	—
1957	—	—	–24	—	28	100	197	–25	—	—	159	—	—
1958	—	—	–22	—	48	192	193	–11	—	—	178	—	—
1959	—	—	–23	—	17	84	136	–35	—	—	172	—	—
1960	—	4	–21	6	39	344	246	–18	–26	—	171	—	27
1961	—	0	–28	1	28	390	161	–24	–26	—	177	—	26
1962	—	–1	–26	–2	37	383	127	17	–27	—	150	—	26
1963	—	33	–29	34	37	200	153	–24	–25	—	141	—	22
1964	—	17	–31	18	91	246	158	33	–16	—	121	—	20
1965	—	14	–30	11	39	225	161	20	–21	—	89	—	14
1966	25	–2	–32	–9	64	129	72	–23	–19	2	147	—	0
1967	13	37	–34	37	61	164	76	60	–24	15	147	—	–4
1968	7	33	–35	30	55	146	215	86	–25	17	88	—	1
1969	–23	31	–36	30	47	164	276	60	–25	–9	75	—	–2
1970	–26	31	–37	33	127	10	26	123	–20	–7	187	—	8
1971	–18	49	–53	39	17	29	53	82	–11	19	115	—	–5
1972	–15	75	–53	57	–9	33	20	79	–26	–16	108	—	–17
1973	7	11	–43	3	–9	51	70	113	–28	–31	117	—	–12
1974	–29	13	–42	32	–2	57	16	–20	–22	–34	192	—	–9
1975	5	–1	–51	3	63	44	54	251	–32	–28	145	—	3
1976	4	–1	–51	–1	50	29	12	191	–6	–21	64	—	5
1977	–41	–2	–51	–1	65	110	83	30	–13	–5	89	—	2
1978	–21	–1	–49	–1	53	152	30	25	–1	2	78	—	1

Year	Cocoa	Apples	Bananas	Grapes	Beans	Garlic	Onions	Tomatoes	Beef	Pig meat	Poultry	Eggs	Milk
1979	-14	-2	-52	-1	17	89	217	-55	-6	-13	164	-10	85
1980	-1	-2	-56	-1	15	130	209	-52	-2	-10	21	24	96
1981	-15	-2	-62	-1	-9	224	162	-20	-5	-4	49	32	139
1982	-1	-1	-22	-1	7	123	66	-42	-8	-24	48	-10	80
1983	21	-3	-37	-2	211	12	30	24	-22	-41	18	-16	70
1984	-24	-4	-26	-3	5	14	42	2	-11	-13	29	-29	136
1985	-12	-2	-38	-1	49	204	180	-51	-8	-7	25	-5	78
1986	-7	-1	-47	-1	-27	130	268	-35	5	-46	38	-21	53
1987	-10	-1	-43	-1	-29	19	67	-55	-17	-41	16	-1	61
1988	-21	-1	-53	-1	-17	145	128	-35	-14	-9	5	10	24
1989	-18	-1	-13	-1	-51	198	-3	-53	14	5	32	-15	23
1990	-20	-1	-11	-1	-16	-19	108	-27	8	-27	54	-11	38
1991	-18	0	-13	-1	6	239	77	-57	-4	2	21	-11	42
1992	-33	0	-18	-1	-6	374	253	39	0	15	6	2	33
1993	-8	0	-6	-1	-3	260	214	-31	0	9	15	15	57
1994	-4	0	-10	-1	-16	285	334	-40	5	31	19	15	57
1995	-17	0	-11	-1	-39	250	109	-71	-1	-11	4	-15	23
1996	-9	0	-9	-1	-19	97	58	-45	8	-14	7	-11	19
1997	-3	0	-21	-1	7	246	177	-32	8	-6	15	-6	33
1998	-13	0	-24	-1	1	72	149	-33	6	4	5	-22	39
1999	-17	0	-21	-1	-4	384	68	-11	4	14	10	-27	33
2000	-4	0	-38	0	7	528	73	-18	0	-2	20	-21	49
2001	-11	0	-9	0	28	552	98	-41	-1	5	21	-13	50
2002	-3	0	-1	0	-12	418	59	-39	5	20	31	-20	57
2003	-9	0	-8	0	-17	108	42	-47	-3	7	11	-16	38
2004	—	0	-65	0	-22	204	98	-40	-8	-8	11	-9	32
2005	—	0	-57	0	197	306	276	1	-2	3	3	—	20

(Table continues on the following page.)

Table B.9. Annual Distortion Estimates, Latin America, 1955–2005 (continued)

b. Agricultural NRAs and RRAs: all products, tradables, and relative to nonagricultural tradables

Year	NRAs, total agriculture ^a				NRAs, agricultural tradables			NRA, nonagricultural tradables	RRA
	Covered products		Noncovered products	All products, including NPS	Exportables ^b	Import- competing ^b	All		
	Inputs	Outputs							
1955	0	−22	−22	−22	−50	96	−23	8	−29
1956	0	−9	−9	−9	−39	134	−10	8	−16
1957	0	−22	−22	−22	−50	107	−24	7	−29
1958	0	−3	−3	−3	−33	94	−3	8	−10
1959	0	1	1	1	−25	70	1	8	−6
1960	0	−17	−6	−13	−27	22	−17	26	−34
1961	−1	−12	0	−7	−21	30	−10	23	−27
1962	−1	−12	−4	−9	−22	27	−12	27	−31
1963	−1	−13	−5	−9	−21	20	−13	29	−33
1964	−1	−5	1	−2	−12	32	−4	30	−26
1965	−1	−11	1	−5	−15	23	−8	30	−30
1966	−1	−9	−6	−7	−12	12	−8	34	−32
1967	−1	−13	−3	−8	−12	3	−9	33	−32
1968	−1	−13	−4	−8	−13	4	−10	30	−31
1969	−1	−12	−4	−8	−12	1	−10	30	−31
1970	−1	−13	−6	−11	−16	10	−12	29	−32
1971	−1	−10	−2	−7	−11	8	−8	29	−29
1972	−1	−26	−14	−21	−27	−7	−24	27	−40
1973	0	−31	−22	−28	−34	−9	−30	28	−45
1974	0	−42	−34	−39	−46	−17	−41	26	−53
1975	0	−35	−28	−32	−42	−4	−34	25	−47
1976	0	−15	−10	−13	−19	3	−14	25	−31
1977	0	−20	−15	−19	−26	15	−19	24	−35

Year	NRAs, total agriculture ^a				NRAs, agricultural tradables			NRA, nonagricultural tradables	RRA
	Covered products		Noncovered products	All products, including NPS	Exportables ^b	Import- competing ^b	All		
	Inputs	Outputs							
1978	−1	−15	−12	−15	−18	−10	−15	24	−32
1979	1	−14	−9	−11	−21	2	−12	18	−25
1980	4	−19	−10	−12	−24	3	−13	21	−28
1981	5	−17	−4	−8	−26	24	−8	19	−22
1982	4	−12	−6	−5	−21	27	−5	20	−21
1983	3	−27	−19	−21	−34	6	−22	17	−33
1984	4	−23	−16	−16	−31	8	−17	17	−29
1985	3	−15	−8	−9	−28	23	−9	16	−22
1986	5	−11	−3	−3	−13	9	−3	21	−20
1987	2	−22	−17	−15	−29	0	−16	19	−29
1988	5	−25	−17	−15	−30	0	−15	15	−26
1989	−7	−11	−20	−12	−25	−7	−13	13	−23
1990	3	−12	−5	−3	−18	11	−3	10	−11
1991	2	−8	−6	−2	−21	18	−2	8	−9
1992	4	−1	3	6	−7	19	6	6	0
1993	3	0	3	7	−11	30	7	6	1
1994	3	6	8	12	4	19	13	7	6
1995	1	−7	−1	0	−9	4	0	6	−6
1996	2	−3	2	3	−3	5	3	6	−2
1997	1	1	5	7	−2	14	8	7	0
1998	1	3	6	8	−3	22	8	8	1
1999	1	2	7	9	−2	17	9	6	3
2000	1	5	8	10	−1	23	10	7	2
2001	0	6	6	9	−2	30	10	6	3
2002	1	2	1	5	−6	25	6	5	1
2003	1	−3	−2	0	−8	15	0	5	−4
2004	1	−4	−2	−1	−7	9	−1	4	−5
2005	−2	1	3	1	−3	22	1	3	−2

(Table continues on the following page.)

Table B.9. Annual Distortion Estimates, Latin America, 1955–2005 (continued)c. Value shares of the primary production of covered and noncovered products^c

Year	Rice	Wheat	Maize	Sorghum	Soybeans	Sunflowers	Sugar	Cotton	Coffee	Cocoa
1955	3	—	—	—	—	—	17	—	10	—
1956	3	—	—	—	—	—	15	—	9	—
1957	3	—	—	—	—	—	19	—	8	—
1958	5	—	—	—	—	—	15	—	7	—
1959	6	—	—	—	—	—	14	—	6	—
1960	1	10	7	0	0	—	2	1	11	—
1961	2	8	8	0	0	—	1	2	10	—
1962	2	8	7	0	0	—	3	2	10	—
1963	2	9	7	0	0	—	3	1	9	—
1964	1	12	7	0	0	—	2	1	11	—
1965	2	12	7	0	0	—	1	1	9	—
1966	1	4	12	0	1	—	1	4	6	0
1967	1	4	14	0	1	—	1	3	6	0
1968	2	6	11	0	1	—	1	5	6	0
1969	1	5	11	0	1	—	1	5	6	0
1970	1	6	13	0	2	—	7	4	8	0
1971	1	5	12	0	2	—	8	6	6	0
1972	1	4	9	0	2	—	15	5	5	0
1973	6	5	10	0	5	—	14	4	4	0
1974	6	6	9	0	5	—	22	3	2	0
1975	8	4	8	0	6	—	19	2	3	0
1976	8	3	12	0	9	—	9	4	7	0
1977	6	3	8	0	13	0	9	5	12	1
1978	8	3	10	0	9	1	8	3	10	1

Year	Rice	Wheat	Maize	Sorghum	Soybeans	Sunflowers	Sugar	Cotton	Coffee	Cocoa
1979	4	4	10	1	7	1	6	2	7	0
1980	6	4	9	1	5	0	9	1	10	0
1981	3	3	10	1	5	0	8	2	14	0
1982	3	3	7	1	5	1	9	1	9	0
1983	2	3	8	1	5	1	9	1	11	0
1984	2	3	10	1	7	1	9	2	9	0
1985	2	2	11	1	7	1	8	2	11	0
1986	2	3	8	1	5	1	7	2	8	0
1987	2	3	7	1	6	1	8	1	10	0
1988	2	3	8	1	8	1	7	1	10	0
1989	4	3	7	1	11	1	5	2	5	0
1990	2	3	9	1	8	1	8	2	5	0
1991	3	3	8	1	6	1	6	2	5	0
1992	2	3	10	1	6	1	6	1	4	0
1993	2	3	10	1	7	1	5	1	4	0
1994	2	2	9	1	7	1	5	1	7	0
1995	2	3	9	1	6	1	6	1	6	0
1996	2	3	10	1	8	1	6	1	6	0
1997	2	3	8	1	9	1	6	0	6	0
1998	2	2	7	1	9	1	5	0	7	0
1999	3	2	8	1	8	2	4	1	5	0
2000	2	3	8	1	10	1	4	1	5	0
2001	2	3	8	1	10	1	4	1	3	0
2002	2	4	8	1	13	1	4	1	3	0
2003	2	3	9	1	17	1	4	1	2	0
2004	2	3	8	1	16	1	3	1	3	—
2005	3	3	5	0	21	1	5	1	5	—

(Table continues on the following page.)

Table B.9. Annual Distortion Estimates, Latin America, 1955–2005 (continued)c. Value shares of the primary production of covered and noncovered products^c

Year	Apples	Bananas	Beans	Cassava	Tomatoes	Beef	Pig meat	Poultry	Eggs	Milk	Noncovered
1955	—	4	2	2	0	—	—	2	—	—	60
1956	—	6	1	4	0	—	—	2	—	—	60
1957	—	4	1	3	0	—	—	2	—	—	60
1958	—	6	1	3	0	—	—	2	—	—	60
1959	—	8	2	2	0	—	—	2	—	—	60
1960	0	1	0	0	0	29	—	0	—	3	34
1961	0	1	0	0	0	31	—	0	—	3	33
1962	0	0	0	0	0	30	—	0	—	3	34
1963	0	0	0	0	0	30	—	0	—	3	35
1964	0	0	0	0	0	28	—	0	—	3	34
1965	0	0	0	0	0	29	—	0	—	3	35
1966	0	1	0	0	0	16	0	0	—	3	49
1967	0	1	0	0	0	14	0	0	—	3	51
1968	0	1	0	0	0	15	0	0	—	3	48
1969	0	1	0	0	0	16	0	0	—	3	49
1970	0	2	0	0	0	17	0	0	—	3	36
1971	0	1	0	0	0	18	0	0	—	3	37
1972	0	1	0	0	0	16	0	0	—	3	37
1973	0	1	0	0	0	13	0	0	—	2	35
1974	0	0	0	0	0	9	0	0	—	2	34
1975	0	1	0	0	0	11	0	0	—	1	36
1976	0	1	0	0	0	9	0	0	—	2	34

Year	Apples	Bananas	Beans	Cassava	Tomatoes	Beef	Pig meat	Poultry	Eggs	Milk	Noncovered
1977	0	1	0	0	0	9	0	0	—	2	30
1978	0	1	0	0	0	10	0	0	—	2	32
1979	4	0	1	0	2	16	4	1	1	3	29
1980	0	0	1	0	1	16	3	2	1	2	28
1981	0	0	1	0	1	16	3	2	1	2	28
1982	0	0	1	0	1	17	5	2	1	3	30
1983	0	0	0	0	1	17	5	2	1	2	30
1984	0	0	0	0	1	14	4	2	1	2	30
1985	0	0	1	0	1	12	4	2	1	2	30
1986	0	0	1	0	1	14	4	2	2	2	35
1987	0	0	1	0	2	16	4	2	1	2	30
1988	0	0	1	0	1	15	3	2	1	3	30
1989	0	0	1	0	1	13	2	2	1	3	37
1990	0	1	2	0	1	13	4	3	1	3	33
1991	0	1	1	0	3	15	3	3	1	4	33
1992	0	1	1	0	1	16	3	3	1	5	35
1993	0	1	1	0	3	15	3	3	1	4	34
1994	0	1	1	0	1	12	2	3	1	4	39
1995	0	1	1	0	2	16	3	4	1	4	32
1996	0	1	1	0	2	15	3	4	1	5	28

(Table continues on the following page.)

Table B.9. Annual Distortion Estimates, Latin America, 1955–2005 (continued)c. Value shares of the primary production of covered and noncovered products^c

Year	Apples	Bananas	Beans	Cassava	Tomatoes	Beef	Pig meat	Poultry	Eggs	Milk	Noncovered
1997	0	1	1	0	2	13	3	4	1	5	31
1998	0	1	1	0	2	13	2	5	1	5	33
1999	0	1	1	0	2	15	2	6	2	5	32
2000	0	1	1	0	2	16	3	6	2	5	31
2001	0	1	1	0	2	15	4	6	2	5	31
2002	0	1	1	0	2	13	3	6	2	4	31
2003	0	1	1	0	2	13	3	6	2	4	28
2004	0	0	1	0	2	15	3	6	2	4	28
2005	0	0	0	0	0	13	2	5	—	3	33

Sources: Berthelon, Kruger, and Saavedra 2007; Guterman 2007; Lopes et al. 2007; Los Santos and Peña 2007; Soloaga and Lara 2007; Sturzenegger and Salazni 2007; Valdés and Jara 2007; Valenzuela, Wong, and Sandri 2007.

Note: Cassava had a zero NRA throughout the period. — = no data are available.

a. Including assistance for nontradables and non-product-specific assistance (NPS).

b. Including product-specific input subsidies.

c. Product shares are calculated at undistorted farmgate prices in U.S. dollars. Barley, groundnuts, sesame, palm oil, grapes, onions, and garlic have been omitted because of their low shares (<0.5 percent) in the gross value of regional production.

Table B.10. Distortion Estimates of NRAs for Nonagricultural Industries, by Trade Status, Latin America, 1955–2005
(percent)

Year	Argentina			Brazil			Chile			Colombia		
	Importables	Exportables	Total tradables	Importables	Exportables	Total tradables	Importables	Exportables	Total tradables	Importables	Exportables	Total tradables
1955	—	—	—	—	—	—	—	—	—	—	—	—
1956	—	—	—	—	—	—	—	—	—	—	—	—
1957	—	—	—	—	—	—	—	—	—	—	—	—
1958	—	—	—	—	—	—	—	—	—	—	—	—
1959	—	—	—	—	—	—	—	—	—	—	—	—
1960	103	–3	66	—	—	—	38	0	22	44	0	19
1961	100	–3	63	—	—	—	38	0	22	44	1	20
1962	97	–2	61	—	—	—	77	0	44	43	1	19
1963	94	–2	59	—	—	—	69	0	40	43	0	19
1964	91	–2	58	—	—	—	69	0	40	44	0	19
1965	88	–2	56	—	—	—	63	0	37	44	1	20
1966	86	–2	54	—	—	—	48	0	28	61	1	37
1967	83	–1	53	—	—	—	43	0	25	54	2	32
1968	80	–1	50	—	—	—	45	0	26	49	2	26
1969	78	–1	48	—	—	—	24	0	14	49	1	26
1970	70	–1	43	52	0	35	24	0	14	55	1	29
1971	63	–1	38	51	0	35	32	0	19	55	1	28
1972	57	–1	35	53	0	36	66	0	38	51	0	24
1973	51	0	31	50	0	34	105	0	60	47	0	23
1974	46	–1	28	48	0	35	51	0	29	37	–2	19
1975	41	–1	24	47	0	34	32	0	18	38	–1	18
1976	37	–1	21	46	0	34	25	0	14	35	–1	17
1977	36	0	21	44	0	33	17	0	10	36	1	20
1978	35	–1	20	52	0	39	10	0	6	35	1	20
1979	35	–1	19	51	0	38	13	0	7	33	1	19

(Table continues on the following page.)

Table B.10. Distortion Estimates of NRAs for Nonagricultural Industries, by Trade Status, Latin America, 1955–2005 (*continued*)

Year	Argentina			Brazil			Chile			Colombia		
	Importables	Exportables	Total tradables	Importables	Exportables	Total tradables	Importables	Exportables	Total tradables	Importables	Exportables	Total tradables
1980	34	−1	19	53	−2	39	10	0	6	33	−2	19
1981	33	1	19	47	−2	35	9	0	5	32	0	18
1982	32	−1	17	44	−1	32	8	0	5	34	2	22
1983	31	−2	17	42	−1	31	15	0	8	43	2	29
1984	31	−3	16	41	−2	30	22	0	12	50	2	31
1985	30	−4	16	40	−2	30	23	0	12	45	2	26
1986	29	−3	16	51	−1	38	18	0	10	48	1	23
1987	29	−1	16	51	−1	38	18	0	10	50	0	23
1988	28	1	17	34	−1	24	14	0	7	47	0	24
1989	25	1	15	26	−5	18	14	0	7	45	0	22
1990	22	3	12	24	−14	13	14	0	7	38	0	17
1991	19	4	11	17	−5	11	11	0	6	26	0	9
1992	18	4	11	13	−9	7	10	0	5	12	0	6
1993	17	4	10	11	−7	5	10	0	6	12	1	7
1994	16	6	11	14	−12	6	10	0	6	13	1	8
1995	16	6	11	15	−7	7	10	0	5	13	0	8
1996	16	6	10	13	−2	7	10	0	5	13	1	8
1997	16	5	10	14	0	9	10	0	5	14	1	8
1998	17	6	11	15	0	9	11	0	6	14	1	9
1999	17	6	11	13	−2	8	10	0	5	14	2	7
2000	15	6	10	13	1	9	8	0	4	14	2	7
2001	15	5	9	8	1	5	6	0	3	14	2	7
2002	14	−2	3	7	0	4	5	0	2	14	4	8
2003	14	−2	3	7	0	4	3	0	2	13	2	7
2004	14	−1	4	7	1	4	2	0	1	13	2	6
2005	14	−2	3	6	0	4	2	0	1	13	2	6

Year	Dominican Republic			Ecuador			Mexico			Nicaragua		
	Importables	Exportables	Total tradables	Importables	Exportables	Total tradables	Importables	Exportables	Total tradables	Importables	Exportables	Total tradables
1955	20	0	8	—	—	—	—	—	—	—	—	—
1956	20	0	8	—	—	—	—	—	—	—	—	—
1957	20	0	7	—	—	—	—	—	—	—	—	—
1958	20	0	8	—	—	—	—	—	—	—	—	—
1959	20	0	8	—	—	—	—	—	—	—	—	—
1960	20	0	8	—	—	—	—	—	—	—	—	—
1961	20	0	8	—	—	—	—	—	—	—	—	—
1962	20	0	8	—	—	—	—	—	—	—	—	—
1963	20	0	8	—	—	—	—	—	—	—	—	—
1964	20	0	8	—	—	—	—	—	—	—	—	—
1965	20	0	9	—	—	—	—	—	—	—	—	—
1966	25	-3	9	8	-2	2	—	—	—	—	—	—
1967	27	-4	9	9	-3	1	—	—	—	—	—	—
1968	26	-3	9	14	-3	2	—	—	—	—	—	—
1969	27	-4	9	13	-8	-1	—	—	—	—	—	—
1970	28	-3	9	13	-6	1	—	—	—	—	—	—
1971	27	-3	9	8	-7	-2	—	—	—	—	—	—
1972	26	-3	9	-1	-6	-4	—	—	—	—	—	—
1973	27	-3	9	-3	-6	-5	—	—	—	—	—	—
1974	27	-3	9	-1	-8	-6	—	—	—	—	—	—
1975	29	-4	9	12	-6	-1	—	—	—	—	—	—
1976	30	-5	10	18	-5	3	—	—	—	—	—	—
1977	38	-8	11	21	-5	6	—	—	—	—	—	—
1978	33	-7	11	19	-1	7	—	—	—	—	—	—
1979	36	-8	11	19	1	9	12	0	8	—	—	—
1980	35	-8	11	19	-7	2	12	0	10	—	—	—
1981	24	-2	9	35	-6	11	12	0	10	—	—	—

(Table continues on the following page.)

Table B.10. Distortion Estimates of NRAs for Nonagricultural Industries, by Trade Status, Latin America, 1955–2005 (*continued*)

Year	Dominican Republic			Ecuador			Mexico			Nicaragua		
	Importables	Exportables	Total tradables	Importables	Exportables	Total tradables	Importables	Exportables	Total tradables	Importables	Exportables	Total tradables
1982	38	−9	11	43	−3	16	12	0	9	—	—	—
1983	43	−12	12	35	−11	8	12	0	4	—	—	—
1984	23	−2	9	35	−10	9	12	0	4	—	—	—
1985	23	−2	9	47	−11	15	12	0	6	—	—	—
1986	23	−2	10	36	−7	12	12	0	2	—	—	—
1987	23	−2	10	25	−8	6	12	0	3	—	—	—
1988	26	−3	10	24	−8	6	12	0	5	—	—	—
1989	40	−11	12	15	−5	3	12	0	4	—	—	—
1990	30	−6	11	6	−6	−1	12	0	5	—	—	—
1991	23	−2	10	12	−3	3	12	0	5	11	0	7
1992	20	0	9	6	−7	−1	13	0	6	11	0	7
1993	18	2	9	12	−2	4	13	0	6	11	0	7
1994	16	2	8	14	−1	7	13	0	7	11	0	7
1995	17	1	8	15	−3	7	12	0	2	10	0	6
1996	12	2	7	9	−1	5	12	0	2	8	0	5
1997	11	3	7	10	−2	5	21	0	4	8	1	6
1998	8	0	4	18	−3	9	19	0	4	9	1	6
1999	8	0	4	5	−1	3	21	0	4	11	1	8
2000	8	0	4	9	0	5	18	0	6	8	1	6
2001	10	0	5	16	0	10	18	0	7	8	1	6
2002	9	0	4	20	1	13	17	0	7	7	1	5
2003	9	0	4	10	1	7	17	0	7	8	1	6
2004	9	0	4	—	—	—	15	0	6	9	1	6
2005	9	0	4	—	—	—	—	—	—	—	—	—

Sources: Calculated by the authors of chapters 2–9.

Note: — = no data are available.

Table B.11. Gross Subsidy Equivalents of Assistance to Farmers, Latin America, 1960–2005*(US\$, millions)*

Year	Argentina	Brazil	Chile	Colombia	Dominican Republic	Ecuador	Mexico	Nicaragua	Total
1960	–428	—	90	–65	–20	—	—	—	–423
1961	–356	—	87	50	2	—	—	—	–217
1962	–405	—	100	8	–30	—	—	—	–327
1963	–342	—	118	–50	–62	—	—	—	–335
1964	–215	—	107	9	16	—	—	—	–84
1965	–464	—	141	45	36	—	—	—	–242
1966	–217	–247	91	–138	2	–37	—	—	–545
1967	–407	–188	129	–125	17	–51	—	—	–625
1968	–469	–179	115	–89	16	–34	—	—	–639
1969	–474	–144	95	–129	–2	–64	—	—	–717
1970	–424	–217	132	–265	–62	–78	—	—	–913
1971	–267	–215	195	–188	–9	–109	—	—	–594
1972	–564	–1,613	200	–304	–77	–141	—	—	–2,498
1973	–1,206	–2,965	19	–570	–165	–152	—	—	–5,037
1974	–1,616	–7,646	–7	–1,090	–411	–250	—	—	–11,019
1975	–1,968	–5,720	–38	–888	–655	–190	—	—	–9,458
1976	–724	–1,124	–3	–676	–126	–191	—	—	–2,844
1977	–1,009	–3,483	153	–895	–159	–334	—	—	–5,727
1978	–765	–2,733	145	–553	–149	–120	—	—	–4,176
1979	–516	–3,907	131	–548	–101	–102	–190	—	–5,233
1980	–396	–9,164	201	–231	–342	–78	1,590	—	–8,420
1981	–2,333	–9,458	102	260	–422	36	5,731	—	–6,084
1982	–2,071	–1,621	127	904	–158	213	–653	—	–3,259

(Table continues on the following page.)

Table B.11. Gross Subsidy Equivalents of Assistance to Farmers, Latin America, 1960–2005 (continued)

Year	Argentina	Brazil	Chile	Colombia	Dominican Republic	Ecuador	Mexico	Nicaragua	Total
1983	–2,163	–8,466	129	701	–444	123	–3,026	—	–13,145
1984	–1,924	–9,792	256	254	–786	106	525	—	–11,361
1985	–1,148	–8,830	317	217	–329	152	4,192	—	–5,429
1986	–1,213	579	397	–27	–563	70	–1,028	—	–1,785
1987	–770	–8,401	361	614	–423	4	–1,250	—	–9,866
1988	–678	–6,997	201	–386	–237	–200	–1,102	—	–9,399
1989	–1,849	–10,242	155	–450	–509	–134	1,882	—	–11,147
1990	–1,999	–4,213	24	–275	–238	–175	4,961	—	–1,915
1991	–519	–5,593	329	142	–152	–175	4,819	–39	–1,189
1992	–297	–5,462	438	1,445	141	–307	8,429	–17	4,369
1993	39	–4,152	414	1,496	190	106	7,413	42	5,548
1994	–282	4,466	457	1,204	–15	–2	6,471	–98	12,201
1995	–469	2,045	428	853	130	141	–3,334	–92	–298
1996	–467	1,678	339	2,342	185	–4	–764	–168	3,141
1997	–491	4,169	476	1,593	140	–234	2,166	–187	7,632
1998	–789	3,761	491	1,555	164	117	3,068	–147	8,220
1999	–628	3,185	485	1,096	93	–356	3,837	–71	7,641
2000	–625	1,877	551	1,619	273	–23	4,792	–10	8,454
2001	–304	922	279	2,018	145	467	4,935	–54	8,409
2002	–3,433	318	265	2,403	40	733	4,608	–42	4,891
2003	–4,251	1,530	254	1,966	–350	169	1,116	–150	284
2004	–4,430	3,236	166	1,522	75	—	–1,146	–27	–604
2005	–4,930	2,404	203	2,737	520	—	—	—	933

Sources: Calculated by the authors of chapters 2–9.

Note: — = no data are available.

Table B.12. Share of the Regional Value of Agricultural Production, Latin America, 1960–2005*(percent)*

Year	Argentina	Brazil	Chile	Colombia	Dominican Republic	Ecuador	Mexico	Nicaragua
1960	38.8	—	11.7	41.5	8.1	—	—	—
1961	37.1	—	12.9	42.9	7.0	—	—	—
1962	38.3	—	11.3	40.5	9.9	—	—	—
1963	39.8	—	9.4	40.6	10.2	—	—	—
1964	40.8	—	9.6	42.0	7.6	—	—	—
1965	44.5	—	12.3	37.1	6.1	—	—	—
1966	20.7	38.0	9.5	21.6	3.8	6.4	—	—
1967	18.7	40.9	9.2	22.0	3.4	5.8	—	—
1968	21.1	36.1	10.2	23.0	3.6	6.0	—	—
1969	23.6	35.8	8.9	22.2	4.0	5.5	—	—
1970	27.5	27.4	8.8	25.3	5.0	6.0	—	—
1971	26.9	29.6	9.6	24.0	4.7	5.1	—	—
1972	19.5	39.8	9.1	22.2	4.6	4.9	—	—
1973	22.9	45.5	5.6	18.3	4.1	3.7	—	—
1974	17.8	55.1	4.1	15.8	3.9	3.3	—	—
1975	19.7	53.3	3.1	15.2	5.2	3.5	—	—
1976	12.6	50.0	5.4	22.3	4.3	5.4	—	—
1977	16.1	51.9	4.8	20.2	2.6	4.5	—	—
1978	19.2	45.2	5.2	22.5	3.1	4.7	—	—
1979	16.8	31.1	4.0	15.3	1.7	3.0	28.1	—
1980	11.0	45.3	3.7	11.1	1.9	2.4	24.6	—
1981	13.1	43.7	4.0	9.9	2.5	2.0	24.7	—
1982	14.1	41.0	4.1	12.0	1.9	2.3	24.6	—

(Table continues on the following page.)

Table B.12. Share of the Regional Value of Agricultural Production, Latin America, 1960–2005 (*continued*)

Year	Argentina	Brazil	Chile	Colombia	Dominican Republic	Ecuador	Mexico	Nicaragua
1983	13.5	41.3	3.3	12.2	1.7	2.0	25.9	—
1984	14.3	43.3	2.7	10.8	2.2	2.1	24.6	—
1985	9.6	45.9	2.9	11.1	2.2	2.5	25.8	—
1986	11.7	42.7	3.6	12.3	2.3	2.6	24.8	—
1987	10.2	47.0	3.8	11.2	1.5	2.2	24.2	—
1988	12.4	39.7	4.0	13.0	1.5	2.6	26.7	—
1989	9.5	54.9	3.2	9.0	1.2	2.0	20.3	—
1990	11.5	44.7	4.2	10.2	1.6	2.5	25.3	—
1991	10.8	37.6	5.1	12.7	1.6	3.0	28.2	1.0
1992	12.5	36.5	5.9	12.1	1.5	3.0	27.4	1.0
1993	12.2	37.9	5.3	11.3	1.5	3.0	27.7	1.0
1994	11.3	44.7	4.6	11.7	1.6	3.1	22.1	1.0
1995	12.9	41.3	5.3	13.3	1.5	3.0	21.8	1.0
1996	14.2	40.0	5.2	10.7	1.4	3.5	23.9	1.1
1997	14.6	38.1	5.4	12.3	1.6	3.7	23.0	1.2
1998	15.6	39.7	5.4	11.5	1.5	2.6	22.5	1.2
1999	15.3	34.5	6.0	10.1	1.9	3.3	27.5	1.4
2000	15.2	36.7	6.1	9.4	1.6	2.6	27.1	1.4
2001	15.9	34.4	5.3	8.6	1.8	3.5	29.2	1.4
2002	16.6	35.5	5.5	7.8	1.7	3.7	27.9	1.4
2003	18.3	38.7	5.0	6.0	1.4	3.6	25.6	1.4
2004	17.0	41.1	5.4	7.1	1.3	—	26.9	1.2
2005	21.8	55.6	6.9	13.8	1.9	—	—	—

Sources: Calculated by the authors of chapters 2–9.

Note: — = no data are available.

Table B.13. Summary of NRA Statistics, Latin America

Country	Maximum number of years	Maximum number of products	Number of NRA observations	2000–04		
				Weighted average NRA ^a	Standard deviation NRA ^a	Gross value of production ^b
Argentina	46	6	213	–14.9	12.6	16.2
Brazil	40	10	331	4.1	7.6	36.6
Chile	46	7	307	5.8	13.3	5.3
Colombia	46	11	505	25.9	46.0	7.5
Dominican Republic	51	10	510	2.5	132.8	1.5
Ecuador	38	11	418	10.1	29.6	3.1
Mexico	26	15	390	11.6	41.1	26.6
Nicaragua	14	12	165	–4.2	27.7	1.3
Total ^c	51	27	2,839	4.8	23.9	98.1

Sources: Chapters 2–9.

a. For the covered products; %. The weight is the gross value of production at undistorted prices.

b. At undistorted prices in current US\$, billions.

c. The regional averages are weighted using the five-year average annual value of production, by country.

Table B.14. Summary of NRA Statistics, by Major Product, Latin America, 2000–04

Product	Countries, number	2000–04			Countries
		Unweighted average NRA, %	Weighted average NRA, %	Gross value of production, ^a US\$, billions	
Apples	1	–0.2	–0.2	0.15	CL
Bananas	2	–43.7	–24.3	0.69	DO, EC
Barley	1	–6.8	–6.8	0.18	MX
Beans	3	19.8	–3.3	0.88	DO, MX, NI
Beef	7	–0.7	–1.3	14.30	AR, BR, CL, CO, EC, MX, NI
Cassava	1	0.0	0.0	0.02	DO
Cocoa	1	–6.7	–6.7	0.08	EC
Coffee	6	–11.9	3.3	3.20	BR, CO, DO, EC, MX, NI
Cotton	2	8.4	10.7	0.86	BR, CO
Eggs	1	–15.7	–15.7	1.84	MX
Garlic	1	361.9	361.9	0.00	DO
Grapes	1	–0.4	–0.4	0.20	CL
Groundnuts	1	–34.5	–34.5	0.04	NI
Maize	7	7.4	–3.1	8.07	AR, BR, CL, CO, EC, MX, NI

Product	Countries, number	2000–04			Countries
		Unweighted average NRA, %	Weighted average NRA, %	Gross value of production, ^a US\$, billions	
Milk	6	35.1	45.3	4.26	AR, CL, CO, EC, MX, NI
Onions	1	74.0	74.0	0.01	DO
Palm oil	1	47.4	47.4	0.14	CO
Pig meat	3	14.3	4.5	2.93	BR, EC, MX
Poultry	5	18.2	18.8	5.78	BR, DO, EC, MX, NI
Rice	6	50.7	33.7	1.87	BR, CO, DO, EC, MX, NI
Sesame	1	−40.5	−40.5	0.01	NI
Sorghum	3	−0.4	−10.3	0.87	CO, MX, NI
Soybeans	6	−6.0	−9.9	13.00	AR, BR, CO, EC, MX, NI
Sugar	7	41.6	26.5	3.71	BR, CL, CO, DO, EC, MX, NI
Sunflowers	1	−31.9	−31.9	0.91	AR
Tomatoes	2	−27.5	−37.0	1.68	DO, MX
Wheat	5	15.3	2.0	2.91	AR, BR, CL, CO, MX
All covered products	8	4.1	2.7	68.6	

Sources: Chapters 2–9.

Note: AR = Argentina. BR = Brazil. CL = Chile. CO = Colombia. DO = Dominican Republic. EC = Ecuador. MX = Mexico. NI = Nicaragua.

a. At undistorted prices.

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The vast majority of the world's poorest households depend on farming for their livelihoods. During the 1960s and 1970s, most developing countries imposed pro-urban and anti-agricultural policies, while many high-income countries restricted agricultural imports and subsidized their farmers. Both sets of policies inhibited economic growth and poverty alleviation in developing countries. Although progress has been made over the past two decades to reduce those policy biases, many trade- and welfare-reducing price distortions remain between agriculture and other sectors and within the agricultural sector of both rich and poor countries.

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ISBN 978-0-8213-7513-6



SKU 17513