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Five Decades of Distortions to Agricultural Incentives

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Five Decades of Distortions to Agricultural Incentives

Kym Anderson

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

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

Every decade or two, food becomes newsworthy globally. Mostly it is about a price spike, either upwards (hurting consumers, as in 1973 and 2008) or downwards (hurting farmers in open economies, as in 1986). And most such price spikes are a consequence of major policy shifts, since local weather-induced supply shocks in a many-country trading world tend to offset each other. In 1986, for example, it was the food export subsidy war between Western Europe and North America that drove real international food prices to their lowest level since 1930. The price hikes of 1973 and 2008, by contrast, were partly a consequence of a unilateral policy decisions by a single large player. In 1973, the Soviet Union departed from its policy of self-reliance and entered the international grain market in a significant way to offset a domestic shortfall. In 2008 the United States and European Union decided to subsidize biofuel production and set mandates/targets for its use domestically. On both occasions, other governments imposed export restrictions to insulate somewhat their consumers from the price rise, which pushed international prices even higher and drove more exporting countries to follow suit. Policy thus contributes to market volatility. That is undesirable because volatility around the long-run trend terms of trade slows economic growth (Williamson 2008). Yet trade policy measures are very blunt instruments for dealing

with volatility (especially in the modern era of myriad financial instruments for risk management), and their beggar-thy-neighbor feature diminishes the international public good contribution of trade openness.

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

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

For advanced economies the most common reason for farm trade restrictions in the past two centuries has been to protect domestic producers from import competition as they come under competitive pressure to shed labor in the course of economic development. But in the process those protective measures hurt not only domestic consumers and exporters of other products but also foreign producers and traders of farm products, and they reduce national and global economic welfare. For decades agricultural protection and subsidies in high-income (and some middle-income) countries have been depressing international prices of farm products, which lowers the earnings of farmers and associated rural businesses in developing countries. The Haberler (1958) report to GATT Contracting Parties forewarned

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

that such distortions might worsen, and indeed they did between the 1950s and the early 1980s (Anderson, Hayami and Others 1986), thereby adding to global inequality and poverty because three-quarters of the world's poorest people depend directly or indirectly on agriculture for their main income (World Bank 2007).[2]

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

This disarray in world agriculture, as D. Gale Johnson (1991) described it in the title of his seminal book, means there has been over-production of farm products in high-income countries and under-production in more-needy developing countries. It also means there has been less international trade in farm products than would be the case under free trade, thereby thinning markets for these weather-dependent products and thus making them more volatile. Using a stochastic model of world food markets, Tyers and Anderson (1992, Table 6.14) found that instability of international food prices in the early 1980s was three times greater than it would have been under free trade in those products.

During the past quarter century, however, numerous countries have begun to reform their agricultural price and trade policies. That has raised the extent to which farm products are traded internationally (see Appendix Table 1.A), but not nearly as fast as globalization has proceeded in the non-farm sectors of the world's economies.[3] A key purpose of the present study is to examine empirically the extent to which those reforms have reversed the above-mentioned policy developments of the previous three decades. True, empirical

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

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

indicators of farm sector support (called Producer Support Estimates or PSEs) have been provided in a consistent way for 20 years by the Secretariat of the OECD (2008a) for its 30 member countries. However, there are no comprehensive time series rates of assistance to producers of nonagricultural goods to compare with the PSEs, nor do they tell us what happened in those advanced economies in earlier decades – which are of more immediate relevance if we are to see how the two groups of countries' policies developed during similar stages of development. As for developing countries, almost no comparable time series estimates have been generated since the Krueger, Schiff and Valdes (1988) study, which covered the 1960-1985 period for just 17 developing countries.[4] An exception is a new set of estimates of nominal rates of protection for key farm products in China, India, Indonesia and Vietnam since 1985 (Orden et al. 2007). The OECD (2006) also has released PSEs for Brazil, China and South Africa as well as several more East European countries. The present study complements and extends those two institutions' efforts and the seminal Krueger, Schiff and Valdés (1988) study. It builds on them by providing similar estimates for other significant (including many low-income) developing economies, by developing and estimating new, more comprehensive policy indicators, and by employing the calculated price wedges in a global economy wide model to estimate the effects of recent and prospective policy developments.

These estimates can be helpful, and are in numerous chapters below, in addressing 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 Japan? What are the political economy forces behind the more-successful reformers, and how do they compare with those in less-successful countries where major distortions in agricultural incentives remain? Over the past two decades, how important have domestic political forces been in bringing about reform relative to international forces (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

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

earlier decades? What explains the pattern of distortions across industries and the choice of support or tax instruments within the agricultural sector of each country? What policy lessons and market implications may be drawn from these differing experiences with a view to ensuring better growth-enhancing and poverty-reducing outcomes—including less overshooting that results in protectionist regimes—in still-distorted economies during their reforms in the future?

The study is timely for at least three reasons. One is because the World Trade Organization (WTO) is in the midst of the Doha round of multilateral trade negotiations, and agricultural policy reform is one of the most contentious issues in those talks. Indeed economy-wide modeling has suggested that as much as two-thirds of the global welfare gains from removing all merchandise trade restrictions and agricultural subsidies would come from reform of agricultural policies, even though agriculture accounts for less than 8 percent of world GDP and exports (Anderson, Martin and van der Mensbrugghe 2006). Second, poorer countries and their development partners are striving to achieve their United Nations–encouraged Millennium Development Goals by 2015, the prime ones being the alleviation of hunger and poverty. And third, the outputs of the study are timely also because world food prices have spiked in 2008 at very high levels and governments in some developing countries, in their panic to deal with the inevitable protests from consumers, have reacted in far from optimal ways. Such spikes have occurred in the past, most notably in 1973-74, and lessons as to what policy responses work better than others can be drawn from such past experiences.

The present study includes 75 countries that together account for 92 percent of the world's population and agricultural GDP and 95 percent of total GDP. The sample countries also account for more than 85 percent of farm production and employment in each of Africa, Asia, Latin America and the transition economies of Europe and Central Asia, and their spectrum of per capita incomes ranges from the poorest (Zimbabwe and Ethiopia) to among the richest (Norway).[5] Nominal rates of assistance and consumer tax equivalents (NRAs and CTEs) are estimated for more than 70 different products, with an average of almost a dozen per country. In aggregate the coverage represents around 70 percent of the gross value of agricultural production in the focus countries, and just under two-thirds of global farm production valued at undistorted prices over the period covered. Not all countries had data for

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

the entire 1955-2007 period, but the average number of years covered is 41 per country.[6] Of the world's 30 most valuable agricultural products, the NRAs cover 77 percent of global output, ranging from two-thirds for livestock, three-quarters for oilseeds and tropical crops, and five-sixths for grains and tubers. Those products represent an even higher share (85 percent) of global agricultural exports (see Appendix B for details).

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

This chapter begins with a brief summary of the long history of national distortions to agricultural markets. It then outlines the methodology used to generate annual indicators of the extent of government interventions in markets, details of which are provided in Anderson et al. (2008a,b) and Appendix A. A description of the economies under study and their economic growth and structural changes over recent decades is then briefly presented as a preface to the main section of the chapter, in which the NRA and CTE estimates are summarized across regions and over the decades since the 1950s. These estimates are discussed in far more detail in the regional chapters that follow. A summary is also provided of an additional set of indicators of agricultural price distortions presented in Chapter 11 that are based on the trade restrictiveness index first developed by Anderson and Neary (2005). In Chapter 12 the focus shifts from countries to commodities, and all the various distortion indicators are used to provide a sense of how distorted are each of the key farm commodity markets globally. Then chapter 13 uses the study's NRA and CTE estimates to provide a new set of results from a global economy-wide model that attempts to quantify the impacts on global markets, net farm incomes and welfare of the reforms since the early 1980s and of the policies still in place as of 2004. The chapter concludes by drawing on the lessons learned to speculate on the prospects for further reducing the disarray in world agricultural markets.

[6] By way of comparison, the seminal multi-country study of agricultural pricing policy by Krueger, Schiff and Valdes (1991) covered an average of 23 years to the mid-1980s for its 18 focus countries that accounted for 5-6 percent of the global agricultural output; and the producer and consumer support estimates of the OECD (2008a) cover 22 years for its 30 countries that account for just over one-quarter of the world's agricultural output valued at undistorted prices.

National Distortions to Farmer Incentives: The Long History, Briefly

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

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

Kindleberger (1975) describes how the nineteenth century free trade movements in Europe reflected the national economic, political and sociological conditions of the time. Agricultural trade reform was less difficult for countries such as Britain with overseas territories that could provide the metropole with a ready supply of farm products. The fall in the price of grain imports from America in the 1870s and 1880s provided a challenge for all, however. Denmark coped well by moving more into livestock production to take advantage of cheaper grain. Italians coped by sending many of their relatives to the New World.

Farmers in France and Germany successfully sought protection from imports, however, and so began the post-industrial-revolution growth of agricultural protectionism in densely populated countries. Meanwhile, tariffs on West European imports of manufactures were progressively reduced after the GATT came into force in the late 1940s, thereby adding to the encouragement of agricultural relative to manufacturing production. (Lindert 1991; Anderson 1995).

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

The other high-income countries were settled by Europeans relatively recently and are far less-densely populated. They therefore have had a strong comparative advantage in farm products for most of their history following Caucasian settlement, and so have felt less need to protect their farmers than Europe or Northeast Asia. Indeed Australia and New Zealand until the present decade have tended – like developing countries – to have adopted policies that discriminated against their farmers (Anderson, Lloyd and MacLaren 2007).

In South Korea and Taiwan in the 1950s, as in many newly independent developing countries, an import-substituting industrialization strategy was initially adopted, which harmed agriculture. But in those two economies – unlike in most other developing countries – that policy was replaced in the early 1960s with a more-neutral trade policy that resulted in their very rapid export-oriented industrialization. That development strategy in those densely populated economies imposed competitive pressure on the farm sector which, just as in Japan in earlier decades, prompted farmers to lobby (successfully, as it happened) for ever-higher levels of protection from import protection (Anderson, Hayami and Others 1986, Ch. 2).

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

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

While that policy history of developing countries is now well known, and has been documented extensively in previous surveys, less well-known is the extent to which many emerging economies have belatedly followed the example of South Korea and Taiwan in abandoning import-substitution and opening their economies. Some (e.g., Chile) started in the

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

Methodology for Measuring Price Distortions[7]

The main focus of the present study's methodology is on government-imposed distortions that create a gap between domestic prices and what they would be under free markets. Since it is not possible to understand the characteristics of agricultural development with a sectoral view alone, the project 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 non-agricultural sectors for comparative evaluation.

Specifically, we compute the Nominal Rate of Assistance (NRA) for each farm product as the percentage by which government policies have raised gross returns to farmers above what they would be without the government's intervention (or lowered them, if NRA<0). We include any product-specific input subsidies in that NRA. A weighted average NRA for all covered products is derived using the value of production at undistorted prices as weights (unlike the producer and consumer support estimates (PSEs and CSEs) computed by OECD (2008a) which are expressed as a percentage of the distorted price). To that NRA for covered products is added a 'guesstimate' of the NRA for non-covered products (on average around 30 pecent of the total) and an estimate of the NRA from non-product-specific forms of assistance or taxation. Since the 1980s some high-income governments have also provided so-called 'decoupled' assistance to farmers but, because that support in principle does not distort resource allocation, its NRA has been computed separately and is not included for direct comparison with the NRAs for other sectors or for developing countries.[8] Each farm

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

[8] The extent to which a payment is production-neutral (the degree of decoupling) differs depending on the way it is administered and the expectations of the recipient (Thompson, Dewbre and Martini 2007). No attempt here is made to evaluate the extent of the distortion that might still be present as policies are decoupled from output

industry is classified either as import-competing, or a producer of exportables, or as producing a nontradable (with its status sometimes changing over the years), so as to generate for each year the weighted average NRAs for the two different groups of covered tradable farm products. We also generate a production-weighted average NRA for nonagricultural tradables, for comparison with that for agricultural tradables via the calculation of a percentage Relative Rate of Assistance (RRA), defined as:

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

where $NRAag^t$ and $NRAnonag^t$ are the percentage NRAs for the tradables parts of the agricultural (including non-covered) and non-agricultural sectors, respectively.[9] Since the NRA cannot be less than -100 percent if producers are to earn anything, neither can the RRA (since the weighted average $NRAnonag^t$ is non-negative in all our country case studies). And if both of those sectors are equally assisted, the RRA is zero. This measure is useful in that if it is below (above) zero, it provides an internationally comparable indication of the extent to which a country's sectoral policy regime has an anti- (pro-)agricultural bias.

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

In addition to the mean NRA, a measure of the dispersion or variability of the NRA estimates across the covered farm products also is generated for each economy. The cost of government policy distortions to incentives in terms of resource misallocation tend to be greater the greater the degree of substitution in production. In the case of agriculture which involves the use of farm land that is sector-specific but transferable among farm activities, the

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price and quantity produced. Rather, we include as 'decoupled' the value the OECD estimates under certain categories of support. For the years 1979-85 there was just one category, called 'direct payments'; from 1986, those payments are specified to comprise the OECD's items C (payments based on area planted/animal numbers), D (payments based on historical entitlements), F (payments based on input constraints) and G (payments based on overall farming income); and for 2005-07, those items replaced by similar but newly defined items C to E. This categorization for economic purposes (and that for 'non-product-specific' assistance) should not be confused with the legal allocation of domestic support measures into the WTO colored "boxes" in the context of international commitments.

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

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

greater the variation of NRAs across industries within the sector then the higher will be the welfare cost of those market interventions. A simple indicator of dispersion is the standard deviation of the covered industries' NRAs.

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

To obtain dollar values of farmer assistance and consumer taxation, we have taken the country authors' NRA estimates and multiplied them by the gross value of production at undistorted prices to obtain an estimate in US dollars of the direct gross subsidy equivalent of assistance to farmers (GSE). These GSE values are calculated in constant dollars, and are also expressed on per-farm-worker basis. Likewise a value of the consumer transfer is derived from the CTE, by assuming consumption value is the gross value of production at undistorted prices divided by the self-sufficiency ratio for each product (production divided by consumption, derived from national volume data or the FAO's commodity balance sheets). These transfer values can be added up across products for a country, and across countries for any or all products, to get regional aggregate transfer estimates for the studied economies.

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

We turn now to summarizing the estimates that have emerged from aggregating the NRA and related estimates provided by the project's country case studies,[11] prefacing that with a brief review of the relative size, economic growth and structural changes that have taken place in the key regions of the world over recent decades. After the national country

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

studies were completed and the global database of NRA and CTE estimates was assembled (see Anderson and Valenzuela 2008), it was possible to estimate partial equilibrium country and global commodity indexes of the trade and welfare restrictiveness of agricultural policies. Since those estimates are not part of the country studies reported in Part II of the book, the methodology for them is not laid out until chapter 11, following which is a summary of those index estimates.

Empirical Estimates of National Distortions to Farmer Incentives

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

North America and Europe (including the newly acceded eastern members of the EU) each account for almost one-third of the global economy, and the remaining one-third is shared almost equally by developing countries and the other high-income countries. When the focus turns to just agriculture, however, developing countries are responsible for slightly over half the value added globally, with Asia accounting for two-thirds of that lion's share. The developing countries' majority becomes stronger still in terms of global population and even more so in terms of farmers, almost three-quarters of whom are in Asian developing countries. Hence the vast range of per capita incomes and agricultural land per capita, and thus agricultural comparative advantages, across the country groups in table 1.1, and the strong concentration of poor people in Asia. The number of poor in Asia has diminished dramatically over the past quarter century though, and even more as a percentage of Asia's population (unlike in Africa), but 60 percent of the world's population living on less than $1 a day still lived in Asia in 2005 (down from 87 percent in 1981 and 76 percent in 1993 – see table 1.2). The decline in Asian poverty was associated with its much faster economic growth

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

and export-led industrialization than the rest of the world's: since 1980, Asia's per capita GDP has grown at four times, and exports nearly two times, the global averages (table 1.3). The share of Asia's GDP that is exported is now one-third above that for the rest of the world and for Latin America (as summarized from the World Bank (2007) by Sandri, Valenzuela and Anderson (2007)).

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

Nominal rates of assistance and gross subsidy equivalent to agriculture

Perhaps the simplest measure for capturing the aggregate extent of distortions to agricultural prices globally is to examine the trend in the gross subsidy equivalent of assistance (GSE, positive or negative) to farmers. Figure 1.1(a) shows the GSE for 5-yearly periods since 1960 for the world as a whole, for developing countries, and for high-income plus Europe's transition economies. The dark line suggests that, apart from the dip during the period of high world food prices in 1973-74, the GSE has been steadily rising over the past half century, especially when the decoupled assistance to farmers in high-income countries is included.[13]

The decomposition of those global transfers by country group in figure 1.1(a) reveals two distinct pairs of trends, each kinked part-way through the period. On the one hand, aggregate support for farmers in high-income countries rose steadily throughout the period from the 1950s to the early 1990s before declining slightly over the most recent 15 years and somewhat more at the end of the period when world food prices shot up. On the other hand, the price and trade policies of developing countries increasingly taxed their farmers in

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

aggregate from the early 1960s to the late 1970s/early 1980s before gradually reducing that taxation and, by the mid-1990s switching to positive assistance to them in aggregate. Thus the contributions of the two groups to the global trend are additive in the 1980s but then offsetting from the early 1990s to 2004. In the 2005-07 period when food prices in international markets rose steeply (and spiked even more in 2008), transfers to farmers in high-income countries fell back considerably (similar to what happened in 1973-74). We do not have enough estimates to show the change for developing countries, but their governments too have responded by reducing/suspending import tariffs and temporarily restricting export of food in 2007-08, so they may have contributed to, rather than offset, the high-income country downward trend in those most recent years.

In figure 1.1(b) those contributions are further subdivided into four high-income regions and four other regions, from which is clear that Japan and Western Europe are the biggest contributors among the high-income countries and that Asia is the biggest contributor by far to the developing country trends – and in both sub-periods. As we will see, the latter result is very largely driven by China and India, although protection growth in Korea added to the assistance increase.

The GSE, while it takes care of inflation by being expressed in constant dollar terms, does not take into account the fact that the agricultural sector is growing and at different rates across countries. That downside is avoided by using the nominal rate of assistance, which is the extent of policy induced price support expressed as a percentage of the value of agricultural output at undistorted prices. Figure 1.2 and Table 1.4, which show the same 8 country groups as Figure 1.1(b), reveal much more similarity among the regions' NRAs than the GSEs for the very different-sized developing country groups. They also reveal that Japan is now proportionately far more protective of its farmers than Western Europe. The bottom row of table 1.4 provides a similar trend to the GSE trend line: the global average NRA was close to zero up to the early 1980s, but it then jumped up as developing countries began to phase out export taxation and it has since averaged in the 15-18 percent range.

Both of these figures are based not only on estimates of assistance to covered products but also non-product-specific assistance and guesstimates of assistance to the roughly 30 percent of the value of farm products that have not been included in the study's explicit price comparison exercise. Figure 1.3 summarizes just the most-robust NRA estimates, for covered farm products. Those products have been categorized each year as either exportable, import-competing or nontradable. The weighted average trends across those covered products are

very similar to the GSE trends both for high-income countries and, in slightly more muted fashion, for developing countries.

What is more striking about figure 1.3 is the marked difference in the levels of support to import-competing versus exportable covered products. Exportables in high-income countries have received relatively little support other than during the export subsidy 'war' of the mid-1980s, while in developing countries they were increasingly taxed from the late 1950s until the 1980s and then that taxation was gradually phased out over the past two decades (although a little remained in 2004, for example in Argentina, and considerably more was added by various developing countries in 2008 in response to concerns about the spike in international food prices). Importables, by contrast, have been assisted throughout the past five decades, and the long-run fitted trend line has almost the same slope for both sets of countries (but a lower intercept for developing countries). Two lessons can be drawn from this: first, there is a strong anti-trade bias for agricultural goods in high-income and developing countries that has not diminished much over the past half century (and it got a lot worse in the 1980s); and second, growth in agricultural import protection appears to have accompanied global economic growth through to the 1990s at least, and has only slowed slightly since then. These lessons hold even when we disaggregate to our 8 regions, as shown in table 1.5, which also reports estimates of a trade bias index for each region. That index confirms the broad global conclusion, although it does indicate a sizable decline in the anti-trade bias in developing countries since the 1980s, especially in Asia.

That anti-trade bias means that the rates of assistance are not uniform across commodities, which indicates that the resources that are being used within the farm sector are not being put to their best use. The extent of that extra inefficiency, over and above that due to too many or too few resources in aggregate in the sector, is crudely indicated by the standard deviation of NRAs among covered products in each focus country. This dispersion index, summarized for our 8 regions in table 1.6, has fluctuated across time and varied between regions, but the global average has remained around 70 percent throughout the period, with no discernable trend.

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

When the country authors' best guesstimates of the NRAs for the various non-covered farm products are aggregated across countries, their weighted average tends to be less than half that for covered products. This is not surprising since many of them are nontraded staples or fruits and vegetables that receive little or no government attention – and that is partly why they were not covered by authors in the first place. Their inclusion in the weighted average across all products therefore dampens the positive or negative NRA average for a region's covered products. Non-product-specific (NPS) and 'decoupled' assistance to farmers added only a little to the NRA for most developing countries, but NPS added 2 or 3 percentage points until the early 1980s and has contributed about 5 points since then for high-income countries. If 'decoupled' payments were included, the NRA for high-income farmers would rise another 5 percentage points for the 1980s and early 1990s and as many as 10 points by during the present decade (table 1.7).

Assistance to non-farm sectors and relative rates of assistance

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

[14] As a reality check, compare this project's regional NRAs for non-agricultural tradables for the 1960s with the spot-year national NRAs from manufacturing import protection (in brackets) for the eight countries reported in Little, Scitovsky and Scott (1970) and Balassa and Associates (1971): South Asia 120 percent (Pakistan 96

Despite these methodological limitations, the estimated NRAs for non-farm tradables are very sizeable prior to the 1990s. For developing countries as a whole, the average NRA value has steadily declined throughout the past four or five decades, from around 45 percent in the 1960s to around 30 percent in the 1970s, 16 pecent in the 1980s and less than 10 percent since the mid-1990s as policy reforms have spread (second last row of table 1.7). This has therefore contributed to a decline in the estimated negative relative rate of assistance for farmers: the weighted average RRA was worse than -50 percent up to the mid-1970s but improved to an average of -38 percent in the 1980s, -12 percent in the 1990s and just above zero (1 percent) in 2000-04. The trend in RRAs and their two component NRAs for developing countries is starkly illustrated in figure 1.5, where it is clear that the falling positive NRAs for non-farm producers has contributed even more to the rise of the RRA than has the gradual disappearance of the negative NRAs for farmers. When decomposed by region, it is clear that Asia has been the major contributor to this dramatic reform (figure 1.6 and table 1.8). And within Asia, it is China and India that contributed most to that outcome (Anderson and Martin 2009b).

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

Despite the very considerable policy reforms of the past quarter century, there is still a long way to go before differences in rates of assistance across countries are removed. The spread of NRAs and RRAs for all our focus countries is shown in figure 1.8 for 2000-04. As economic growth proceeds there are fewer countries below the zero lines in those ladders, reflecting the apparently on-going tendency for political economy forces to transform

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percent), East Asia 40 percent (Malaysia 8 percent, Philippines 29-46 percent, Taiwan 30 percent), and Latin America 30 percent (Argentina 141 percent, Brazil 89-99 percent, Chlie 89 percent, Mexico 20-22 percent).

countries from taxing to subsidizing their farmers relative to producers of non-farm goods as per capita incomes grow. For the whole panel dataset, that tendency over the 50-year period examined appears to be almost exactly the same for developing as for high-income countries, the only difference being the average RRA starting point (see the country fixed effects regression lines in figure 1.9).[15]

A final way of summarizing two of the reform indicators used above – the RRA and the trade bias index, by which we are able to assess changes in the anti- or pro- agricultural production and trade biases in policy regimes – is to map them in two-dimensional space. Figure 1.10 shows agriculture's trade bias index on the horizontal axis and the RRA on the vertical axis. An economy with no anti- or pro-agricultural bias (RRA = 0) and no anti- or pro-trade bias within the farm sector (TBI = 0) would be located at the intersection of the two axes in figure 1.10. Africa, Asia and Latin America (shown there as LAC) were all well to the southwest of that neutral point as of 1980-84, but by 2000-04 all had moved to become much closer to the vertical axis (meaning they had reduced their anti-trade bias in agriculture), and all but Africa had become closer to the horizontal axis – although Asia is now above rather than below that axis, which means those developing countries are assisting farmers relative to producers of other tradable products. While that can lead to just as much waste of resources as the earlier, anti-agricultural, policy bias, it is only in Korea and Taiwan that the 2000-04 RRA is well above zero (being just 1 percent for China and 4 percent for Southeast Asia).

Producer assistance and consumer taxation in value terms

To conclude this survey, we return to the dollar values mentioned at the outset. Table 1.9 shows their full time series, in aggregate but also per person engaged in agriculture. Two points are worth stressing from the latter estimates. One is that for high-income countries, when decoupled payments are included, the assistance per farmer has continued to rise over time even when expressed in constant (2000) US dollars. By 2000-04 the annual transfer was double what it was in 1975-79, and that in turn is more than double the transfer in 1965-69. At $13,400 per farmer that is a very large transfer to a group whose household incomes are not grossly below those of non-farm workers when adjusted for differences between urban

[15] The R^2 values improve (to 0.16 and 0.26, respectively) and the slope of each line steepens (coefficients become 0.36 and 0.32, respectively) if the years from 1990 for HICs and before 1985 for DCs are ignored.

and rural costs of living.[16] The second point to note from table 1.9(b) is that for half this period, farmers in developing countries were effectively taxed between 30 and 50 US cents a day by price-distorting policies, at a time when many hundreds of millions of them were struggling to survive on less than $1 a day per household member. Thankfully most of the export taxation that drove those transfers was dismantled, although some has been resurrected in response to the high international food prices of 2008. The move from negative to positive transfers to developing country farmers since the mid-1990s is not necessarily a good thing, however, even if society believes farmers should be compensated for the cost of adjusting to the structural changes that accompany rapid economic growth – there are almost always more efficient ways to raise welfare of poor people than via price and trade policies.

Since it is mostly border (trade) policies rather than domestic measures that are responsible for the nominal assistance provided to farmers, those border measures also confer a tax on consumers of farm products. The extent of those consumer tax equivalents, shown in table 1.10 for all covered farm products, differ from NRAs also because consumption weights are not the same as production weights for tradable products. But in percentage terms their orders of magnitude are similar to the NRAs. Again two points are noteworthy. One is that developing countries' price-distorting policies prior to the 1990s had been providing up to 30 cents per capita per year to consumers, directly at the expense of farmers who on average are far poorer than urban dwellers. The other is that the cost to consumers in high-income countries of farm support policies is miniscule relative to their incomes, amounting even at its peak in the most protected countries other than Japan to well under $1 a day. It is thus not surprising that domestic opposition to these policies is weak.

Additional Indicators of Agricultural Price Distortions

The indicators used above to summarize trends in the extent of distortions within the agricultural sector of a country include the unweighted or weighted mean NRA of covered products, the standard deviation of covered product NRAs, the weighted mean NRA for exportable versus import-competing covered products, and the trade bias index of the agricultural sectors' covered plus non-covered tradable products. The reason for reporting

[16] The drop to $6,000 per farmer in 2005-07 may well prove to be only temporary if international food prices return to trend levels soon.

these various indicators of dispersion of NRAs in addition to the means – apart from them being informative in their own right – is that theory suggests the national economic welfare cost of government policy distortions to incentives in terms of resource misallocation tends to be greater the greater the degree of substitution in production in response to price changes. In the case of agriculture which involves the use of farm land that is sector-specific but substitutable among farm activities, the greater the variation of NRAs across industries within the sector then the higher will be the welfare cost of those market interventions.

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

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

estimates, while having the advantage of providing an annual time series. The time series derived for this project, available as Anderson and Croser (2009), is made use of in Chapters 11 and 12.

The WRI five-year results in Figure 1.11 indicate a fairly constant tendency for covered products' policies to reduce welfare from the 1960s to the mid-1980s, but thereafter some decline in the 1990s. This pattern is generated by different policy regimes in the different country groups though: in high-income countries, covered products were assisted throughout the period, although less so after the 1980s, whereas covered products in developing countries were disprotected until the most recent years. That is, the WRI has the desirable property of correctly identifying the welfare consequences that result from both positive and negative assistance regimes, because it captures the dispersion of NRAs among covered products: the larger the variance in assistance levels, the greater the potential for resources to be used in activities which do not maximize economic welfare. One consequence is that the WRI values are much higher than the NRAs for high-income countries. Another consequence is that the WRI for Africa spikes in the mid-1980s in contrast to the NRA which moves close to zero. The reason is that while Africa was still taxing exportables it had moved (temporarily) from low to very high positive levels of protection for import-competing farm products (table 1.4). At the aggregate level African farmers received almost no government assistance then (NRA close to zero), but the welfare cost of its mixture of agricultural policies as a whole was at its highest according to the WRI. A third consequence is that for developing countries its average WRI in the years 1995 to 2004 is around 20 percent even though its average NRA for covered products in those years is close to zero (see figure 1.3), again reflecting the high dispersion across product NRAs – particularly between exportables and import-competing goods – in each country.[17]

For developing countries as a group, the trade restrictiveness of agricultural policy was roughly constant until the early 1990s and thereafter it declined, especially for Asia and Latin America, according to the TRI estimates. For high-income countries the TRI time path was similar but the decline began a few years later. The aggregate results for developing countries are being driven by the exportables sub-sector which is being taxed

[17] National WRIs are aggregated across countries using as weights an average of the value of consumption and production at undistorted prices; and TRIs use the absolute difference between the values of production and consumption at undistorted prices as weights. This is unlike NRAs and RRAs (or CTEs), which use as weights just the value at undistorted prices of production (or consumption). Like NRAs, RRAs and CTEs, national and regional WRIs and TRIs for the 5-year periods are unweighted averages of the annual indexes.

and the import-competing sub-sector which is being protected (albeit by less than in high-income countries). For high-income countries, policies have supported both exporting and import-competing agricultural products and, even though they favor the latter much more heavily, the assistance to exporters has offset somewhat the anti-trade bias from the protection of import-competing producers in terms of their impacts on those countries' aggregate volume of trade in farm products. Thus up to the early 1990s the TRI for high-income countries was below that for developing countries; and, to use again the example of Africa, in 1985-89 when the NRA was closest to zero the TRI peaked, correctly identifying the trade-reducing effect of positive protection to the import-competing farmers and disprotection to producers of exportables (Figure 11.6 and Table 11.4 of Lloyd, Croser and Anderson 2009a).

Chapter 12 differs from the preceding chapters in that it focuses on commodities rather than countries, to show by to what extent global markets for some farm commodities are distorted relative to others. It also shows that the basic food staples of the poor in low-income countries are reasonably well covered in our database for African countries where they matter most, and that their non-coverage in other regions does not bias the aggregate NRA estimates for covered products. That chapter also reports new partial equilibrium estimates of global commodity TRIs and WRIs, to parallel the country-based ones reported in chapter 11. A summary of both of them for 28 key farm commodities is provided in figure 1.12 (from Lloyd, Croser and Anderson 2009b). It shows that the most distorted of all those commodities in 2000-04, in terms of both their global welfare cost and their trade restrictiveness, are rice, sugar, milk and beef – although cocoa trade is just as restricted as beef, because export restrictions are still prevalent in major supplying countries such as Cote d'Ivoire.

Economy-Wide Effects of Past Reforms and Remaining Policies

It is clear from the above that there has been a great deal of change over the past quarter of a century in policy distortions to agricultural incentives throughout the world: the anti-agricultural and anti-trade biases of policies of many developing countries have been reduced, export subsidies of high-income countries have been cut, and some re-instrumentation toward less inefficient and less trade-distorting forms of support, particularly

in Western Europe, has begun. However, protection from agricultural import competition has continued to be on an upward trend in both rich and poor countries, notwithstanding the Uruguay Round Agreement on Agriculture that aimed to bind and reduce farm tariffs.

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

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

Second, developing economies benefited proportionately more than high-income economies (1.0 percent compared with 0.7 percent of national income) from those past policy reforms, and would gain nearly twice as much as high-income countries by completing that reform process (an average increase of 0.9 percent compared with 0.5 percent for high-income countries. Of those prospective welfare gains from global liberalization, 60 percent would come from agriculture and food policy reform. This is a striking result given that the shares of agriculture and food in global GDP and global merchandise trade are only 3 and 6 percent, respectively. The contribution of farm and food policy reform to the prospective welfare gain for just developing countries is even greater, at 83 percent.

Third, the share of global farm production exported (excluding intra-EU trade) in 2004 was slightly smaller as a result of those reforms since 1980-84, because of less farm export subsidies. Agriculture's 8 percent share in 2004 contrasts with the 31 percent share for other primary products and the 25 percent for all other goods – a 'thinness' that is an important contributor to the volatility of international prices for weather-dependent farm products. If the policies distorting goods trade in 2004 were removed, the share of global production of farm products that is exported would rise from 8 to 13 percent, thereby reducing instability of prices and quantities of those products traded.

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

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

Sixth, for developing countries as a group, net farm income (value added in agriculture) is estimated to be 4.9 percent higher than it would have been without the reforms of the past quarter century, which is more than ten times the proportional gain for non-agriculture. If policies remaining in 2004 were removed, net farm incomes in developing countries would rise a further 5.6 percent, compared with just 1.9 percent for non-agricultural value added. As well, returns to unskilled workers in developing countries – the majority of whom work on farms – would rise more than returns to other productive factors from that liberalization. Together, these findings suggest both inequality and poverty could be

alleviated by such reform, given that three-quarters of the world's poor are in farm households in developing countries (Chen and Ravallion 2007).

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

Prospects for Further Reform

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

The indications are very mixed as to why some countries appear to have reformed their price-distorting agricultural and trade policies more than others in recent decades, and why some have stubbornly resisted reform. Some reforming countries have acted unilaterally, apparently having become convinced that it is in their own national interest to do so. China is but the most dramatic and significant example of the past three decades among developing countries, while among the high-income countries only Australia and New Zealand categories

are in that category. Others may have done so partly to secure bigger and better loans from international financial institutions and then, having taken that first step, they have continued the process, even if somewhat intermittently. India is one example, but there are numerous examples also in Africa and Latin America. Few have gone backwards in terms of increasing their anti-agricultural bias, but Zimbabwe and perhaps Argentina qualify during the present decade – and numerous others have joined them in 2008, at least temporarily, in response to the sudden upward spike in international food price. And some have reduced their agricultural subsidies and import barriers at least partly in response to the GATT's multilateral Uruguay Round Agreement on Agriculture, the European Union being the most important example (helped by its desire also for preferential trade agreements, including its recent expansion eastwards).

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

Indeed, there are numerous signs that developing country governments want to keep open their options to raise agricultural NRAs in the future, particularly via import restrictions. One indicator is the high tariff bindings developing countries committed themselves to following the Uruguay Round: as of 2001, actual applied tariffs on agricultural products averaged less than half the corresponding bound tariffs for developing countries of 48 percent, and less than one-sixth in the case of least-developed countries (Anderson and Martin 2006, Table 1.2).

Another indicator of agricultural trade reform reluctance is the unwillingness of many developing countries to agree to major cuts in bound agricultural tariffs in the WTO's on-going Doha round of multilateral trade negotiations. Indeed, many of them believe high-income countries should commit to reducing their remaining farm tariffs and subsidies before developing countries should offer further reform commitments of their own. Yet modeling results reported in Valenzuela, van der Mensbrugghe and Anderson (2009) suggest that if

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

high-income countries alone were to liberalize their agricultural markets, such a sub-global reform would provide less than two-thirds of the potential gains to developing countries that could come from global agricultural policy reform.

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

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

Developing countries that continue to free up domestic markets and practice good macroeconomic governance will keep growing, and typically the growth will be more rapid in manufacturing and service activities than in agriculture, especially in the more densely populated countries where agricultural comparative advantage is likely to decline. Whether such economies become more dependent on imports of farm products depends, however, on what happens to their RRA. The first wave of Asian industrializers (Japan, and then Korea and Taiwan) chose to slow the growth of food import dependence by raising their NRA for

[19] On the size of those potential net benefits compared with those from other opportunities that could address the world's most important challenges as conceived by the Copenhagen Consensus project (whose expert panel ranked trade reform as having the second highest payoff among those dozens of opportunities), see www.copenhagenconsensus.org including the trade paper by Anderson and Winters (2008).

agriculture even as they were bringing down their NRA for non-farm tradables, such that their RRA became increasingly above the neutral zero level. A key question is: will later industrializers follow suit, given the past close association of RRAs with rising per capita income and falling agricultural comparative advantage? Figure 1.9 suggests developing countries' RRA trends of the past three decades have been on the same trajectory as the high-income countries prior to the 1990s, so unless new forces affect their polities the governments of later industrializing economies may well follow suit.

One new force is disciplines on farm subsidies and protection policies of WTO member countries following the Uruguay Round. Earlier industrializers were not bound under GATT to keep down their agricultural protection. Had there been strict discipline on farm trade measures at the time Japan and Korea joined GATT in 1955 and 1967, respectively, their NRAs may have been halted at less than 20 percent (figure 1.13). At the time of China's accession to WTO in December 2001, its NRA was less than 5 percent according to this present study, or 7.3 percent for just import-competing agriculture. Its average bound import tariff commitment was about twice that (16 percent in 2005), but what matters most is China's out-of-quota bindings on the items whose imports are restricted by tariff rate quotas. The latter tariff bindings as of 2005 were 65 percent for grains, 50 percent for sugar and 40 percent for cotton (Anderson, Martin and Valenzuela 2008). Clearly the legal commitments even China made on acceding to WTO are a long way from current levels of support for its farmers, and so are unlikely to constrain the government very much in the next decade or so. And the legal constraints on developing countries that joined the WTO earlier are even less constraining. For India, Pakistan and Bangladesh, for example, their estimated NRAs for agricultural importables in 2000-04 are 34, 4 and 6 percent, respectively, whereas the average bound tariffs on their agricultural imports are 114, 96 and 189 percent, respectively (WTO, ITC and UNCTAD 2007). Also, like other developing countries, they have high bindings on product-specific domestic supports of 10 percent and another 10 percent for non-product specific assistance, a total of 20 more percentage points of NRA (17 percent in China's case) that legally could come from domestic support measures – compared with currently 10 percent in India and less than 3 percent in the rest of South Asia.

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

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

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

Areas for Further Research

The fact that the indications are mixed as to why some countries appear to have reformed more than others and some continue to resist reform, and that it is therefore unclear as to how

policies might develop in the future, should not be surprising. After all, the long history of globalization is full of episodes of sensible policy reforms that for all sorts of reasons get reversed (Findlay and O'Rourke 2007, North, Wallis and Weingast 2006). To better understand what might happen in the context of continuing economic growth and terms of trade volatility, more in-depth analysis of the political economy of past policy behavior is warranted. That is now possible thanks to the new panel set of distortion estimates reported here, and some early findings from such analyses will appear in Anderson (2010). That collection includes a broad range of theoretical and econometric analyses aimed at better understanding the political economy forces that generated the evolving pattern of inter- and intra-sectoral distortions to farmer and food consumer incentives over recent decades.

To contribute further to policy debate, a second area requiring further research economy-wide modeling of the impacts on agricultural markets, national economic welfare and income distribution of alternative policies. That is now easier to do well following the recent development of micro-simulation add-ons to such CGE models. How the reform of current policies – both own-country and rest-of world's – impact on the extent of poverty and inequality are explored in a series of new country case studies in Anderson, Cockburn and Martin (2010), using global and national economy-wide models that are enhanced with detailed earning and spending information of numerous types of urban and rural households. The rest-of-world's policy impact on each country's terms of trade is informed by the project's agricultural distortions database and generated using the same model as in this book's final chapter (Valenzuela, van der Mensbrugghe and Anderson 2009). Hopefully other analysts will make use of the project's agricultural distortions database to explore other policy scenarios, including a continuation of past agricultural protection growth for import-competing farmers as an alternative counterfactual to further freeing of trade.

And a third area for further research is in growth diagnostics. How much of the long-term divergence in per capita incomes between current high-income countries on the one hand and developing and transition economies on the other can be explained by the long-term growth of agricultural NRAs and RRAs in the former? How much can be explained by the domestic market-insulating fluctuations in NRAs around those long-term assistance trends, which have contribute to the volatility of the terms of trade for agricultural-exporting countries? The recent work of Williamson (2008) offers one suggestion as to how such research might proceed. Finally, how much of the growth since the early 1980s in individual countries can be attributed to the reduction in distortions to agricultural incentives? Ravallion and Chen (2007) show that the decline in the anti-agricultural bias in farm price policies has

contributed significantly to China's poverty reduction. Rural growth has been shown to be a key contributor to the reduction in poverty in India too (Ravallion and Datt 1996). These types of studies can now be revisited using the more comprehensive set of measures of the extent of changes in distortions to agricultural incentives summarized above.

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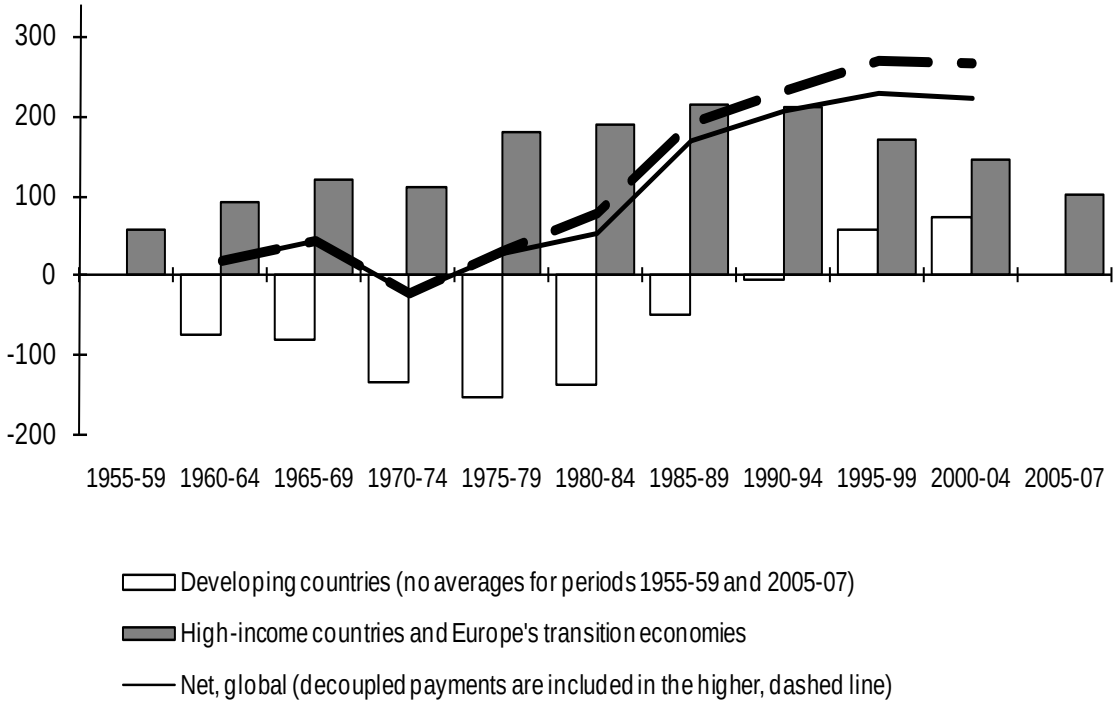
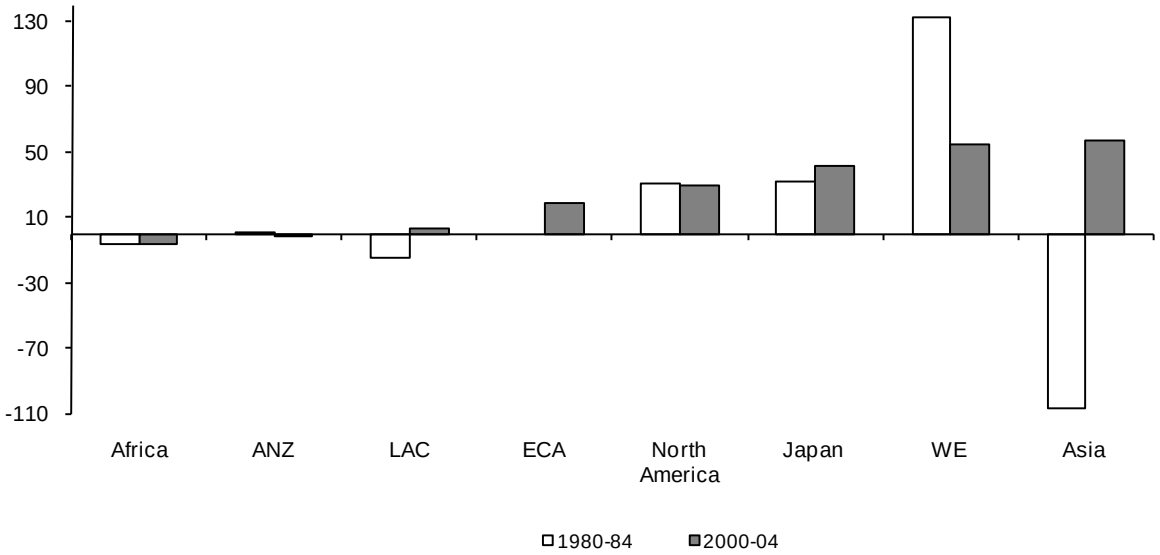
Figure 1.1: Gross subsidy equivalents of assistance to farmers, over time and by region,[a] 1955 to 2007

(constant 2000 US$ billions)

(a) over time



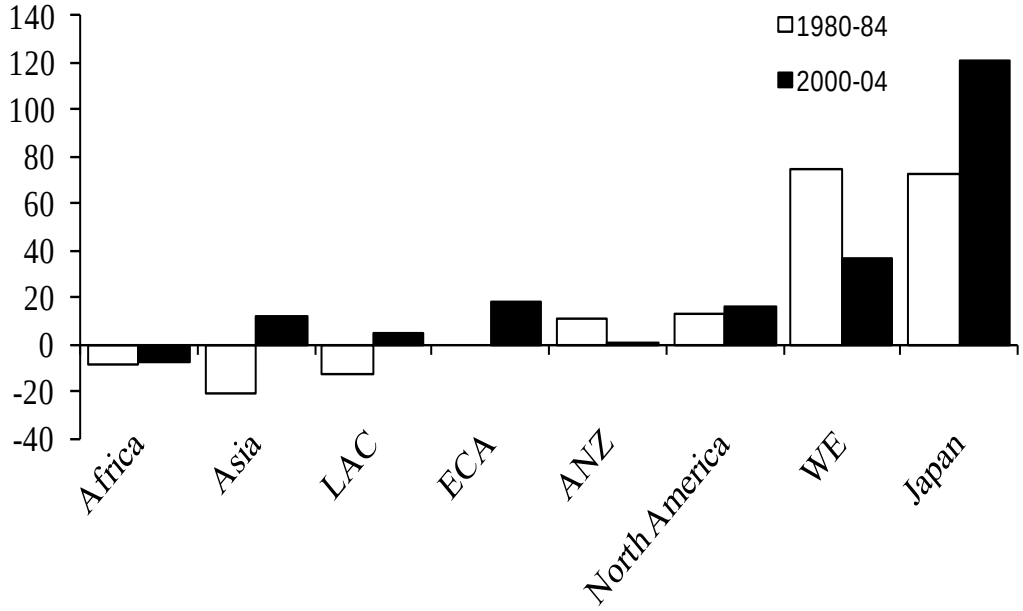
(b) by region



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

Figure 1.2: Nominal rates of assistance to agriculture,[a] by regions, 1980-84 and 2000-04[a]

(percent)



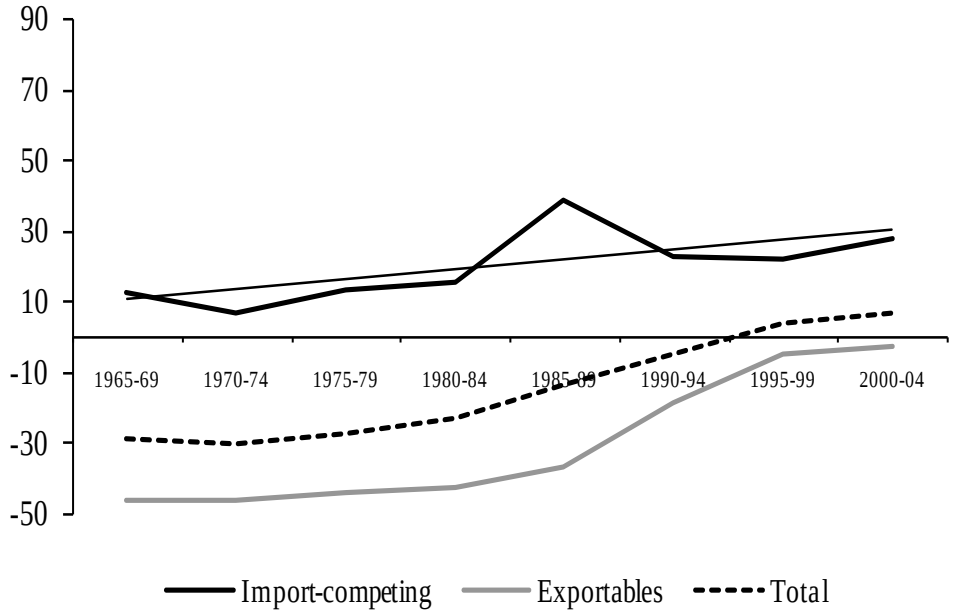
Source: Anderson and Valenzuela (2008), based on estimates reported in the project's national country studies.

a. Includes non-covered products and non-product-specific (but not decoupled) assistance.

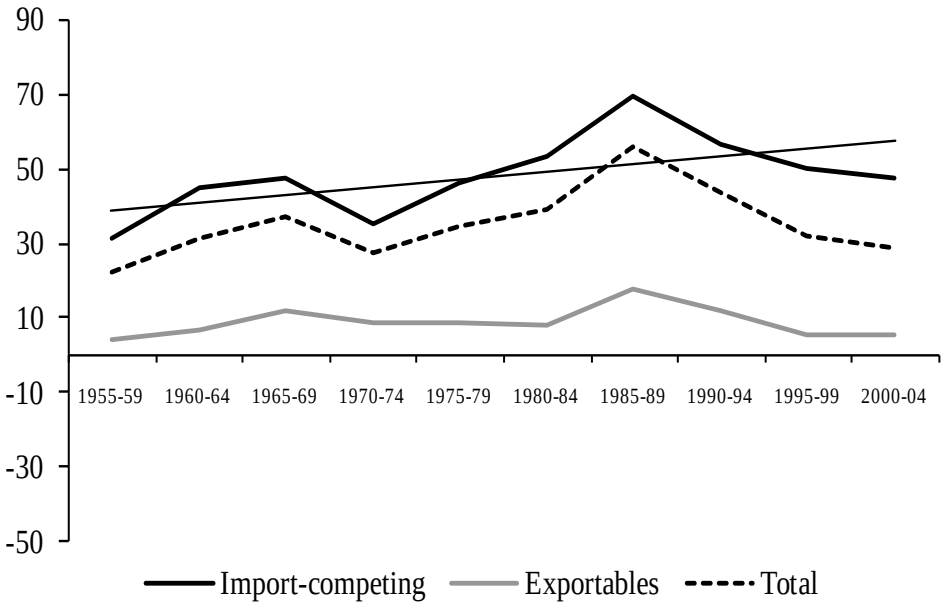
Figure 1.3: Nominal rates of assistance to exportable, import-competing and all covered agricultural products,[a] high-income and developing countries, 1955 to 2004

(percent)

(a) Developing countries



(b) High-income countries plus Europe's transition economies

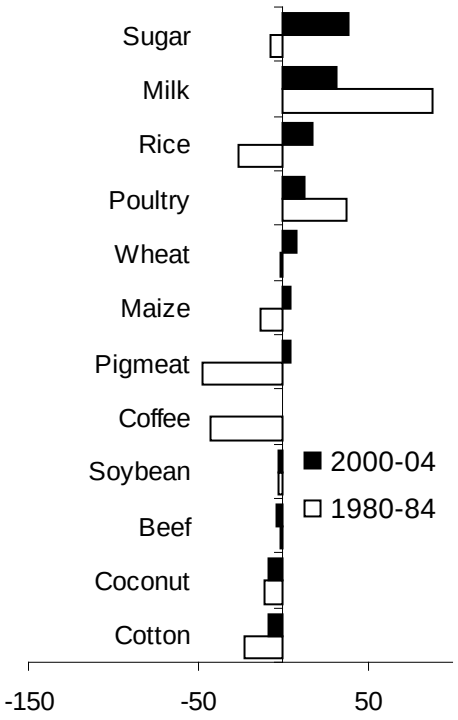


Source: Anderson and Valenzuela (2008), based on estimates reported in the project's national country studies.
a. Covered products only. The total also includes nontradables.

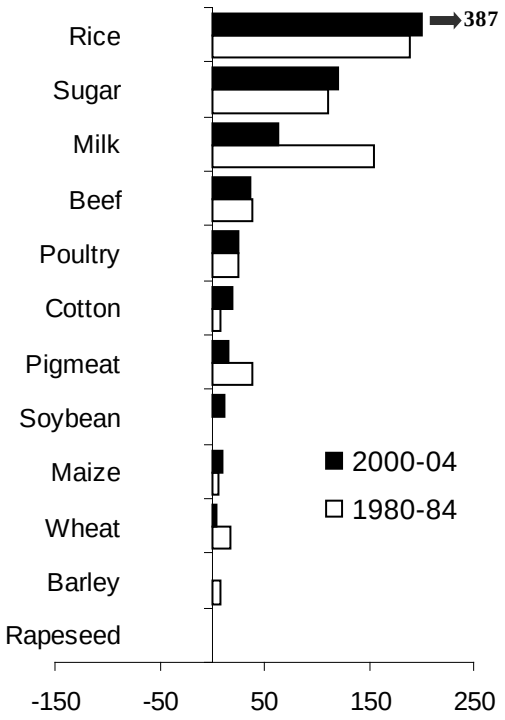
Figure 1.4: Nominal rates of assistance, key covered products, high-income and developing countries, 1980-84 and 2000-04

(percent)

(a) Developing countries



(b) High-income countries

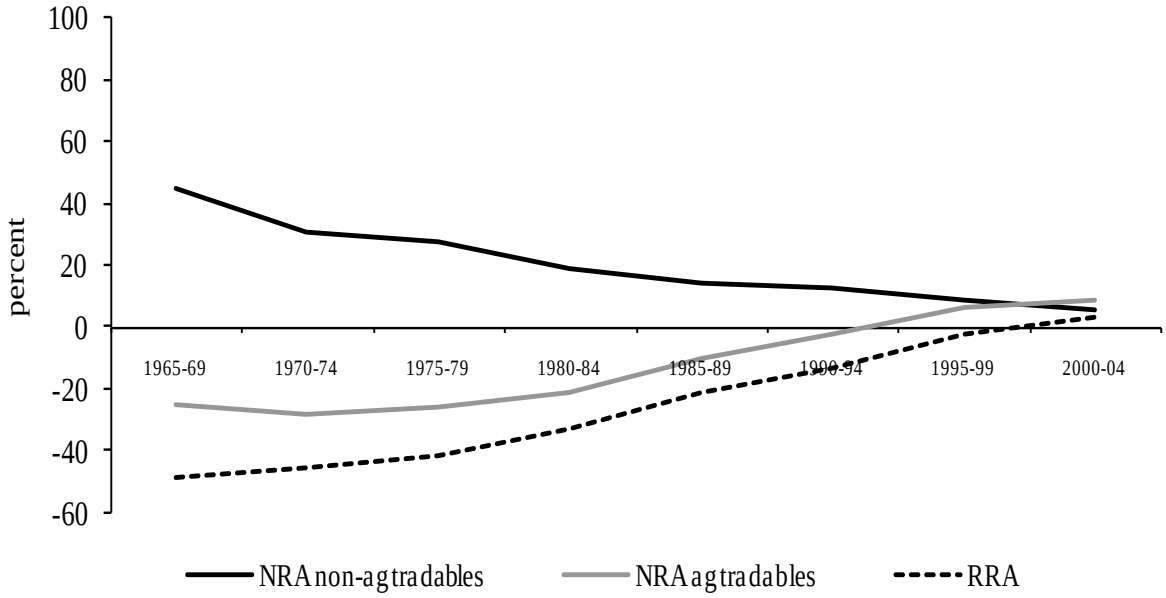


Source: Anderson and Valenzuela (2008), based on estimates reported in the project's national country studies.

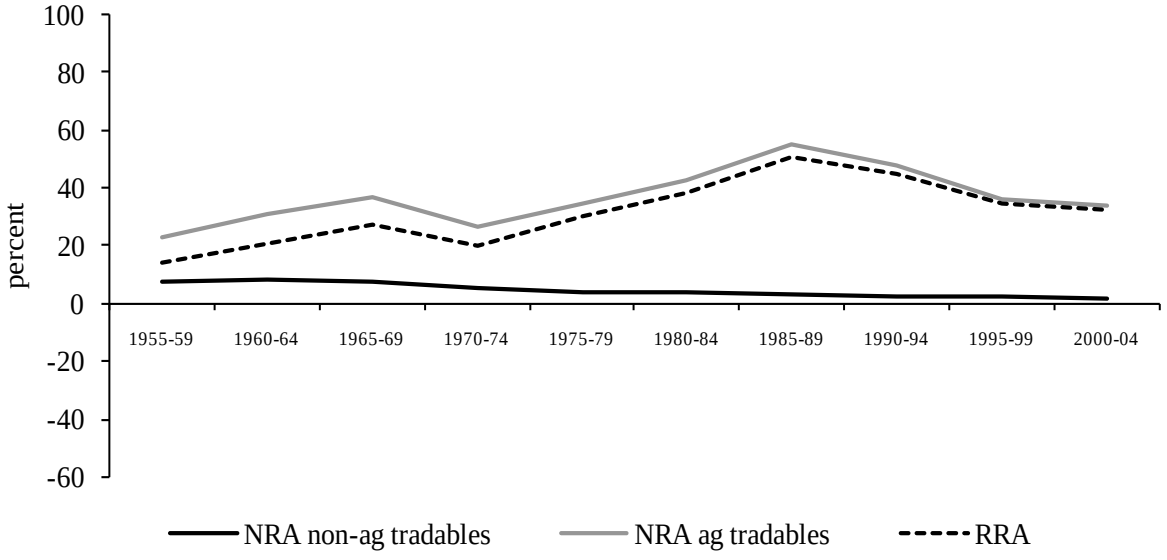
Figure 1.5: Nominal rates of assistance to agricultural and non-agricultural tradable products and relative rate of assistance,[a] all focus countries, 1955 to 2004

(percent)

(a) Developing countries[b]



(b) High-income countries [not including ECA]



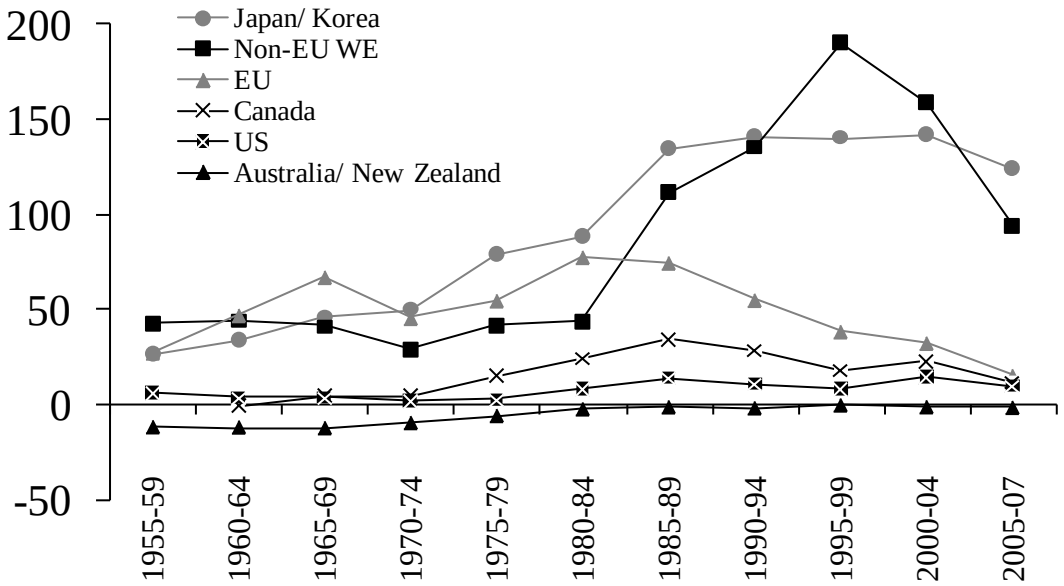
Source: Anderson and Valenzuela (2008), based on estimates reported in the project's national country studies.
a. The RRA is defined as $100*[(100+NRAag^t)/(100+NRAnonag^t)-1]$, where $NRAag^t$ and $NRAnonag^t$ are the percentage NRAs for the tradables parts of the agricultural and non-agricultural sectors, respectively.
b. Estimates for China pre-1981 and India pre-1965 are based on the assumption that the nominal rate of assistance to agriculture in those years was the same as the average NRA estimates for those countries for 1981-84 and 1965-69, respectively, and that the gross value of production in those missing years is that which gives the same average share of value of production in total world production in 1981-84 and 1965-69, respectively.

Figure 1.6: Relative rates of assistance to tradables,[a] Asia, Africa and Latin America, 1965 to 2004

(percent)

Source: Anderson and Valenzuela (2008), based on estimates reported in the project's national country studies.
a. 5-year weighted averages with value of production at undistorted prices as weights. In Asia, estimates for China pre-1981 are based on the assumption that the nominal rate of assistance to agriculture and non-agricultural tadables and hence the RRA in those earlier years were the same as the average NRA estimates for China in 1981-89.

Figure 1.7: Relative rates of assistance to agriculture,[a] high-income countries 1955 to 2007 (percent)

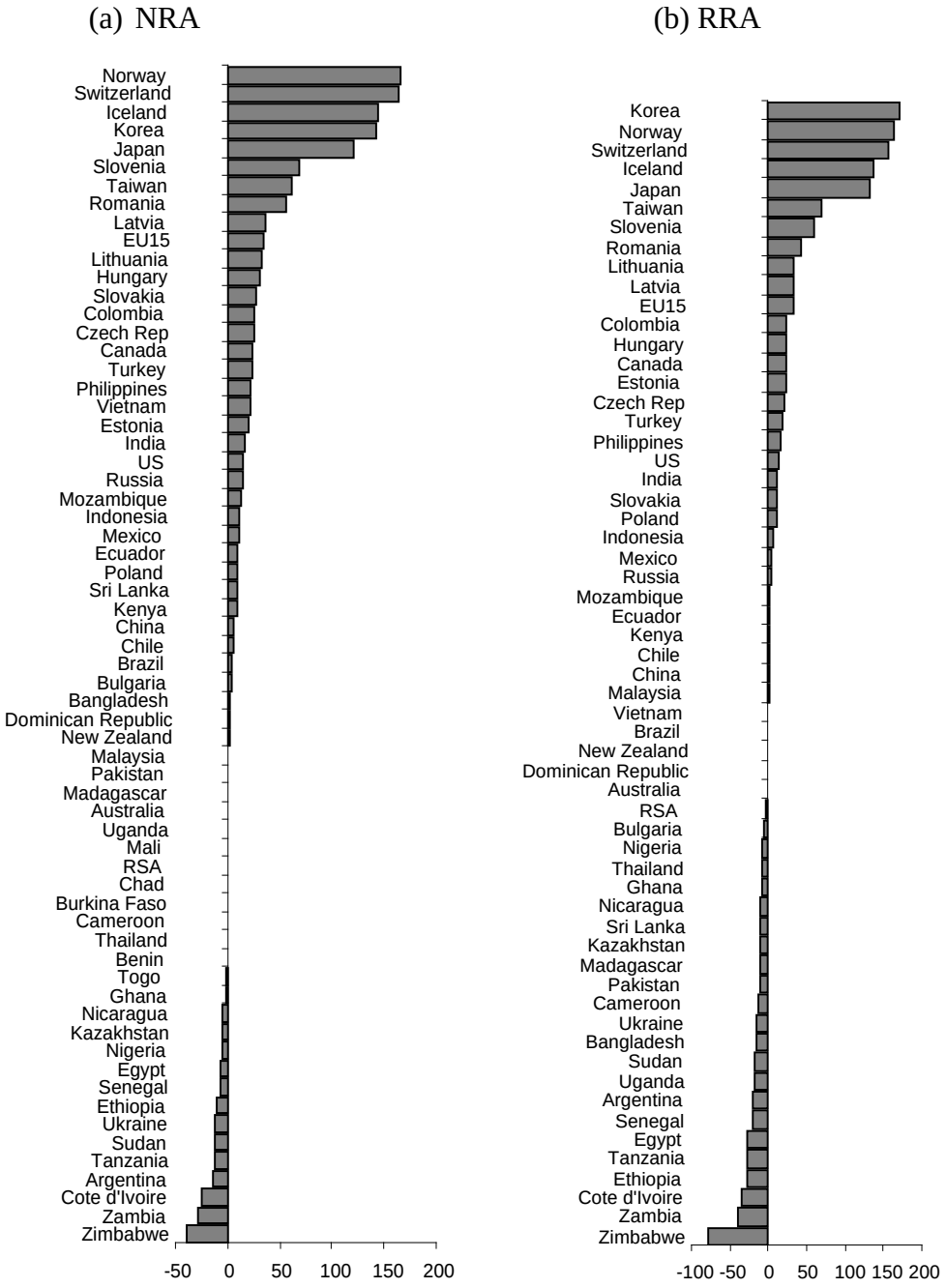


Source: Anderson and Valenzuela (2008), based on estimates reported in the project's national country studies.

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

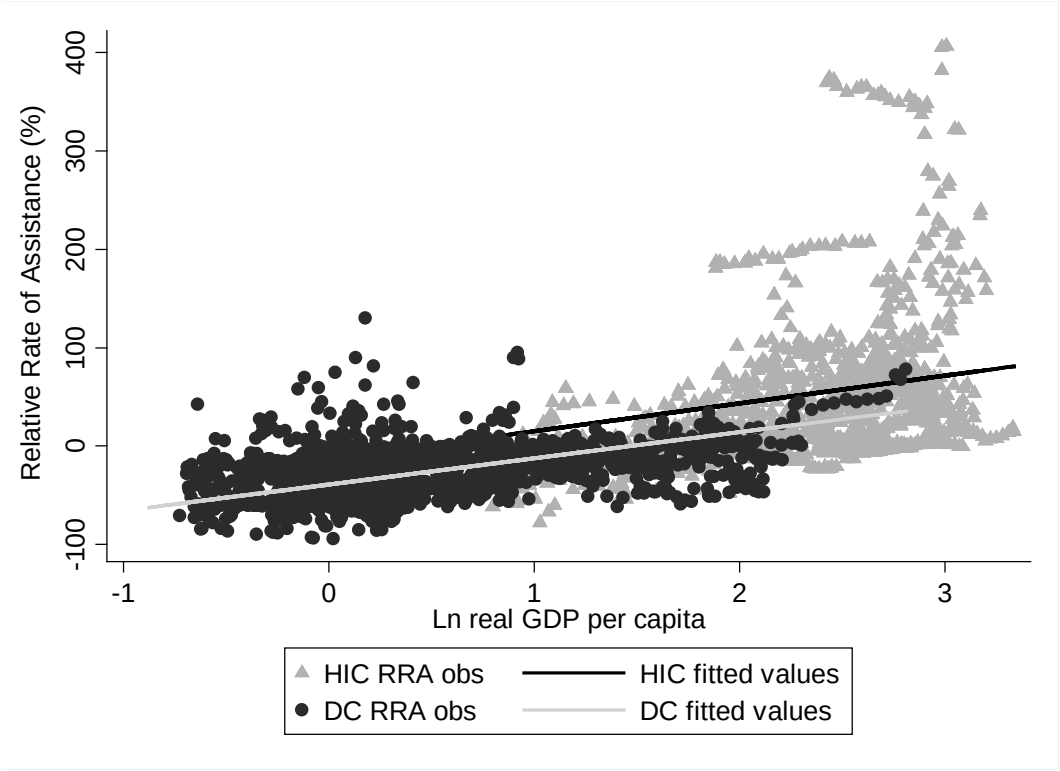
Figure 1.8: Cross-country dispersion of NRA (all agriculture products, incl. NPS) and RRA. 2000-04

(percent)



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

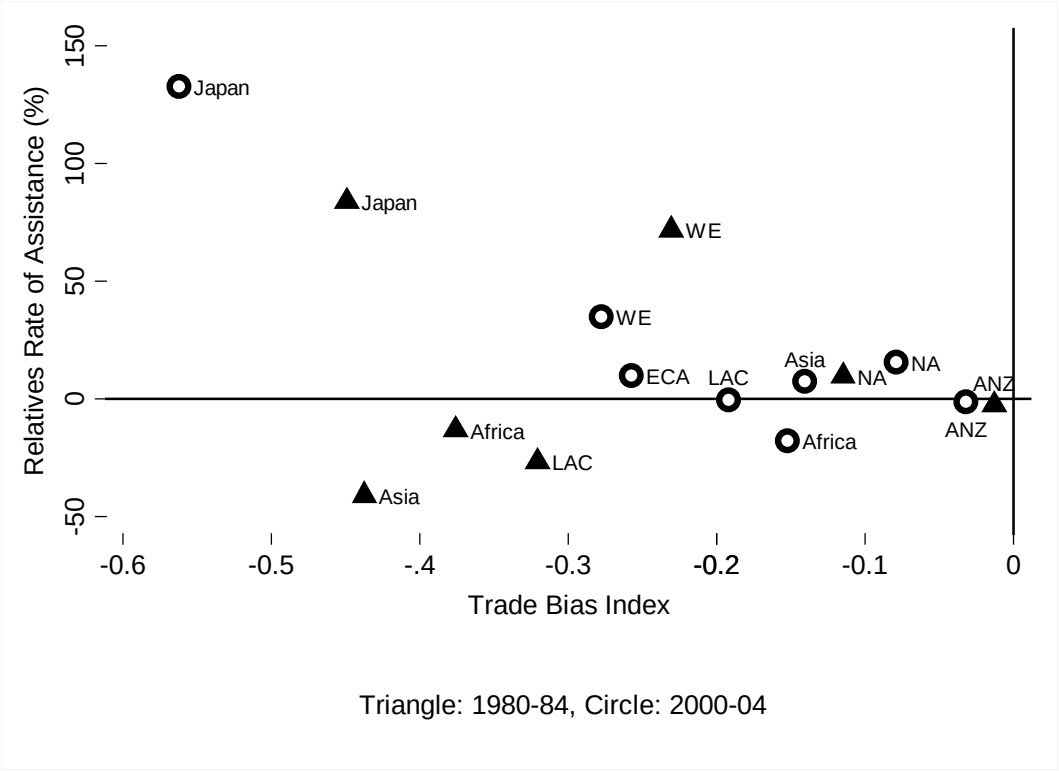
Figure 1.9: Relationships between real GDP per capita and RRA,[a] all focus countries, 1955 to 2007



	Coefficient	Standard error	R^2
DCs	0.26	0.02	0.17
HICs	0.28	0.03	0.14

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

Figure 1.10: Relationship between RRA and the trade bias index for agriculture, focus regions, 1980-84 and 2000–04

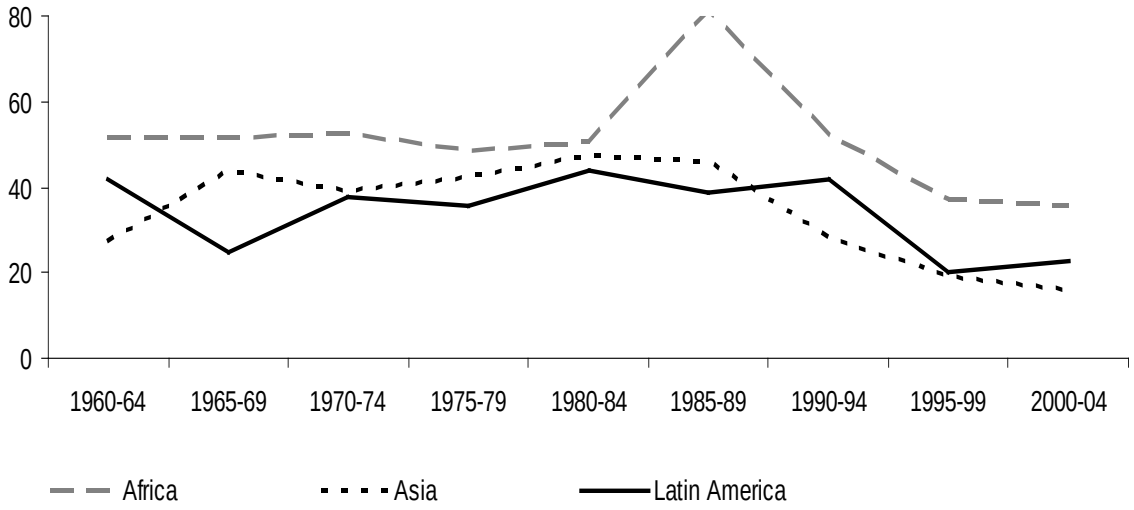


Source: Author's derivation using data in Anderson and Valenzuela (2008) that are based on NRA and RRA estimates reported in the project's national country studies

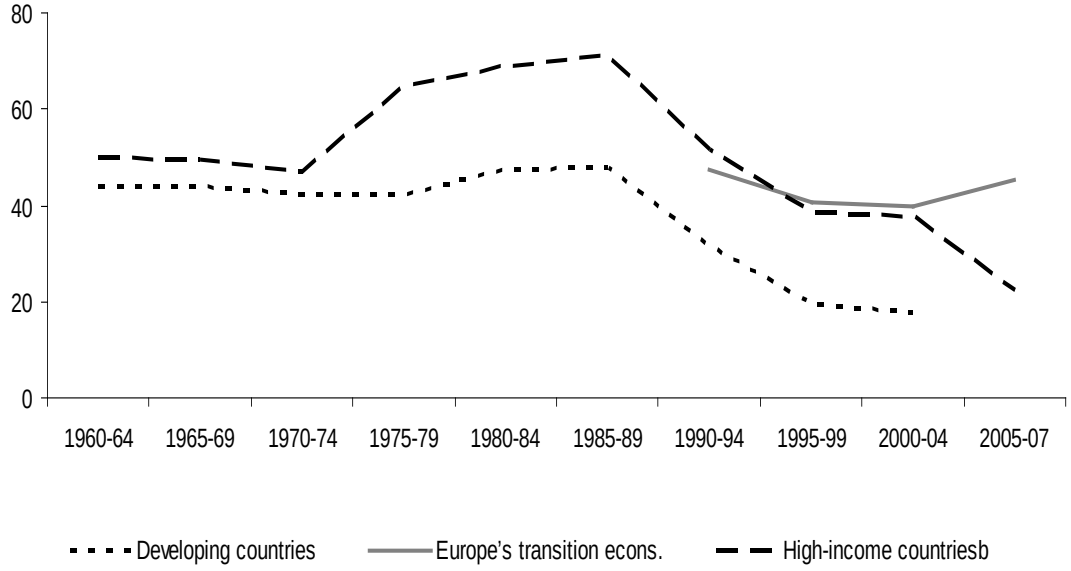
Figure 1.11: Welfare Reduction Indexes for covered tradable farm products, by region, 1960 to 2007

(percent)

(a) Africa, Asia and Latin America

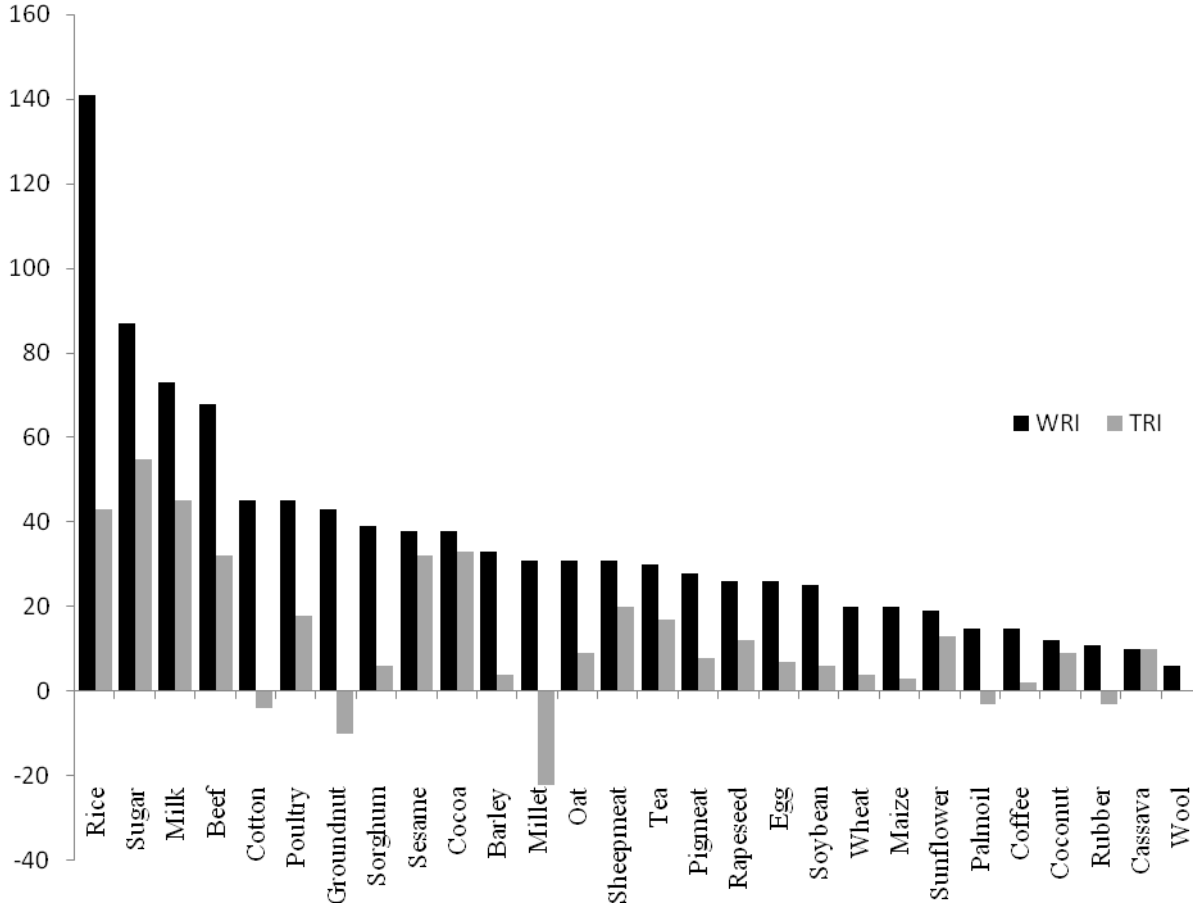


(b) Developing countries, high-income countries and Europe's transition economies



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

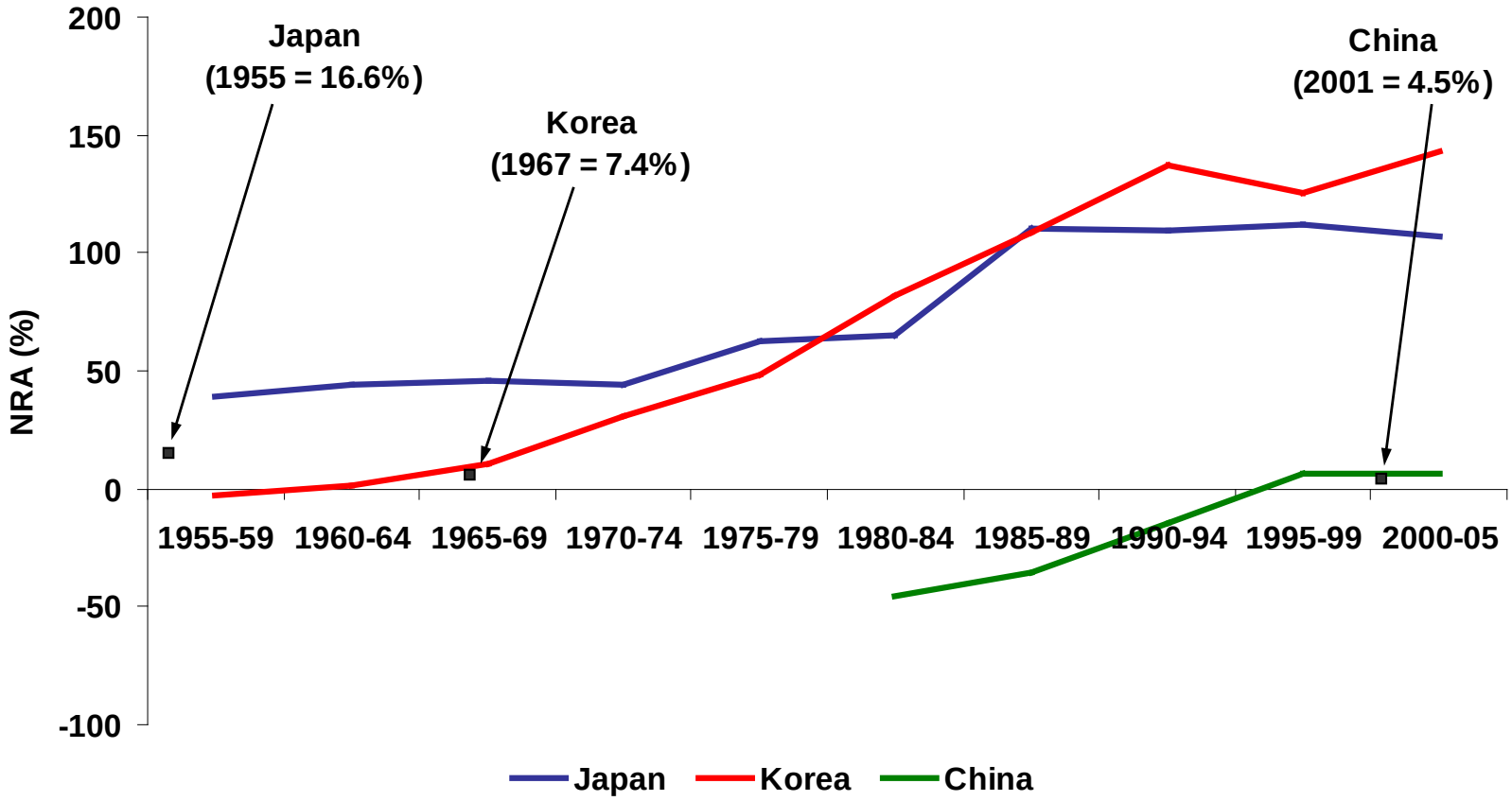
Figure 1.12: Trade and Welfare Reduction Indexes for 28 major agricultural products, 2000-04 (percent)



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

Figure 1.13: NRAs for Japan, Korea and China and date of accession to GATT or WTO, 1955 to 2005

(percent)



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

Table 1.1: Key economic and trade indicators of focus countries, by region, 2000–04

	Share (%) of world:				National relative to world (world=100)			Agric trade special-ization index[b]
	Pop'n	Total GDP	Agric GDP	Agric worker	GDP per capita	Ag land per capita	RCA,[a] agric & food	
Africa	11.71	1.67	6.04	12.87	14	148	na	na
Asia	50.76	10.37	36.65	72.46	20	34	80	-0.03
Latin America	8.33	5.33	7.73	3.20	64	171	na	na
Europe and Central Asia	7.43	3.60	6.39	3.30	48	178	na	na
Western Europe	6.31	28.66	15.43	0.56	454	46	106	-0.03
United States and Canada	5.14	32.67	10.82	0.25	636	186	119	0.08
Australia and New Zealand	0.38	1.54	1.57	0.05	405	2454	354	0.62
Japan	2.05	12.51	4.94	0.19	610	5	12	-0.84
All focus countries	87.83	94.94	89.57	89.75	na	na	na	na
Other (non-focus) developing and transition economies	12.17	5.06	10.43	10.25	na	na	na	na

Source: Sandri, Valenzuela and Anderson (2007), compiled mainly from World Bank's *World Development Indicators.*

a. Revealed comparative advantage index is the share of agriculture and processed food in national exports as a ratio of that sector's share of global exports.

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

Table 1.2: Poverty in Africa, Asia, Latin America and Europe's transition economies, 1981 to 2005

(on less than $1/day)

	1981	**1993**	**2005**	*Share of poor (%) who are rural, 2002*
No. of people (million):				
Sub-Saharan Africa	157	247	299	*69*
East Asia and Pacific	948	600	180	*85*
of which China	*730*	*444*	*106*	*90*
South Asia	387	341	350	*75*
of which India	*296*	*280*	*267*	*74*
Latin America and Caribbean	27	34	28	*34*
European transition economies	3	10	16	*50*
WORLD	1528	1237	879	*74*
Asia's share of world	*87*	*76*	*60*	
% of population				
Sub-Saharan Africa	40	44	39	
East Asia and Pacific	69	36	10	
of which China	*74*	*38*	*8*	
South Asia	42	29	24	
of which India	*42*	*31*	*24*	
Latin America and Caribbean	7	7	5	
European transition economies	1	2	3	
WORLD	42	27	16	

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

Table 1.3: Growth of real GDP and exports, focus countries, 1980 to 2004

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

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

Source: Sandri, Valenzuela and Anderson (2007), compiled from World Bank's *World Development Indicators.*

Table 1.4: Nominal rates of assistance to agriculture,[a] focus countries, 1955 to 2007[c]

(percent)

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

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

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

[b] ECA countries are not included in the high-income or developing country aggregates.

Table 1.5: Nominal rates of assistance to agricultural exportables, import-competing products, and the trade bias index,[a] focus regions, 1955 to 2007

(percent)

	1955-59	1960-64	1965-69	1970-74	1975-79	1980-84	1985-89	1990-94	1995-99	2000-04	2005-07
Africa											
NRA agric. exportables	na	-30.1	-38.4	-42.6	-42.6	-35.0	-36.7	-35.8	-26.1	-24.6	na
NRA agric. imp-comp	na	18.6	11.8	1.9	14.5	13.2	58.3	5.2	9.8	1.6	na
Trade Bias Index	na	-0.41	-0.45	-0.44	-0.50	-0.43	-0.60	-0.39	-0.33	-0.26	na
Latin America											
NRA agric. exportables	na	-20.4	-12.8	-27.0	-25.2	-27.1	-25.0	-10.5	-3.5	-4.6	na
NRA agric. imp-comp	na	26.3	8.7	-2.8	1.1	13.6	5.1	19.4	12.5	20.6	na
Trade Bias Index	na	-0.37	-0.20	-0.25	-0.26	-0.36	-0.29	-0.25	-0.14	-0.21	na
South Asia[c]											
NRA agric. exportables	na	-37.5	-37.2	-30.0	-36.1	-27.9	-20.6	-15.8	-12.0	-6.2	na
NRA agric. imp-comp	na	39.2	41.2	39.4	45.1	37.9	63.3	25.1	14.5	26.5	na
Trade Bias Index	na	-0.55	-0.56	-0.50	-0.56	-0.48	-0.51	-0.33	-0.23	-0.26	na
China and Southeast Asia[c]											
NRA agric. exportables	na	-55.5	-55.1	-51.8	-50.1	-50.0	-41.0	-20.8	-2.2	0.1	na
NRA agric. imp-comp	na	-10.3	-8.9	-9.4	-2.6	0.5	15.1	3.3	13.3	12.3	na
Trade Bias Index	na	-0.50	-0.51	-0.47	-0.49	-0.50	-0.49	-0.23	-0.14	-0.11	na
Japan, Korea and Taiwan											
NRA agric. exp	-18.1	5.7	4.3	15.4	10.3	25.1	48.9	57.1	57.0	70.3	na
NRA agric. imp-comp	35.6	43.3	52.8	54.1	76.6	83.7	124.9	127.4	127.0	134.6	122.6
Trade Bias Index	-0.40	-0.26	-0.32	-0.25	-0.38	-0.32	-0.34	-0.31	-0.31	-0.27	na
European transition econs.											
NRA agric. exportables	na	na	na	na	na	na	na	-3.2	-1.0	-1.0	15.2
NRA agric. imp-comp	na	na	na	na	na	na	na	32.5	35.4	35.7	32.3
Trade Bias Index	na	na	na	na	na	na	na	-0.27	-0.27	-0.27	-0.13
Western Europe											
NRA agric. exp	9.3	17.4	31.7	22.5	33.3	31.1	50.1	38.0	15.0	8.1	1.7
NRA agric. imp-comp	59.4	77.2	82.9	55.7	61.7	79.5	87.6	67.2	52.8	50.5	28.9
Trade Bias Index	-0.31	-0.34	-0.28	-0.21	-0.18	-0.27	-0.20	-0.17	-0.25	-0.28	-0.21
North America											
NRA agric. exportables	2.7	2.8	6.1	5.1	2.9	5.4	10.5	6.0	5.4	7.6	4.1
NRA agric. imp-comp	8.6	9.3	8.8	6.7	10.5	19.7	23.6	18.6	11.3	16.8	11.0
Trade Bias Index	-0.05	-0.06	-0.02	-0.01	-0.07	-0.11	-0.10	-0.10	-0.05	-0.08	-0.06
ANZ											
NRA agric. exportables	3.8	4.7	6.6	5.8	5.5	7.6	6.5	3.6	2.2	0.2	0.2
NRA agric. imp-comp	7.9	8.3	9.3	11.7	8.7	8.4	6.5	3.8	2.0	2.0	1.5
Trade Bias Index	-0.04	-0.03	-0.02	-0.05	-0.03	-0.01	0.00	0.00	0.00	-0.02	-0.01
Developing countries[c]											
NRA agric. exportables	na	-46.5	-44.6	-45.4	-43.9	-41.4	-35.8	-18.7	-5.5	-3.0	na
NRA agric. imp-comp	na	12.7	13.5	7.8	12.8	16.5	37.7	22.6	22.0	23.0	na
Trade Bias Index	na	-0.53	-0.51	-0.49	-0.50	-0.50	-0.53	-0.34	-0.23	-0.21	na
High-income countries											
NRA agric. exportables	4.2	7.4	13.5	10.3	11.3	12.1	22.3	15.9	8.1	6.9	2.9
NRA agric. imp-comp	31.2	45.9	50.2	36.5	47.4	58.1	71.4	62.4	53.9	50.7	30.8
Trade Bias Index	-0.21	-0.26	-0.24	-0.19	-0.24	-0.29	-0.29	-0.29	-0.30	-0.29	-0.21
World [c]											
NRA agric. exportables	na	-23	-20	-23	-25	-24	-17	-7	-1	0	na
NRA agric. imp-comp	na	35	37	27	34	38	57	43	38	36	na
Trade Bias Index	na	-0.43	-0.42	-0.39	-0.44	-0.45	-0.47	-0.35	-0.28	-0.26	na

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

a. NRAs for non-covered products are included here (unlike in Figure 1.3).

b. Trade Bias Index, TBI = $(1+NRAag_x/100)/(1+NRAag_m/100) - 1$, where $NRAag_x$ and $NRAag_m$ are the weighted average percentage NRAs for the exportable and import-competing parts of the agricultural sector, with weights based on production

valued at undistorted prices. TBIs shown here are calculated using the regional 5-year averages of $NRAag_x$ and $NRAag_m$.

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

Table 1.6: Dispersion of nominal rates of assistance across covered agricultural products,[a] focus regions, 1965 to 2007 (percent)

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

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

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

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

Table 1.7: Nominal rates of assistance to agricultural relative to non-agricultural industries, 1955 to 2007

(percent, weighted averages)

(a) Developing countries[e]

	1955-59	1960-64	1965-69	1970-74	1975-79	1980-84	1985-89	1990-94	1995-99	2000-04
Covered products[a]	-33.4	-29.6	-28.8	-30.2	-27.6	-23.3	-13.2	-4.9	3.8	6.7
Non-covered products	-9.0	-7.9	-7.6	-9.8	-9.8	-7.1	0.3	0.1	3.9	6.3
All agricultural products[a]	-27.1	-24.0	-23.1	-24.9	-23.1	-19.1	-9.8	-3.5	3.9	6.6
Total agricultural NRA (incl. NPS)[b]	-25.8	-22.7	-21.8	-23.7	-22.0	-17.8	-8.3	-1.8	5.7	8.7
Decoupled assistance	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.3
Total agric. NRA (incl. NPS + decoup)	-25.8	-22.7	-21.8	-23.7	-22.0	-17.8	-8.3	-1.6	5.9	9.0
Assistance to just tradables:										
All ag tradables[b]	-27.9	-25.4	-25.3	-28.2	-25.7	-20.9	-10.3	-2.2	6.2	8.9
Non-ag tradables	56.9	43.1	45.0	30.6	27.3	18.8	14.0	12.7	9.0	5.7
Relative rate of assistance, RRA[d]	-54.1	-47.7	-48.4	-44.9	-41.6	-32.9	-21.2	-13.1	-2.5	3.1

(b) High-income countries [incl. ECA]

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

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

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

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

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

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

production in total world production in 1981-84 and 1965-69, respectively. Developing country and world aggregates are computed accordingly.

Table 1.8: Nominal rates of assistance to agricultural and nonagricultural tradables, and the RRA,[a] by region, 1955 to 2007

(percent)

	1955-59	1960-64	1965-69	1970-74	1975-79	1980-84	1985-89	1990-94	1995-99	2000-04	2005-07
Africa											
NRA agric.	na	-13.3	-19.6	-25.0	-22.1	-13.5	-0.3	-15.4	-8.7	-12.0	na
NRA non-agric.	na	3.7	2.7	1.5	5.7	1.6	9.2	2.7	2.0	7.3	na
RRA	na	-15.2	-21.4	-26.0	-25.9	-13.1	-8.3	-17.1	-10.4	-18.0	na
Latin America											
NRA agric.	na	-11.4	-9.3	-23.0	-19.0	-12.9	-11.2	4.4	5.5	4.9	na
NRA non-agric.	na	26.9	31.3	27.8	23.3	18.5	16.8	7.3	6.6	5.4	na
RRA	na	-30.2	-30.9	-39.8	-34.2	-26.6	-24.0	-2.7	-1.0	-0.5	na
South Asia[b]											
NRA agric.	na	4.1	4.4	9.7	-7.7	1.8	47.1	0.2	-2.4	12.7	na
NRA non-agric.	na	114.4	117.8	81.7	57.8	54.6	39.9	18.6	15.0	10.1	na
RRA	na	-51.5	-51.9	-39.8	-41.6	-33.3	5.1	-15.5	-14.9	3.4	na
China and Southeast Asia[b]											
NRA agric.	na	-43.6	-42.6	-40.1	-35.7	-34.5	-27.8	-12.0	4.9	7.1	na
NRA non-agric.	na	36.5	36.5	33.7	30.8	20.6	23.3	19.8	9.6	5.5	na
RRA	na	-58.7	-58.0	-55.2	-50.8	-43.4	-41.6	-26.4	-4.2	1.5	na
Japan, Korea and Taiwan											
NRA agric.	30.1	39.9	48.8	51.3	75.5	78.8	124.3	129.9	130.5	138.1	126.1
NRA non-agric.	8.6	8.3	6.1	4.2	3.5	2.4	2.5	1.4	1.1	0.6	1.0
RRA	19.7	29.1	40.2	44.9	69.6	74.6	118.7	126.7	128.1	136.7	123.7
European transition econs.											
NRA agric.	na	na	na	na	na	na	na	10.0	18.3	16.1	17.0
NRA non-agric.	na	na	na	na	na	na	na	9.8	5.5	4.6	2.7
RRA	na	na	na	na	na	na	na	0.1	12.2	11.0	13.9
Western Europe											
NRA agric.	43.8	57.0	67.5	45.7	56.3	74.4	82.0	63.4	43.6	36.8	18.5
NRA non-agric.	8.0	7.2	5.7	3.8	2.5	1.5	1.7	1.3	1.5	1.4	1.2
RRA	33.1	46.5	58.6	40.4	52.6	71.9	79.0	61.3	41.5	34.9	17.1
North America											
NRA agric.	12.5	10.5	10.9	7.5	7.6	13.8	20.2	16.1	11.4	17.3	11.2
NRA non-agric.	6.1	7.4	7.4	5.5	4.1	3.8	3.7	3.3	2.1	1.5	1.3
RRA	6.0	2.9	3.3	1.8	3.4	9.7	15.8	12.4	9.1	15.5	9.7
ANZ											
NRA agric.	5.5	6.6	8.3	7.9	7.3	10.6	8.7	4.3	2.9	1.0	0.6
NRA non-agric.	20.0	21.5	24.0	19.7	14.3	13.5	10.3	6.4	3.4	2.4	2.4
RRA	-12.1	-12.2	-12.6	-9.9	-6.1	-2.6	-1.5	-2.0	-0.5	-1.4	-1.8
Developing countries[b]											
NRA agric.	na	-24.0	-27.3	-31.9	-25.5	-21.0	-15.6	-3.9	4.0	7.4	na
NRA non-agric.	na	58.3	60.0	45.8	37.3	34.6	27.0	16.7	9.8	6.3	na
RRA	na	-52.0	-54.5	-53.3	-45.8	-41.3	-33.6	-17.6	-5.3	1.1	na
High-income countries											
NRA agric.	23.0	30.9	36.8	26.5	34.7	43.0	55.5	48.2	36.6	33.9	18.3
NRA non-agric.	7.5	8.5	7.7	5.4	3.6	3.4	3.2	2.5	1.7	1.3	-0.7
RRA	14.3	20.6	27.1	19.9	30.1	38.3	50.6	44.6	34.3	32.1	19.2
World[b]											
NRA agric.	na	5.6	7.6	0.8	2.6	5.7	18.7	19.7	18.4	18.6	na
NRA non-agric.	na	19.0	20.5	16.1	13.7	10.0	9.8	7.6	6.0	4.0	na
RRA	na	-11.3	-10.7	-13.2	-9.8	-3.6	8.1	11.3	11.8	14.0	na

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

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

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

Table 1.9: Gross subsidy equivalents of assistance to farmers, total and per farm worker, by region, 1965 to 2007

(a) Total (constant 2000 US$ billion per year)

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

Table 1.9 (continued): Gross subsidy equivalents of assistance to farmers, total and per farm worker, by region, 1965 to 2007

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

	1965-69	1970-74	1975-79	1980-84	1985-89	1990-94	1995-99	2000-04	2005-07
Africa	-77	-137	-142	-81	-10	-69	-44	-46	na
Asia	-114	-166	-174	-136	-45	-9	41	60	na
Latin America	-79	-410	-408	-407	-305	132	177	143	na
Europe and Central Asia	-123	-54	-101	-443	45	141	541	569	888
Western Europe	4259	4433	8163	10097	10889	12397	9617	8427	5141
United States and Canada	3733	3436	4189	6730	8220	7478	5582	9182	8763
Australia and New Zealand	3504	3452	3492	4744	3226	1613	1221	442	1061
Japan	1301	1845	4830	5432	10234	13957	16234	16933	12469
All focus countries	59	-27	34	66	164	185	181	172	na
Developing countries	-116	-177	-185	-154	-51	-6	53	67	na
High-income countries (HICs)	3261	3491	6483	8166	9972	11325	9745	9871	7180
HICs including decoupled[a]	3261	3491	6625	9151	11091	12857	12539	13447	11681

Source: Anderson and Valenzuela (2008), based on estimates reported in the project's national country studies.
a. ECA data are only Turkey until 1991. Farmer numbers are from FAOSTAT which may differ from national statistics. Estimates for the NRA and RRA for China pre-1981 and India pre-1965 are based on the assumption that the agricultural NRAs in those years were the same as the average NRA estimates for those countries for 1981-84 and 1965-69, respectively, and that the value of production in those missing years is that which gives the same average share of value of production in total world production in 1981-84 and 1965-69, respectively. Developing country and world aggregates are computed accordingly.
b. Decoupled payments to farmers are excluded from all rows except the final two.
c. Assumes the NRA in non-focus countries is the same as the average for the focus countries in each region (including decoupled payments in the case of other high-income countries), and that their share of the value of regional agricultural production at undistorted prices is the same as their average share of the region's agricultural GDP at distorted prices during 1990-2004. For the countries of North Africa (other than Egypt) and the Middle East, their NRAs are assumed to be the same as Turkey's.

Table 1.10: Consumer tax equivalents of policies assisting producers of covered farm products, percent and per capita, by region, 1965 to 2007

(a)Percent

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

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

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

Source: Anderson and Valenzuela (2008), based on estimates reported in the project's national country studies.
a. ECA data are only for Turkey until 1991.

Table 1.11: Intensity of public agricultural R&D investment, high-income and developing country regions, 1971 to 2004

(expenditure as percent of gross value of agric production at undistorted prices)

	1970s	**1980s**	**1990s**	**2000-04**
All high-income countries	2.2	2.2	1.9	1.6
All developing countries	0.4	0.6	0.75	0.9
Asia	0.3	0.6	0.7	0.9
Latin America	0.2	0.4	0.45	0.6
Sub-Saharan Africa	1.2	1.1	1.2	1.1

Source: Anderson and Valenzuela (2008), based on R&D data from the CGIAR's Agricultural Science and Technology Indicators website at www.asti.cgiar.org

Appendix Table 1.A: Export orientation, import dependence and self-sufficiency in primary agricultural production, focus countries[a], 1961 to 2004

(percent at undistorted prices)

(a) Exports as share of production

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

(b) Imports as share of apparent consumption

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

(c) Self-sufficiency ratio

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

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

[a] Includes intra-EU trade. Not included are Iceland, ECA, Benin, Burkina Faso, Chad, Mali, Togo.