Global Distortions to Key Agricultural Commodity Markets

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Agricultural Distortions Working Paper 71, revised March 2009

This is part of a Working Paper series (see www.worldbank.org/agdistortions) that is designed to promptly disseminate the findings of work in progress for comment before they are finalized. It is a product of a research project on Distortions to Agricultural Incentives, under the leadership of Kym Anderson of the World Bank's Development Research Group. The authors are grateful for country case study authors for their spreadsheets and for help with data compilation by Esteban Jara and Marianne Kurzweil. Funding from World Bank Trust Funds provided by the governments of the Netherlands (BNPP) and the United Kingdom DfID) also is gratefully acknowledged. A revised version of this paper, without the Appendix, will appear as Ch. 12 in *Distortions to Agricultural Incentives: A Global Perspective, 1955 to 2007*, edited by K. Anderson, London: Palgrave Macmillan and Washington DC: World Bank (forthcoming 2009).

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Kym Anderson, Johanna Croser, Signe Nelgen and Ernesto Valenzuela

The regional books that provided detailed estimates of distortion in developing economies[1] are all country focused. While they include commodity details for their particular country, they are not able to provide an overview for developing countries or high-income countries as a group, or for the world as a whole. This paper seeks to fill this gap.

The paper begins by describing the overall project's coverage of 30 major commodities and their importance in regional and global agricultural production and trade. It then summarizes the nominal rates of assistance and consumer tax equivalents for twelve key covered products, together with their gross subsidy/tax equivalents in constant dollars.

The policies generating the positive or negative NRAs and CTEs are often an attempt by government to not only raise or lower the trend level of domestic producer or consumer prices relative to those in international markets, but also to reduce price and quantity volatility in the domestic market for key farm products. Given that this issue became headline news again when international food prices briefly spiked in 2008, we examine whether domestic prices of key products have in fact been more stable than prices in international markets over the past fifty years. There is space to discuss this issue only briefly here, but we point to the scope that the Agricultural Distortions database provides for further in-depth study of the role of policies in influencing market volatility.

The paper then examines seven largely non-traded food staples that are nonetheless important food items for poor people in low-income countries. Even though those commodities are only a small share of global production and exports of farm products, they can be crucial to the food security of large segments of developing country societies. The

[1] Those regional books cover Africa (Anderson and Masters 2009), Asia (Anderson and Martin 2009), Latin America (Anderson and Valdés (2008) and Europe's transition economies (Anderson and Swinnen 2008).

Agricultural Distortions database lends itself to placing the policies affecting (or ignoring) those products in a broader perspective.

The final part of the paper provides another new perspective on the project’s database. It seeks to shed light on how relatively distorted are the various commodity markets from the viewpoint of global trade or welfare restrictiveness. This analysis draws on the theory outlined in the previous chapter, but switches the focus from countries to products. True, a global model of each commodity market (or a global economy wide computable general equilibrium (CGE) model) calibrated for a particular year of interest could provide such insights for that year: the NRA and CTE estimates for that product could be inserted in such a model to generate partial (or general) equilibrium estimates of the global trade and welfare effects of those distortionary policies. However, global models do not exist for many commodities, and global CGE models such as the one used by Valenzuela, van der Mensbrugghe and Anderson (2009) in the next chapter typically have to aggregate many of the smaller commodities into groups to keep the model tractable. Moreover, such models are calibrated to a particular year and so are incapable of providing a long time series of estimates of the global trade and welfare effects of distortionary policies affecting particular commodity markets. The global trade and welfare reduction indexes used here are calculated for each of twelve key agricultural commodities for each year over the past half century, based on NRA and CTE estimates for the project’s sample of 75 countries. These two new indexes provide for each product the ad valorem trade tax rate which, if applied uniformly to that commodity in every country would generate the same partial equilibrium reduction in trade or economic welfare as the actual structure across countries of NRAs and CTEs for that tradable commodity.

NRA and CTE Coverage of Key Farm Products

This project has involved the estimation of annual nominal rates of assistance and consumer tax equivalents over the past five decades for 75 focus countries. In aggregate the coverage represents around 70 percent of the gross value of agricultural production in those focus countries, and just under two-thirds of global farm production valued at undistorted prices over the period covered. That generated about 30,000 NRA and CTE estimates covering more than 70 different products, with an average of 11 products per country. Not all countries had data for the entire 1955-2007 period, but the average number of years covered is 41 per country.

These NRAs cover more than three-quarters of global output of the 30 most valuable agricultural products in terms of their share of global farm production, and as much as five-sixths for grains and tubers. In this section we concentrate on just 12 main commodities: three meats plus milk (worth 55 percent of global output of these 12 products) three grains plus soybean (37 percent of this group's output), and three tropical products plus sugar (just 8 percent of global output of these 12 products, but of much greater significance to agriculture in developing countries). All but one-seventh of global production of these 12 products is covered by the project's NRAs and CTEs (table 1). That coverage is spread well across the five regions under study, as shown in table 2. Each region's share of the 12 key products varies considerably but, as a group, the NRA coverage of those 12 products ranges from one-third of agricultural production in our focus countries of Africa to one-half in Latin America and high-income countries (table 3). Taken together, these coverage statistics suggest the NRAs can be considered very representative of the regional and global agricultural economies.

GSEs and NRAs by Product

The gross subsidy equivalents (GSEs) of the NRAs for the 12 key products are summarized in figure 1 for developing and high income countries separately as well as for all of the study's focus countries. These estimates are obtained by multiplying the NRA by the value of production of each product at undistorted prices for each country, and summing across countries. The products attracting the largest subsidies in 2000-04 were the rice pudding ingredients of rice, milk, and sugar plus beef, with milk dominating by far (and even more so two decades earlier). Since for some countries the GSE for a particular product may be negative, it offsets the positive assistance in other countries. Rice is a case in point: it received positive assistance in both developing and high-income countries in 2000-04, but in 1980-84 developing countries in aggregate taxed rice production more than high-income countries subsidized it. That figure also shows that assistance fell for the majority of those 12 products in high-income countries over the past quarter century, becoming less positive, whereas in developing countries it rose, becoming less negative. Hence for all focus countries as a group the picture is mixed: sugar was more assisted in 2000-04 than in 1980-84; wheat, beef and especially milk has become less assisted; and rice, maize and pigmeat have moved from being taxed in aggregate to being subsidized. Coffee, coconut and cotton are all less taxed now than in the early 1980s.

The full time series of those GSEs is summarized in table 4 from 1965. Throughout that period, livestock assistance dominated crop assistance globally, and by a huge margin before the mid-1980s when crop assistance was negative in many years. Typically developing countries have not taxed milk so, unlike for meat earlier, that is not an offset to the positive assistance in high-income countries. Developing countries switched from negative to positive assistance during the 1980s for wheat and sugar, and during the 1990s for rice, maize and meat, while assistance for the three tropical crops of coconut, coffee and cotton remained slightly negative into the present century.

These GSE values are the combined effect of output values reflected in tables 1 to 3 and NRAs shown in figure 2. Figure 2 confirms that the three rice pudding ingredients share the dubious honor of being the most assisted products in percentage terms in both developing and high-income countries. The time series since 1965 is shown in table 5 for all focus countries, where it is evident that it is not just the value of the livestock sector but also its high NRAs that contribute to its dominance in GSE terms, with milk the stand-out assisted product. We turn now to consider the distribution across countries of NRAs for these products individually, beginning with the most assisted.

Rice, milk and sugar

The first thing that is striking about figure 3 is that virtually all countries for which NRAs have been estimated for rice, milk and sugar assisted these three industries in 2000-04. The only exceptions are Ukraine and Egypt for milk and, for rice, Egypt, Zambia, Pakistan, and (very slightly) Thailand and China.

Secondly, in virtually no country in the project's sample does the government not intervene in the market for these three products.

And the third striking feature of figure 3 is the huge rates of assistance for these products in some countries, with the peak rate for each product exceeding 200 percent in 2000-04. This is far higher than the peak NRAs for the other products in our sample of 12, with the exception of poultry (and beef in Norway). These three features, and especially the third one, suggest there are characteristics that these industries have in common that influence the political economy of support for them. One thing milk and sugar share with poultry is the need for immediate processing of the raw farm product before it is saleable to consumers, but that is also true of other products such as cotton. The definitive political economy paper on these products has yet to be written, but perhaps the availability of the project's NRA database will stimulate such an analysis.

With high protection for these products in virtually all markets, their international price will have been depressed perhaps more than that of most other farm products. That would thus be very harmful for the main unsubsidized exporters of these products, notably Thailand for rice, New Zealand for milk products, and Brazil and Australia for sugar.

Beef, pigmeat and poultry

Meat industries too tend to be mostly assisted, except for beef where there are several countries still taxing its production (often implicitly, for example via export taxes or restrictions). The highest NRAs by far for these meats are in Norway, Switzerland and Northeast Asia. Since there are almost no pig and poultry industries with negative assistance, and since high-income countries dominate the upper part of figure 4, this suggests that those countries are overproducing these protein-rich foods. And since all but low-income countries produce these products using intensive feeding of grains and oilseed meals, it is also putting upward pressure on the prices of those crop products – except perhaps in countries where the assistance to these intensive livestock industries is just to compensate for the protection-induced high domestic price for feedgrains and oilseeds.

Wheat, maize and soybean

These three temperate crop products are grown more in high-income countries than in any of the other four studied regions (table 2). But where they are grown in developing countries (predominantly in the Southern Hemisphere), the NRAs tend to be negative. There are also lots of countries where these products' NRAs are close to zero, and the peak NRAs are in countries that grow very little of them (again mostly Norway, Switzerland and Northeast Asia – figure 5). Thus their contribution to global farm subsidies is quite modest even though these products account for a large share of the world's farm production (one-quarter of the 12 key products in focus here, according to table 1).

Coconut, cocoa, coffee and cotton

Coconut NRAs are not shown in figure 6 because there are only three countries in the sample for which they were estimated. In each case the NRA by the turn of this century had become slightly positive: 10 percent in Indonesia, 14 percent in the Philippines and 17 percent in Sri Lanka for 2000-04. But in the last few decades of the 20th century this tree crop's exports were taxed heavily.

Cocoa NRAs are available for six countries, all on the equator. In all cases production is still discouraged (negative NRAs), and most heavily in the major producing country of Cote d'Ivoire.

Coffee is now produced in lots of countries, and the extent of government intervention in this product varies from heavy taxation (Cote d'Ivoire again and almost as much as for cocoa) to slight assistance in the case of Brazil and Columbia in 2000-04.

Cotton more than any of our key products, and in sharp contrast to rice, milk and sugar, is simultaneously taxed heavily in developing countries and subsidized heavily in high-income countries. The United States had an NRA of 70 percent in 2000-04,[2] while several African countries have NRAs of around -70 percent – and several more were equally taxing of this industry in earlier decades (Baffes 2009). It also seems that some of the countries of Central Asia also still tax cotton producers substantially, although the data are not sufficiently robust to be able to estimate their NRAs with confidence (Pomfret 2008). This wide diversity of NRAs means that a freeing of cotton markets globally would lead to a big relocation of production from supporting countries, most notably the United States, to many poor countries, especially those in Africa and Central Asia that are currently underpricing raw cotton to growers. A recent study using an economy wide model of the global economy (Anderson and Valenzuela 2007) strongly supports that inference.

CTEs by Product

[2] Unfortunately the European Union does not show up in Figure 5 because a time series of its cotton NRA was not measured (being a relatively small crop produced only in southern Europe). Nor has the OECD measured its PSE. However, independent estimates for recent years show growers there receive an even higher NRA than the 70 percent received by US growers in 2000-04 (see Anderson and Valenzuela 2007).

The consumer tax equivalents of government intervention in nine of these key products are fairly similar to the NRAs in percentage terms (compare tables 5 and 6(a)), because intervention is mostly at the border and such measures affect producer and consumer prices equally. (The three tropical cash crops are not shown in table 6 because they are grown almost exclusively for export once they are lightly processed.) In cases where only border measures are used, the sign of the dollar equivalent of those taxes is the same as that of the GSE too. However the magnitude differs because these are heavily traded products and so countries differ in the extent to which they are net importers or exporters of each one.

Table 6(b) shows that of the meats, only pigmeat consumption has been subsidized on a global basis. That was mostly due to China and was phased out by the mid-1990s. Among the grain crops, rice consumption was taxed in aggregate in the focus countries only up to the mid-1980s, soybean was taxed on net only in the 1970s, and maize consumption was taxed in aggregate only from the early 1990s.

The Effects of Intervention on Price Variability

Many governments intervene in commodity markets not only to alter the trend level of prices using long-term subsidies or taxes on farmers or food consumers, but also in an attempt to reduce price and quantity volatility in the domestic market for key farm products. The justification sometimes given for such intervention in poor countries is that credit markets are underdeveloped or inefficient because of local monopoly lenders, so low-income consumers and producers have difficulty smoothing their consumption over time as prices fluctuate. There and in higher-income countries the motive for intervention may be partly viewed also as a form of income insurance (Thompson et al. 2004), although it needs to be kept in mind that stabilizing prices is not the same as stabilizing incomes of the target households. It is also true that to achieve price stability through altering trade barriers is extraordinarily difficult. Indeed more than sixty years ago Hayek (1945) warned that such intervention is likely to lead to government failure that could reduce welfare more than the cost of the market failure it seeks to overcome, given the high cost of the information needed to do it well.

There is a huge analytical literature on the economics of price stabilization. Its innate connection with trade policy was highlighted by Johnson (1975) following the upward spike in world food prices in 1973-74. His analysis of grain prices suggested that if free trade in grain was in place in 1975, prices would be so much less variable – because trade could mitigate local supply variability – that only negligible quantities of carryover/storage would be profitable. A subsequent study of global food trade provided complementary results: using a stochastic model of world markets for grains, livestock products and sugar, Tyers and Anderson (1992, 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.

Many countries vary their trade taxes and hence NRAs inversely with international prices, particularly for staple foods. Rice is perhaps the most obvious example. Anderson and Martin illustrate it for Southeast Asia in Chapter 9 in this volume, and figure 7 illustrates it for South Asia, where the domestic rice NRA moves in the opposite direction to the world rice price with a high correlation coefficient of -0.75 (which compares with -0.59 for Southeast Asia for the same period). This desire to stabilize does not seem to be diminishing, even though the trend rate of NRA for rice is rising as incomes grow (see figure 8).

One consequence of such domestic market-stabilizing activities by governments is that the international market for food stables is 'thinned'. As shown in table 7, food staples are traded much less than tropical products by developing countries – and the numbers in the high-income countries column of that table would be much lower too had intra-European Union trade been excluded from the data. For example, only 6.9 percent of global rice production was traded internationally in 2000-03, compared with 14 and 24 percent for maize and wheat, and prior to the 1990s the global share of rice traded was less than 4.5 percent.

If this matters most in low-income countries where consumption smoothing through time is most unaffordable for poor households, the question arises as to how successful governments in that group of countries have been in keeping domestic price volatility below volatility in international markets. A recent attempt to test that, using the prices that generated the NRAs from this project, found that government intervention in low-income countries on average had de-stabilized prices relative to the international marketplace (Masters and Garcia 2009), apparently vindicating Hayek's concern cited above, and contrary to the general conclusion reached by Schiff and Valdés (1992, Ch. 3) using data up to the mid-1980s. That is, policies continue to seek to reduce fluctuations in domestic food prices and in the quantities available for consumption via fluctuations in barriers to trade. This beggar-thy-neighbor dimension of each national economy's food policy reduces the international public good role that trade between nations can play in bringing stability to the world's food markets. The more some countries insulate their domestic markets, the more other countries perceive a need to do likewise, exacerbating the effect on world prices so that even larger changes in

NRAs are desired—a classic collective action problem, and one that was illustrated yet again in 2007-08 when the imposition of export restrictions in key exporting countries in late 2007 and early 2008 certainly contributed to the sharp increases in world prices in the first half of 2008. This is an area requiring considerably more analysis of past government behavior, and for which the current project's Agricultural Distortions database is well suited, but space and time limitations preclude it from being included in this volume.

What about Nontraded Food Staples of Low-income Countries?

It was noted early in this chapter that the NRA coverage of the 12 key traded products discussed above represents only one-third of agricultural production in Africa, compared with one-half of farm output in Latin America and high-income countries (table 3). Part of the reason for the difference is that in low-income countries where rural infrastructure is weak, trade costs are relatively high and so a larger proportion of food production focuses on products that tend to be mostly not traded internationally. They include rootcrops such as cassava, potato, sweet potato and yams, grains such as millet, and fruits such as banana and plantain, its even-less-traded relative. Apart from potatoes, these crops are almost exclusively grown in hot developing countries, but with different degrees of specialization across regions (table 8). And apart from bananas, they are traded very little across borders, even with neighboring countries (table 9). Yet in terms of calories and protein, banana and plantain account for two-thirds of the fruit intake in Sub-Saharan Africa, and they with the four tubers and millet account for one-quarter of all Sub-Saharan African food intake, according to FAO food balance sheets in recent years.

How much difference would it make if these products had been more-fully included in the Agricultural Distortions database? Despite their importance as a source of calories and protein, their share of the global value of production is quite low, because of their low prices. In aggregate those 7 products account for just 5 percent of the global value of farm output, when valued at domestic producer prices. In Africa, though, they account for a bit more than one-fifth of the regional value of agricultural production. For that reason, the project's African country authors typically included them in their sample of covered products. This can be seen from table 10, where row 4 shows that these products accounted in 1995-2004 for one-third (22 percentage points) of the 67 percent coverage ratio for the African sample. The second set of rows in Table 10 shows that had all developing countries included all 7 of these products in their covered sample, it would have raised their coverage by no more than 6 percentage points. Those rows also show their inclusion in the African studies was nearly complete.

Those facts together suggest that the fuller inclusion of those 7 staples in the covered product set would not have altered the developing countries' average NRA for covered products very much. But to test that assertion more formally, the NRA for covered products, shown in the third set of rows in table 10, was re-calculated to include any of the 7 staples that were missing, assuming the NRAs for those missing staples were zero (since the nature of the market for these products is such that they attract very little government intervention). The final set of rows in table 10 show that such inclusion would bring the NRA average for covered products only very slightly closer to zero (e.g., from 5.3 to 4.9 percent for developing countries as a group in 1995-2004). Moreover, their partial omission from the covered set makes no difference to the NRA average for all agriculture (including non-covered products), since in most cases the 'guesstimated' NRA for non-covered non-tradable farm products in developing countries was zero anyway.

Global commodity trade and welfare reduction indexes[3]

This final part of the chapter provides yet another perspective on the project's database. It seeks to shed light on how relatively distorted are the various commodity markets from the viewpoint of global trade or welfare restrictiveness. This analysis draws on the theory outlined in the previous chapter, but with a focus on products rather than countries. It provides time series estimates for a pair of indexes that give more insights than NRAs or CTEs can provide into the likely impact of policies in restricting global trade in particular products and in reducing the contribution each product's market can make to global economic welfare. Certainly global models can estimate trade and welfare effects, but such models typically are calibrated to a particular year and so are incapable of providing a long time series of estimates of the global effects of distortionary policies affecting particular commodity markets.

[3] This section draws heavily on Lloyd, Croser and Anderson (2009), who develop the theory summarized here and provide index estimates for a much larger sample of products than reported below.

These two new indexes can provide for each product the ad valorem trade tax rate which, if applied uniformly to that commodity in every country, would generate the same partial equilibrium reduction in trade or economic welfare as the actual structure across countries of NRAs and CTEs for that tradable commodity. If one is willing to assume that the domestic price elasticities of supply are equal across countries for a particular commodity, and likewise for the domestic price elasticities of demand for that commodity (as indeed many global commodity modelers do, for lack of country-specific econometric estimates), then there is no need to know the size of those elasticities in order to estimate the two new indexes.

As in the previous chapter, we call these indicators the trade reduction index (TRI) and the welfare reduction index (WRI). One feature of the TRI is that it uses not a country's share of world production or consumption but rather its share of world trade in determining the global trade effect of price-distorting policies. And an important feature of the WRI is that it takes into account the fact that the welfare effect of a policy such as an import tariff is related to the square of the tariff rate, which is particularly important in global commodity markets with a wide dispersion of NRAs across countries.

The theoretical literature that identifies ways to measure the welfare- and trade-reducing effects of international trade policy in scalar index numbers stems from the theoretical advances by Anderson and Neary (summarized in and extended beyond their 2005 book) and the partial equilibrium simplifications by Feenstra (1995). Notwithstanding these advances, to our knowledge no long time series of indexes had been estimated across countries for individual commodities until Lloyd, Croser and Anderson (2009) showed that the required theory is a straightforward variation of that summarized for countries in chapter 11 of this volume. They have applied the theory to estimate the indexes for 28 of the commodity markets included in the Agricultural Distortions database, summing across countries for each product in contrast to chapter 11 where the summation is across products for each country. Here we summarize their results for just the twelve key global markets that are the focus of this chapter, for each year since 1965, based on NRA and CTE estimates for the project's sample of 75 countries.

Table 11 reports the time series of estimated global TRIs for each of the twelve agricultural commodities, and for the three groups of commodities (grains and oilseeds, tropical crops, and livestock products). Generally those TRIs are somewhat above the NRAs reported in Table 5, and especially for tropical products where the trade-reducing effects of import taxes of some high-income countries are reinforced by the export taxes of some lower-income countries. By contrast, for a few products the global average TRI is less than the NRA, reflecting the fact that export subsidies have been in place for some higher-income countries or import subsidies for some lower-income countries.

The most trade-distorted products are sugar, milk and rice. Among the grains it is rice trade that has been taxed most since the 1970s, while among the oilseeds and tropical crops it is sesame and sugar trade, respectively, that are taxed most. Maize and soybean trade has been taxed least among those crops shown, and at very low rates compared with livestock products, especially milk. Note, however, that the extent of distortions to trade has diminished more for livestock products than for crops since the 1980s when agricultural price and trade reforms began to be implemented in numerous countries.

Table 12 similarly reports the global WRI estimates. These are substantially above the NRAs, with 5-year averages across the twelve commodities between 1965 and 2004 in the range of 55 to 85 percent compared with the 6 to 24 percent range for the comparable NRA averages. This greater size is partly because the welfare cost is proportional to the square of the NRA, and partly because some NRAs are negative and so offset positive NRAs in the process of averaging them whereas the welfare cost of those negative and positive NRAs are additive. Figure 9 shows that the most distorted among the twelve commodities in 2000-04 in terms of both their global welfare cost and their trade restrictiveness are rice, sugar, milk and beef.

A useful way of summarizing the WRI and TRI estimates for particular products is provided in figure 10, which shows their movement since many of the indexes peaked in the late 1980s. The indexes would suggest policies for a particular commodity market were not reducing either trade or welfare if the product were located at the zero point of both axes, that is, in the bottom left corner of the diagram (the ‘sweet spot’). Nearly all of the farm commodities shown have moved towards that spot since 1985-89, and very substantially so for the outliers, namely milk and coffee, but considerably also for wheat and maize.

The countries that contribute most to the global TRI are shown in figure 11 for the 5 most-distorted products. These shares are related to not only the size of the index but also the contribution of the country to global trade in that product. In the case of sugar,milk and beef, many countries protect their domestic producers highly and so the contributions are relatively evenly spread across lots of countries. By contrast, rice trade restrictions are due mostly to a few Asian countries, notably, India, Japan and Taiwan. And cotton trade distortions are even more concentrated, with subsidies in the United States the main contributor.

Similar summary information for the country contributions to the global commodity WRIs are presented in figure 12. In this case Japan is prominent in reducing world welfare in the markets of not just rice but also milk and beef. For cotton, distortionary policies not only in the United States but also in Turkey and several large developing countries are dominant contributors, where it is the size of the country in global cotton production/consumption that interacts with the percentage WRI to determine the aggregate contribution of each nation. In short, this application of these two additions to the family of so-called trade restrictiveness indexes provides very different indicators of distortions to global agricultural markets than the NRAs and CTEs (and even more so than the OECD's producer and consumer support estimates, which are expressed as a percentage of distorted rather than undistorted prices and so are smaller than their NRA and CTE counterparts). More specifically, the TRI offers a much truer indication of the world trade effects of government interventions in the markets for traded products, by properly accommodating trade subsidies alongside trade taxes; and the WRI offers a much truer indication of the global welfare effects of government interventions in the markets for traded products, by also properly taking into account the fact that the welfare cost of a price distortion is proportional to the square of the tax or subsidy rate.

These two indexes have been calculated with the help of a number of simplifying assumptions, most notably that each country is small and that its price elasticity of supply (demand) for a particular product is the same as that for every other country, and that cross-price elasticities are zero. However, that is what trade negotiators typically assume when they attempt to calculate the trade effects of market access 'concessions' they are considering exchanging. It is also commonly what would be assumed when calculating, for the Arbitrator of a trade dispute settlement case, the magnitude of the trade damage from a violation of commitments under a trade agreement. Models of the global market for particular farm products often have to make such assumptions too, for want of reliable or agreed econometric estimates of those elasticities for each country. Moreover, these indexes have the advantage over formal supply/demand models in that they can be expressed in time series form and thereby reveal trends and fluctuations over long periods, rather than just providing a snapshot at a point in time.

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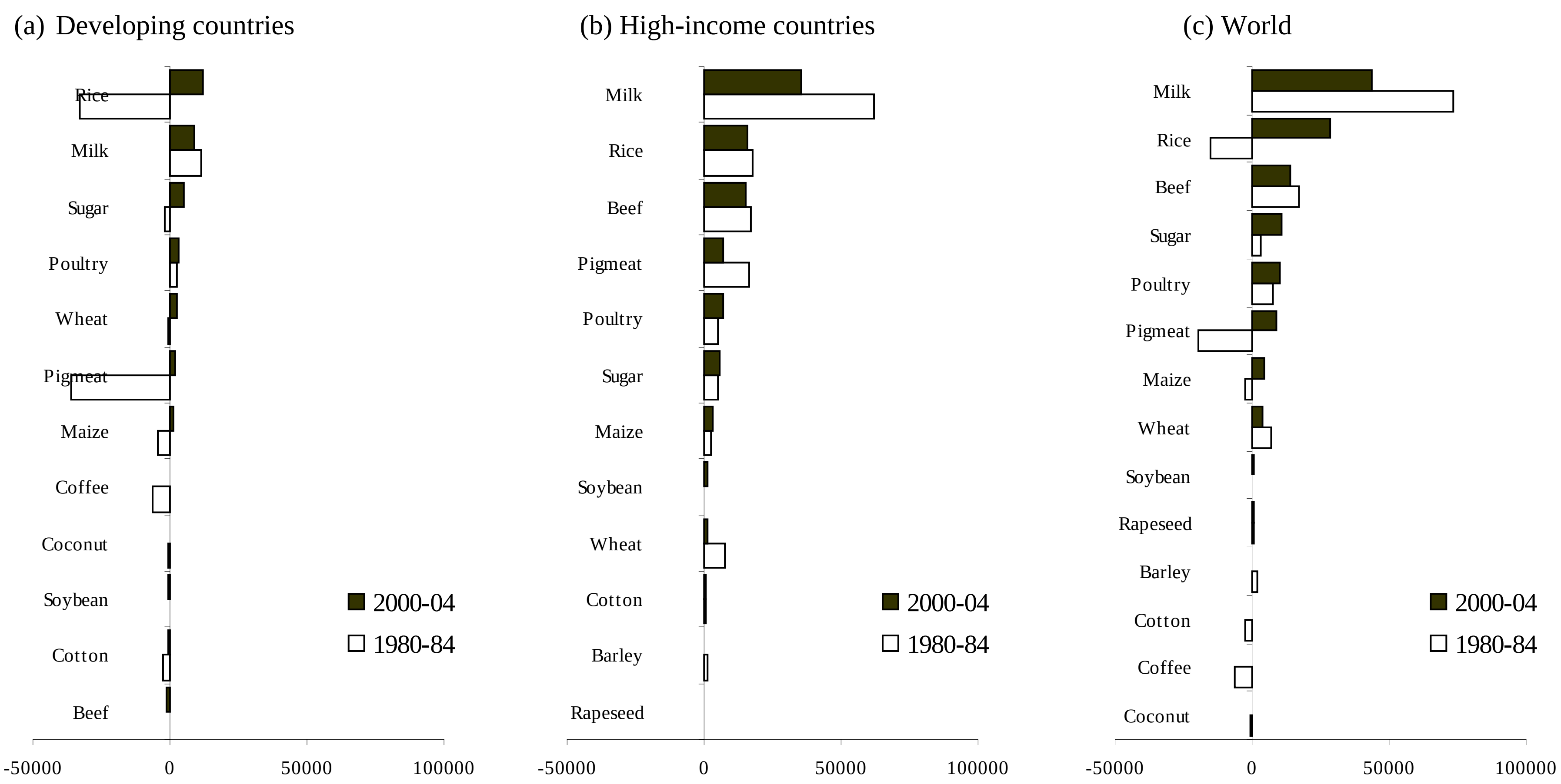
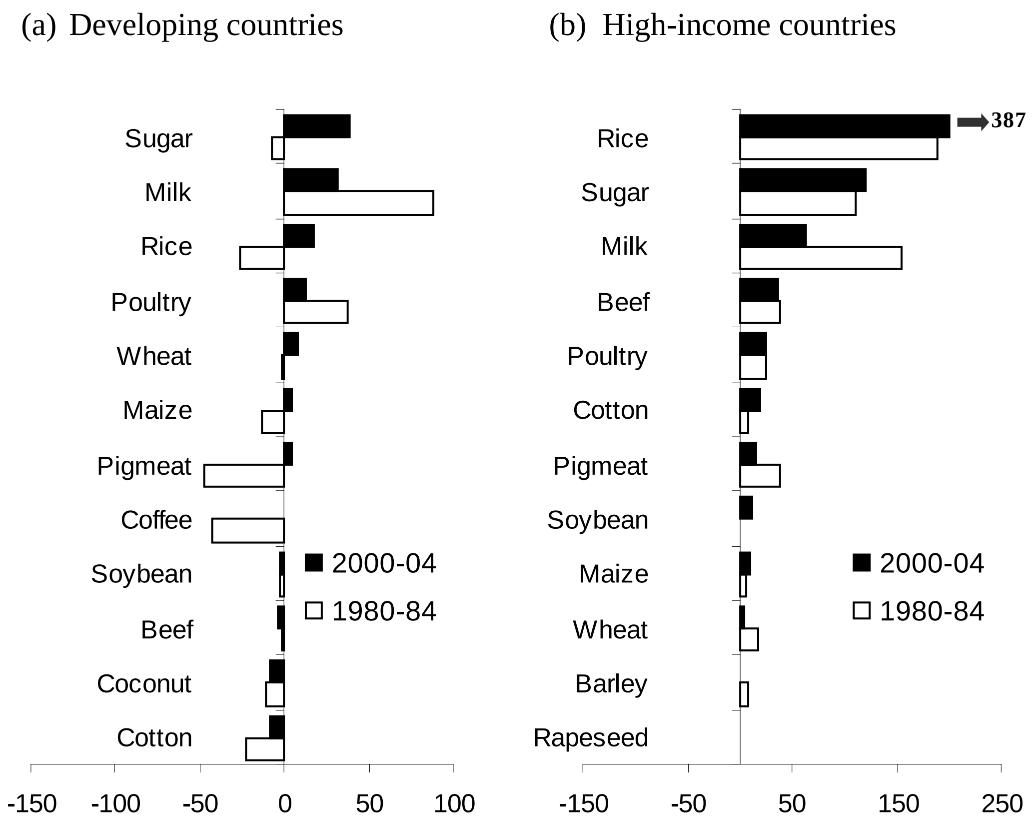
Figure 1: Gross subsidy equivalents of assistance to farmers globally, by product, 1980-84 and 2000-04 (constant 2000 US$ million)



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

Figure 2: Nominal rates of assistance, key covered products[a], high-income and developing countries, 1980-84 and 2000-04

(percent)

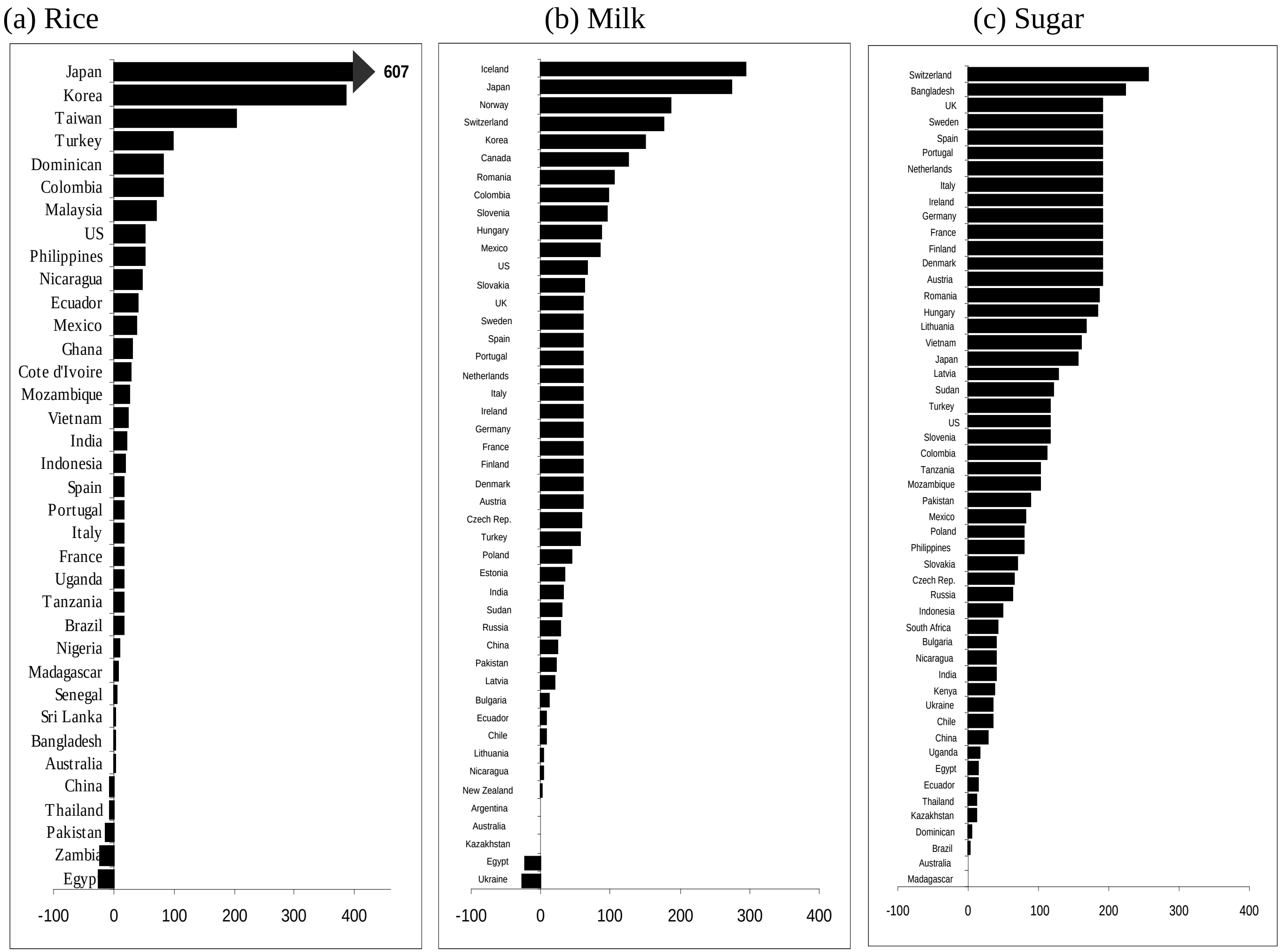


Source: Anderson and Valenzuela (2008), based on estimates reported in the project's national country studies.

a. Product nominal rates of assistance (NRAs) are averages of country NRAs weighted by the value of production at undistorted prices.

Figure 3: Nominal rates of assistance, rice, milk and sugar, by country, 2000-04

(percent)

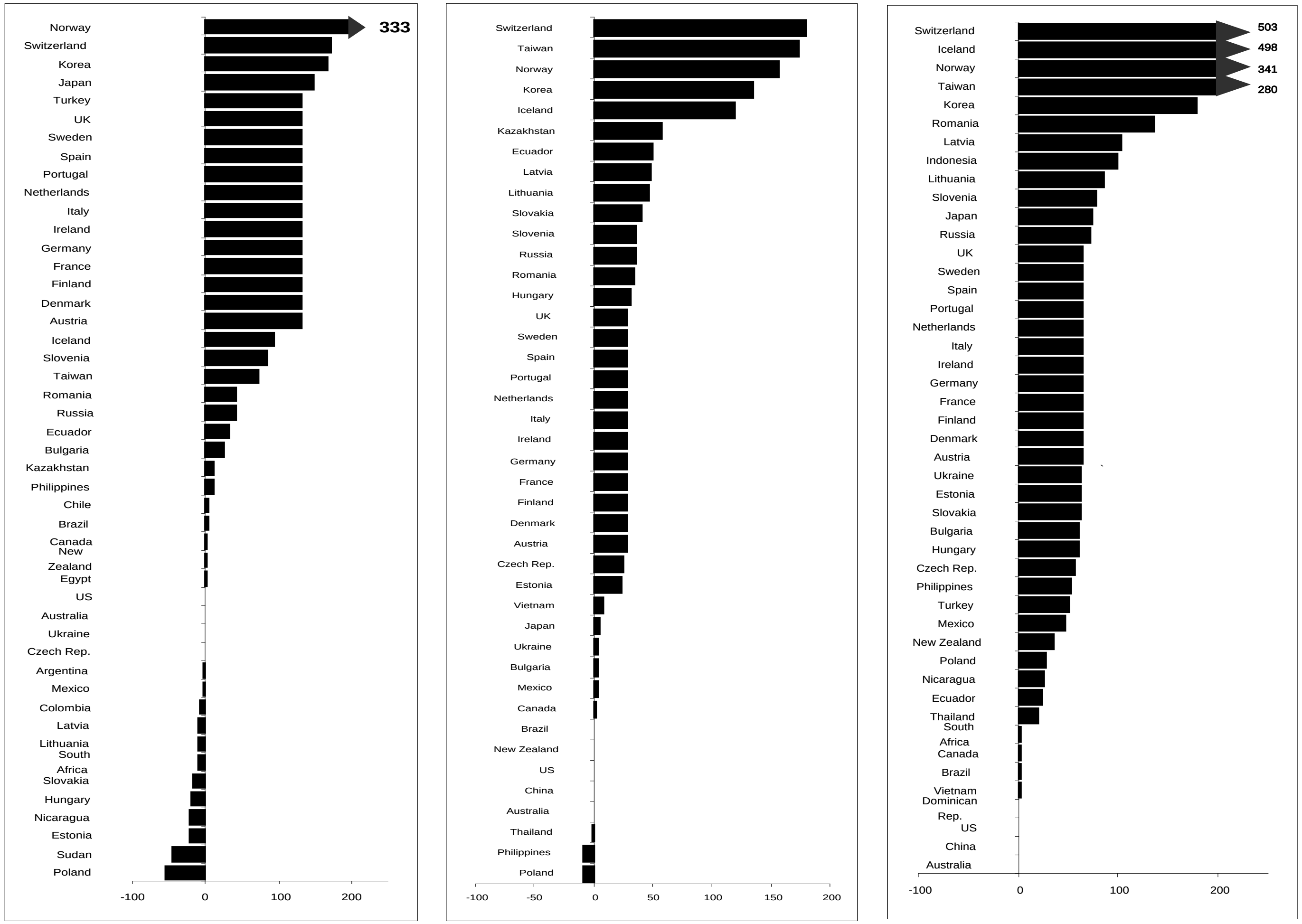


Source: Anderson and Valenzuela (2008), based on estimates reported in the project's national country studies.

Figure 4: Nominal rates of assistance, beef, pigmeat and poultry, by country, 2000-04

(percent)

(a) Beef (b) Pigmeat (c) Poultry

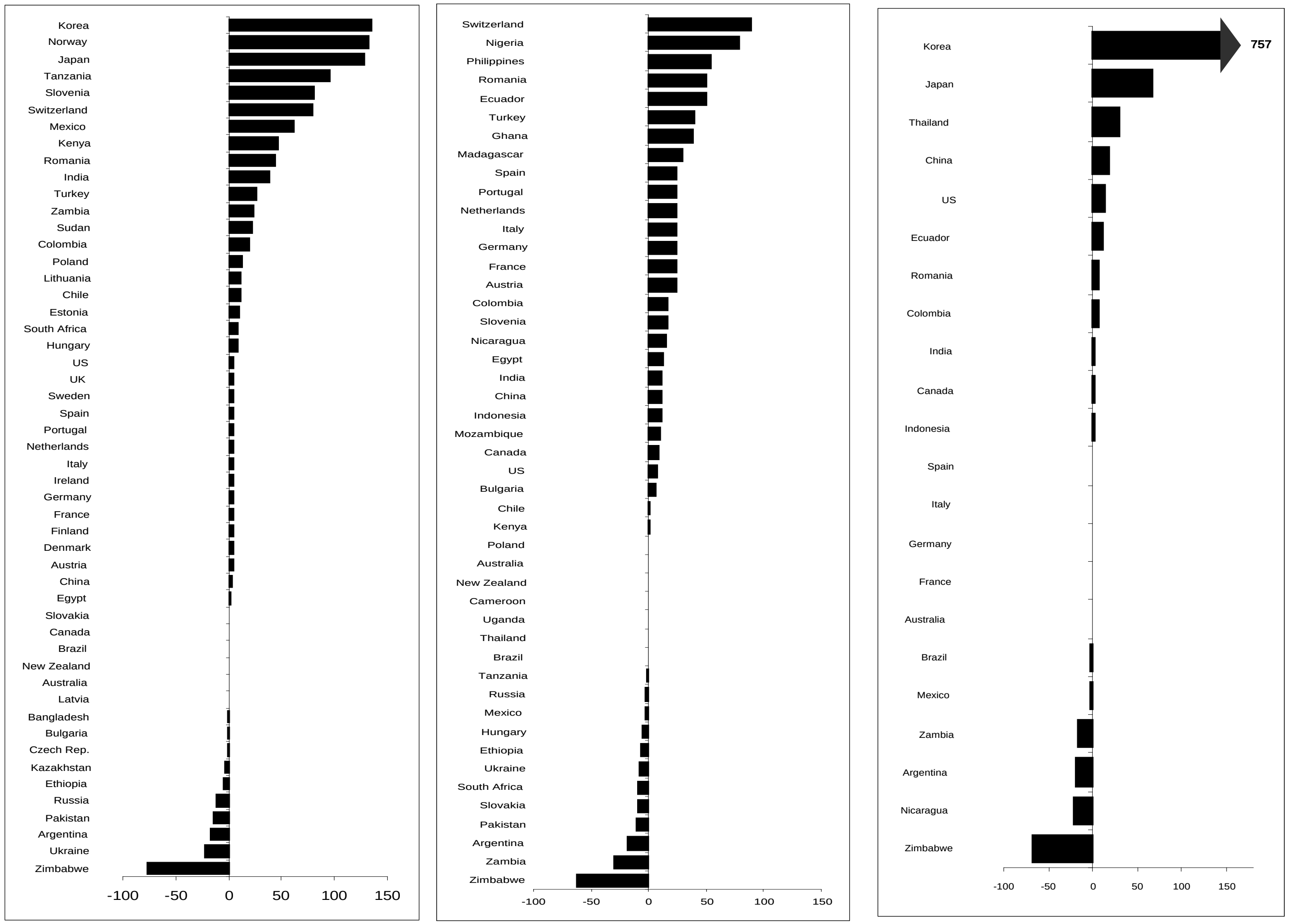


Source: Anderson and Valenzuela (2008), based on estimates reported in the project’s national country studies.

Figure 5: Nominal rates of assistance, wheat, maize and soybean, by country, 2000-04

(percent)

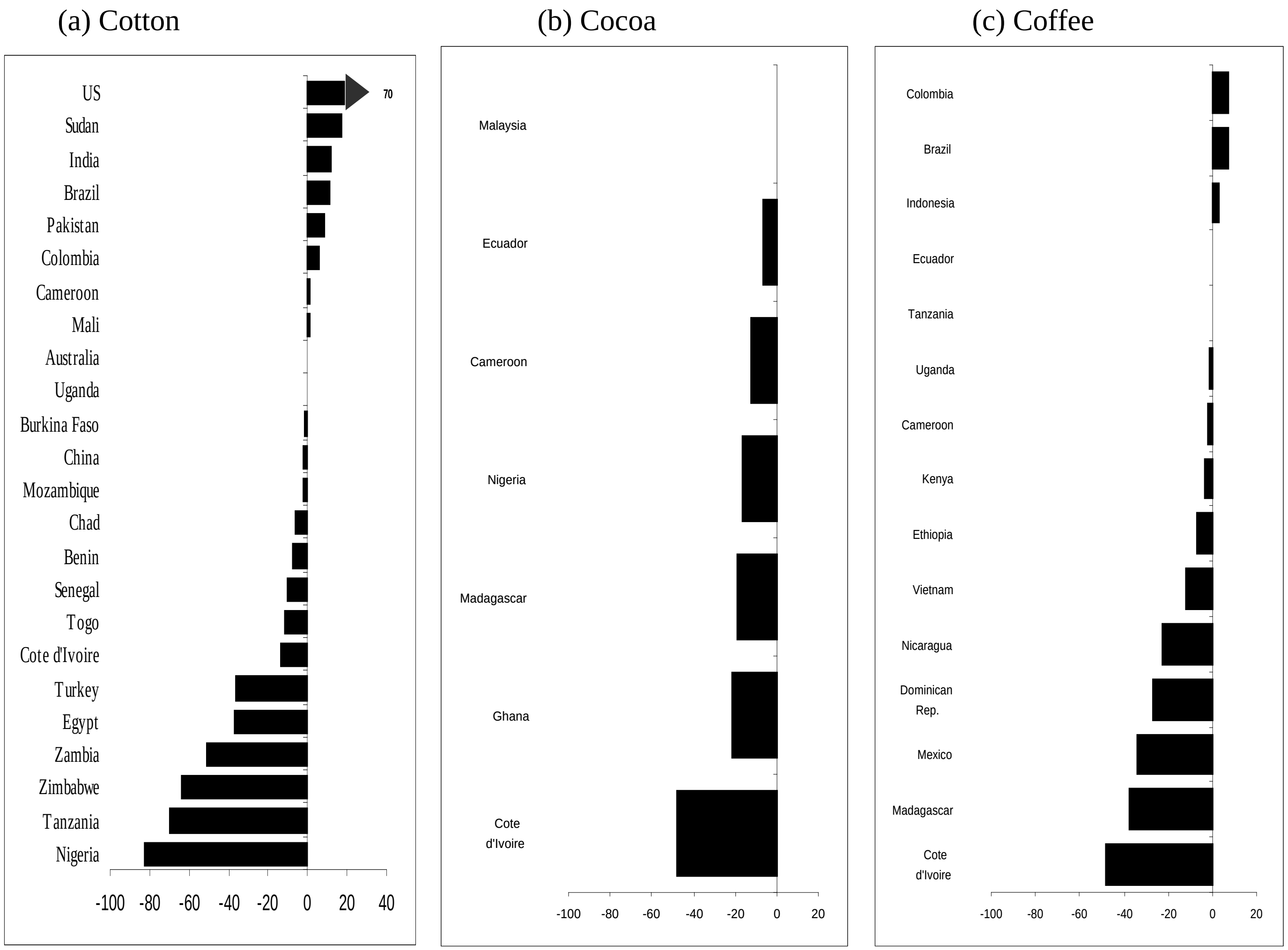
(a) Wheat (b) Maize (c) Soybean



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

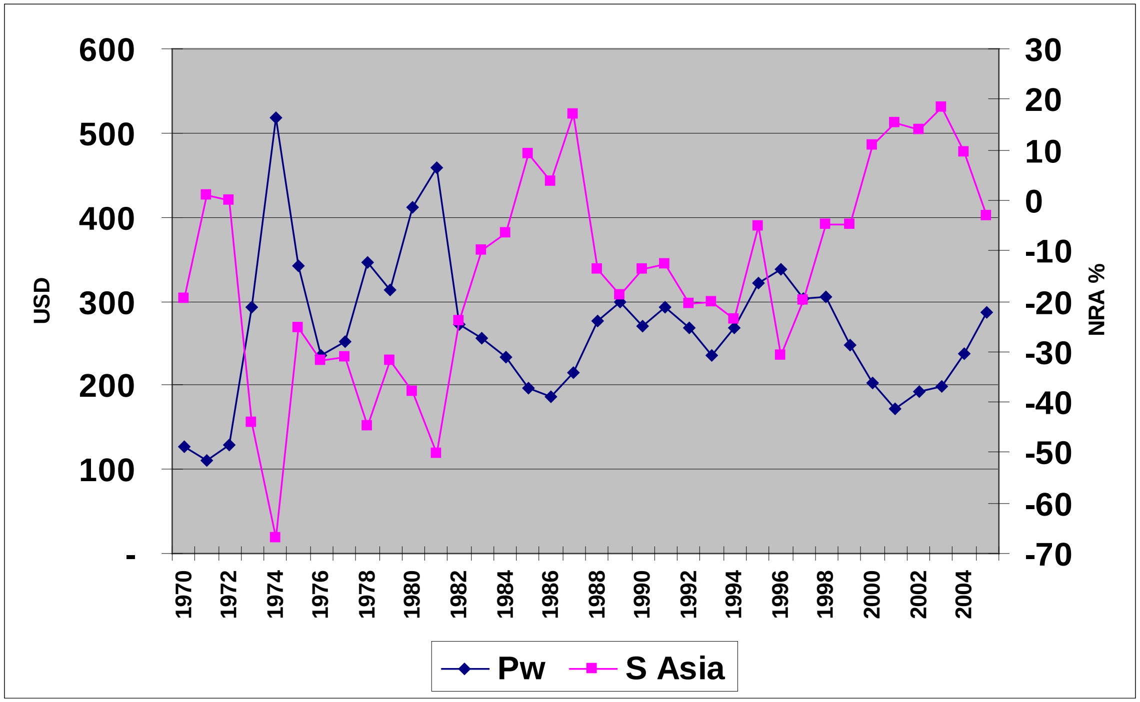
Figure 6: Nominal rates of assistance, cotton, cocoa and coffee, by country, 2000-04

(percent)



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

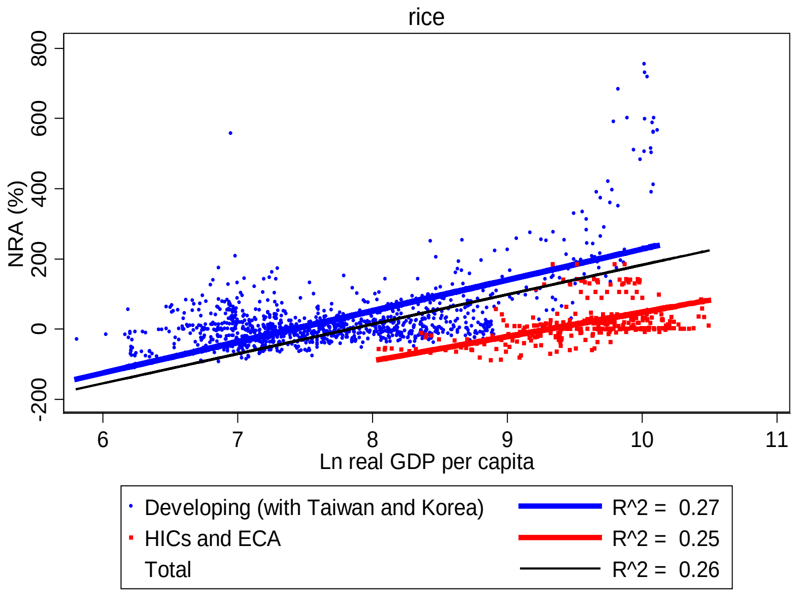
Figure 7: Rice NRA and international rice price, South Asian region, 1970 to 2005
(left axis is int'l price in USD, right axis is NRA in percent)



Correlation coefficient is -0.75

Source: Authors' compilation based on data in Anderson and Valenzuela (2008)

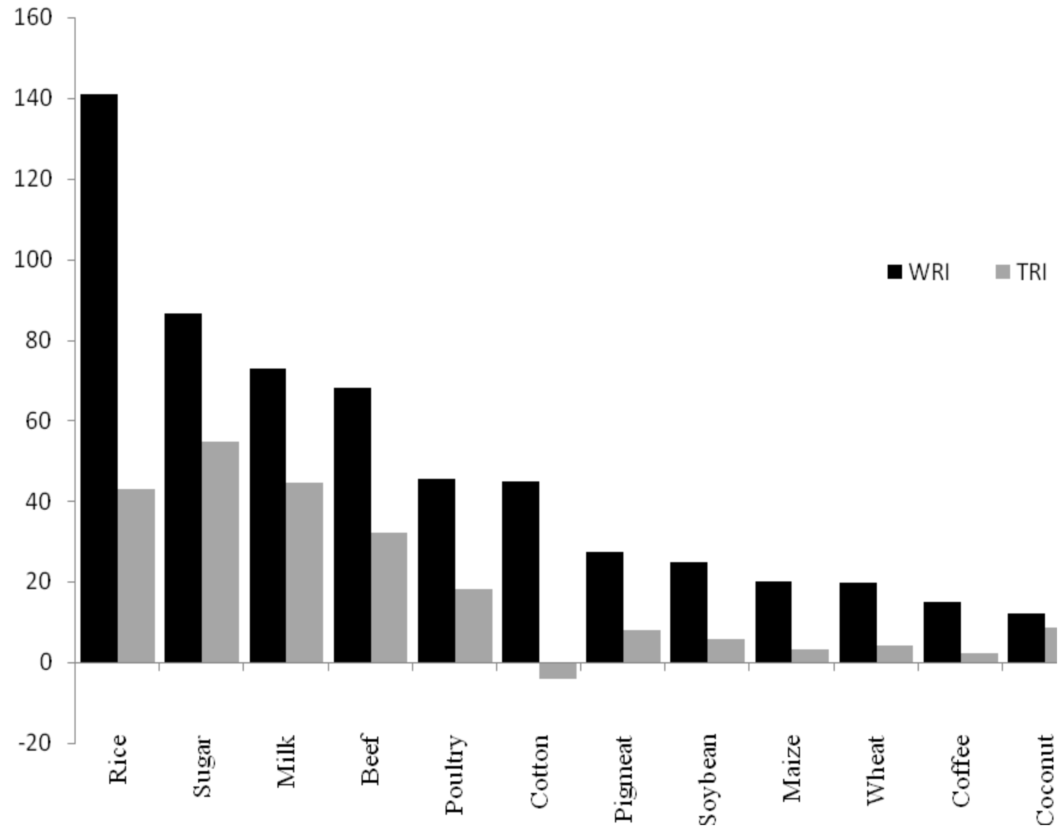
Figure 8: Nominal rates of assistance for rice and per capita income, 1955 to 2007



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

Figure 9: Trade and welfare reduction indexes for twelve key covered products, 2000-04

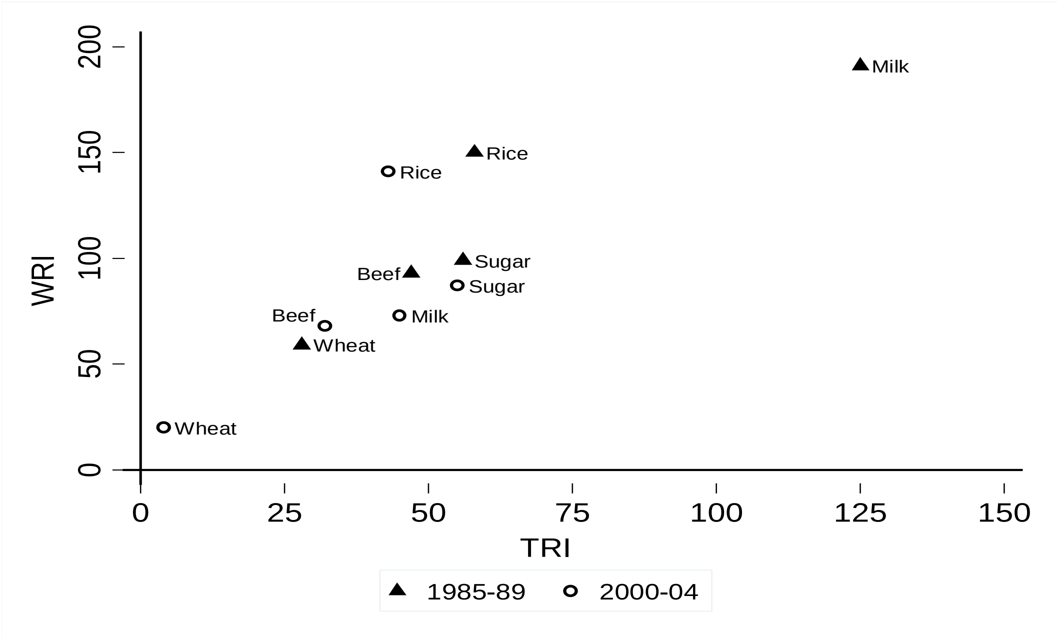
(percent)



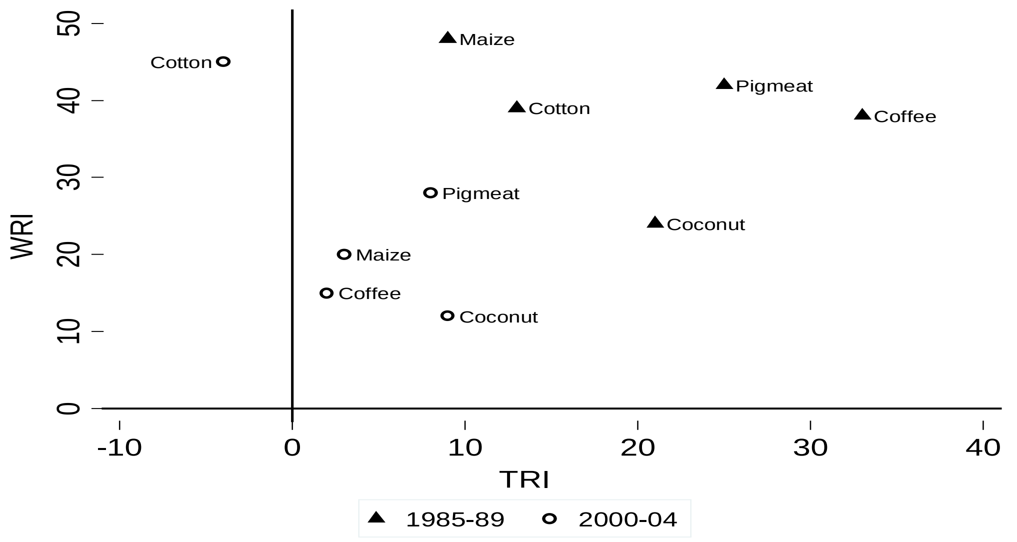
Source: Derived from estimates in Anderson and Croser (2009), based on NRA and CTE estimates in Anderson and Valenzuela (2008).
Figure 10: Global Trade and Welfare Reduction Indexes for covered tradable farm products, by commodity, 1985-89 and 2000-04

(percent)

(a) Beef, milk, rice, sugar and wheat



(b) Coconut, coffee, cotton, maize and pigmeat



Source: Derived from estimates in Anderson and Croser (2009), based on NRA and CTE estimates in Anderson and Valenzuela (2008).

Figure 11: Country Share of the Global Commodity-Specific TRI for Rice, Sugar, Beef, Cotton and Milk, 2000–04

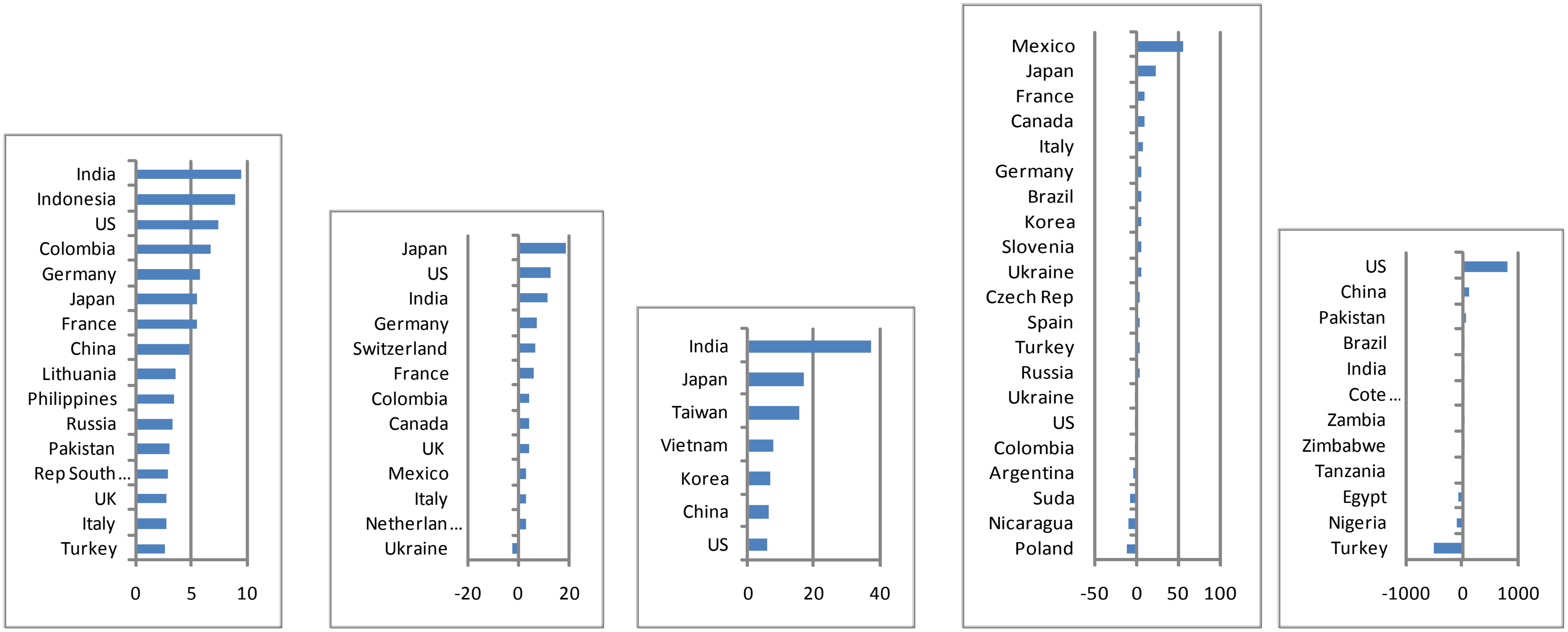
(a) Sugar
(51 countries global TRI = 54.8)

(b) Milk
(46 countries global TRI = 44.5)

(c) Rice
(36 countries global TRI = 42.9)

(d) Beef
(47 countries global TRI = 32.0)

(e) Cotton
(19 countries global TRI = -4.1)



Source: Derived from estimates in Anderson and Croser (2009), based on NRA and CTE estimates in Anderson and Valenzuela (2008).
Notes: The decomposition over the 5-year period can be greater than or less than 100, even though the decomposition sums to 100 in any one year. We have scaled the 5-year averages, so that the decompositions sum to 100. Focus countries have been omitted where the decomposition share has an absolute value of less than 2.

Figure 12: Country Share of the Global Commodity-Specific WRI for Rice, Sugar, Milk, Beef and Cotton, 2000–04

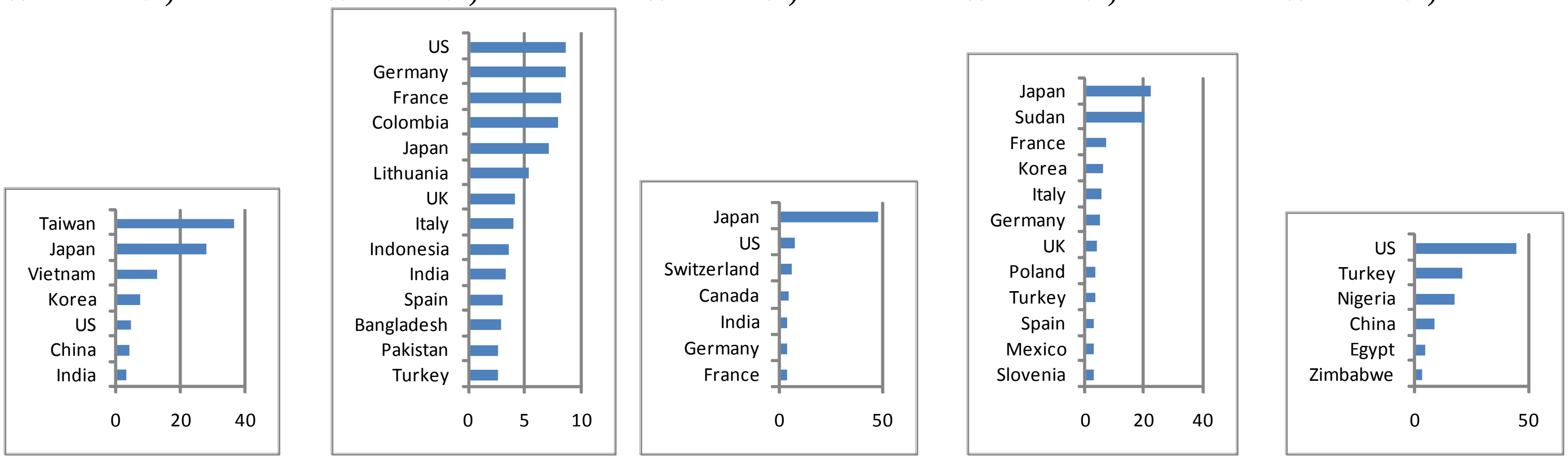
(a) Rice (51 countries global WRI = 140.9)

(b) Sugar (46 countries global WRI = 86.7)

(c) Milk (36 countries global WRI = 72.8)

(d) Beef (47 countries global WRI = 68.1)

(e) Cotton (19 countries global WRI = 44.7)



Source: Derived from estimates in Anderson and Croser (2009), based on NRA and CTE estimates in Anderson and Valenzuela (2008).

Note: The decomposition over the 5-year period can be greater than or less than 100, even though the decomposition sums to 100 in any one year. We have scaled the 5-year averages, so that the decompositions sum to 100. Focus countries have been omitted where the decomposition share has a value of less than 2.

Table 1: Coverage of gross value of agricultural production at undistorted prices, for twelve key covered products, 2000-04

(percent)

	NRA coverage (%) of product's global value of production	**Product's share of global production value of 12 key products**
Grains and oilseeds	**93**	**37**
Rice	92	13
Wheat	89	10
Maize	94	9
Soybean	96	5
Tropical crops	**80**	**8**
Sugar	87	3
Cotton	82	3
Coconut	60	1
Coffee	75	1
Livestock products	**82**	**55**
Milk	83	15
Beef	69	14
Pigmeat	91	16
Poultry	81	10
All above products	**86**	**100**

Source: Authors' calculations based on the Anderson and Valenzuela (2008) database and FAO commodity balance and production data.

Table 2: Share of global agricultural production for key covered products, by region,[a] 2000-04

(percent)

	Regional shares (%) of global gross value of agric production							
	Covered products in focus countries						Residual	World
	Africa	Asia	LAC	ECA	HIC	All		
Grains+oils	**11**	**39**	**5**	**6**	**23**	**84**	**16**	**100**
Rice	3	81	2	0	5	92	8	100
Wheat	6	32	4	14	33	89	11	100
Maize	11	26	13	5	40	94	6	100
Soybean	0	15	37	0	43	96	4	100
Tropical crops	**10**	**36**	**12**	**5**	**11**	**74**	**26**	**100**
Sugar	5	43	17	6	16	87	13	100
Cotton	11	30	5	14	22	82	18	100
Coconut	0	60	0	0	0	60	40	100
Coffee	11	12	52	0	0	75	25	100
Livestock products	**3**	**21**	**6**	**7**	**36**	**72**	**28**	**100**
Milk	3	21	4	12	43	83	17	100
Beef	6	1	16	5	41	69	31	100
Pigmeat	0	49	3	6	34	91	9	100
Poultry	2	27	9	5	38	81	19	100

Source: Authors' calculations based on the Anderson and Valenzuela (2008) database and FAO commodity balance and production data.

a. The group averages refer to 30 key products, and in total there are more than 70 products covered by the project, even though only 12 are shown separately here.

Table 3: Shares of regional agricultural production for major covered products,[a] by region, 2000-04

(percent)

	Covered product shares of regional gross value of agricultural production of focus countries				
	Africa	Asia	Latin America	Eastern Europe and CIS	High-income countries
Grains + oils	**16**	**23**	**13**	**12**	**16**
Rice	2.8	13.6	1.9	0.1	1.0
Wheat	4.7	4.6	3.0	10.2	5.6
Maize	8.4	3.3	8.3	2.7	6.2
Soybean	0.0	1.1	13.3	0.0	3.6
Tropical crops	**4.3**	**3.8**	**8.0**	**3.3**	**1.6**
Sugar	1.2	1.9	3.8	1.3	0.8
Cotton	2.3	1.0	0.9	2.1	0.9
Coconut	na	0.8	na	na	na
Coffee	0.8	0.1	3.3	na	na
Livestock products	**12**	**19**	**28**	**24**	**33**
Milk	3.5	4.5	4.4	11.8	11.1
Beef	6.8	0.2	14.7	4.6	9.1
Pigmeat	na	10.6	3.0	6.6	8.9
Poultry	1.6	3.6	5.9	2.9	6.2
Total of above 12	**32**	**45**	**49**	**39**	**51**
All covered	**68**	**66**	**70**	**61**	**72**
Non-covered	**32**	**34**	**30**	**39**	**28**
All agric	**100**	**100**	**100**	**100**	**100**

Source: Authors' calculations based on the Anderson and Valenzuela (2008) database and FAO commodity balance and production data.

a. The product group averages refer to 30 key products, and in total there are more than 70 products covered by the project, even though only 12 are shown separately here.

Table 4: Gross subsidy equivalents of assistance to farm industries, by focus country group,[a] 1965 to 2007

(a) All focus countries (constant 2000 US$ per year)

	1965-69	1970-74	1975-79	1980-84	1985-89	1990-94	1995-99	2000-04
Grains and oilseeds	**12911**	**-2700**	**11442**	**-10561**	**44083**	**38345**	**37908**	**36655**
Rice	2009	-3700	9851	-15006	23352	23491	24633	28189
Wheat	8365	-881	974	7010	16094	12663	7993	3489
Maize	2477	1995	1300	-2259	5507	1770	3347	4124
Soybean	61	-114	-682	-307	-869	422	1935	853
Tropical crops	**7053**	**-7289**	**-6757**	**-6521**	**2092**	**3468**	**5716**	**10683**
Sugar	8287	-6247	547	3134	7816	7211	8958	10750
Cotton	-94	927	-2008	-2230	-1422	-2151	-1297	228
Coconut	-110	-543	-256	-841	-841	-1117	-1017	-273
Coffee	-1030	-1425	-5040	-6584	-3462	-476	-928	-21
Livestock products	**61368**	**66214**	**105824**	**77798**	**97486**	**94166**	**86491**	**76757**
Milk	35581	39518	72029	73126	73973	59982	46208	43974
Beef	7350	7364	10554	17018	27272	21052	19998	13986
Pigmeat	15792	15132	17550	-19655	-9729	3382	9874	8927
Poultry	2644	4201	5691	7309	5969	9750	10411	9869
All of above	**81332**	**56225**	**110509**	**60716**	**143661**	**135979**	**130116**	**124095**

Table 4 (continued): Gross subsidy equivalents of assistance to farm industries, by region,[a] 1965 to 2007

(b) Developing countries (constant 2000 US$ per year)

	1965-69	1970-74	1975-79	1980-84	1985-89	1990-94	1995-99	2000-04
Grains and oilseeds	**-6971**	**-15204**	**-14214**	**-38079**	**-3883**	**-7934**	**9494**	**15235**
Rice	-9278	-14804	-11835	-32706	-5435	-7230	2513	12245
Wheat	1574	108	-115	-453	3191	1361	4720	2297
Maize	673	-396	-1579	-4611	-28	-2092	1106	1222
Soybean	61	-112	-685	-308	-1611	27	1155	-529
Tropical crops	**331**	**-8680**	**-12538**	**-12092**	**-5003**	**-3181**	**-503**	**4222**
Sugar	2980	-6249	-4819	-1982	889	440	2273	5103
Cotton	-1509	-462	-2424	-2684	-1590	-2028	-832	-586
Coconut	-110	-543	-256	-841	-841	-1117	-1017	-273
Coffee	-1030	-1425	-5040	-6584	-3462	-476	-928	-21
Livestock products	**-755**	**-1814**	**11494**	**-22745**	**-2035**	**7066**	**14248**	**12930**
Milk	263	55	9639	11242	13198	6443	5610	8684
Beef	-1914	-2793	-307	-298	1583	-608	1926	-965
Pigmeat	671	883	1352	-36180	-16910	-1207	3323	2125
Poultry	225	41	810	2491	94	2438	3388	3085
All of above	**-7396**	**-25699**	**-15258**	**-72916**	**-10921**	**-4049**	**23238**	**32387**

Table 4 (continued): Gross subsidy equivalents of assistance to farm industries, by region,[a] 1965 to 2007

(c) High-income countries (constant 2000 US$ per year)

	1965-69	1970-74	1975-79	1980-84	1985-89	1990-94	1995-99	2000-04	2005-07
Grains and oilseeds	**19889**	**12523**	**25672**	**27495**	**47967**	**46277**	**28416**	**21431**	**15359**
Rice	11291	11128	21696	17685	28791	30717	22126	15955	11431
Wheat	6795	-991	1095	7459	12894	11300	3272	1192	1351
Maize	1804	2387	2879	2349	5542	3862	2243	2905	2408
Soybean	0	-2	2	1	739	397	776	1379	169
Tropical crops	**10304**	**3555**	**11135**	**6948**	**15900**	**14940**	**8037**	**6595**	**5120**
Sugar	5301	1	5373	5117	6914	6775	6682	5645	2819
Cotton	1414	1390	416	455	168	-119	-467	816	1992
Barley	3563	2135	5324	1359	7154	7175	1858	129	307
Rapeseed	26	29	22	17	1664	1110	-36	6	2
Livestock products	**62126**	**68044**	**94370**	**100534**	**99476**	**87122**	**72259**	**63791**	**34486**
Milk	35312	39462	62441	61852	60757	53568	40626	35260	13117
Beef	9277	10171	10854	17324	25661	21648	18062	14953	8519
Pigmeat	15121	14249	16196	16534	7176	4590	6543	6802	7206
Poultry	2416	4162	4879	4824	5882	7316	7027	6777	5643
All of above	**92319**	**84122**	**131176**	**134976**	**163343**	**148339**	**108712**	**91817**	**54964**

Source: Anderson and Valenzuela (2008), based on estimates reported in the project's national country studies.
[a] Does not include non-product-specific or decoupled assistance, nor and assistance provided by non-focus countries.

Table 5: Nominal rates of assistance, twelve key covered farm products,[a] all focus countries, 1965 to 2004

(percent)

	1965-69	1970-74	1975-79	1980-84	1985-89	1990-94	1995-99	2000-04
Grains and oilseeds[b]	**11**	**6**	**5**	**-3**	**21**	**16**	**14**	**17**
Rice	6	11	12	-10	26	25	23	39
Wheat	22	7	2	9	32	23	12	6
Maize	8	5	2	-3	12	3	6	7
Soybean	1	0	-2	-1	-2	1	7	4
Tropical crops[b]	**34**	**-5**	**-9**	**-8**	**4**	**7**	**11**	**27**
Sugar	157	-4	9	15	39	28	39	60
Cotton	0	9	-9	-12	-8	-10	-6	3
Coconut	-24	-8	-3	-11	-19	-34	-22	-8
Coffee	-31	-33	-43	-43	-31	-8	-10	0
Livestock products[b]	**46**	**39**	**50**	**30**	**42**	**35**	**30**	**27**
Milk	97	91	140	138	151	85	62	53
Beef	14	12	13	25	43	29	31	23
Pigmeat	47	36	31	-16	-11	4	10	10
Poultry	20	26	26	29	21	26	20	19
All of above	29	18	21	10	28	24	21	23
All covered products[b]	**24**	**15**	**18**	**6**	**16**	**18**	**16**	**16**

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

a. The group averages refer to 30 key products, and in total there are more than 70 products covered by the project, even though only 12 are shown separately here
b. Weighted averages using value of production at undistorted prices.

Table 6: Consumer tax equivalents of policies assisting producers of covered farm products, per cent and by value, all focus countries, 1965 to 2007

(a)Percent

	1965-69	1970-74	1975-79	1980-84	1985-89	1990-94	1995-99	2000-04	2005-07[a]
Crops[b]	**10**	**-3**	**4**	**5**	**19**	**17**	**13**	**16**	**22**
Rice	-14	-11	4	1	24	25	22	38	137
Wheat	19	2	3	12	27	16	6	2	5
Maize	11	7	8	2	5	-3	-2	-2	3
Soybean	1	-3	-1	3	1	0	7	4	8
Sugar	175	1	13	19	40	42	44	63	79
Livestock products[b]	**46**	**39**	**50**	**32**	**41**	**29**	**27**	**25**	**19**
Milk	98	89	137	130	140	69	54	46	23
Beef	16	14	16	25	47	30	36	31	21
Pigmeat	47	35	30	-12	-10	0	7	8	19
Poultry	23	28	27	28	18	21	18	19	16
All of above[b]	**28**	**16**	**25**	**17**	**30**	**23**	**20**	**21**	**21**

(b)Aggregate value (constant 2000 US$ per year)

	1965-69	1970-74	1975-79	1980-84	1985-89	1990-94	1995-99	2000-04	2005-07[a]
Crops	**13090**	**-20549**	**10751**	**12591**	**46803**	**49139**	**38465**	**40780**	**34167**
Rice	-7405	-15615	4303	-511	21994	23714	22973	27390	15748
Wheat	7020	-2812	1113	7545	14412	9339	3720	1420	2418
Maize	3399	2396	3992	1218	2249	-1755	-1487	-998	1465
Soybean	60	-452	-323	703	-11	123	2557	1518	2280
Sugar	10016	-4065	1667	3636	8159	17718	10702	11450	12255
Livestock products	**62252**	**66748**	**106150**	**80323**	**96353**	**83687**	**82670**	**76759**	**41500**
Milk	34929	38158	70180	69282	69593	52186	41196	40069	13019
Beef	8622	8945	12604	17432	30110	23143	24990	18906	12589
Pigmeat	15702	15119	17544	-13400	-8648	-82	6971	7487	9676
Poultry	2998	4526	5822	7009	5297	8440	9513	10298	6217
All of above	**75342**	**46200**	**116901**	**92914**	**143156**	**132826**	**121135**	**117539**	**75667**

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

a. The estimates for the period 2005-07 refer only to high-income country policies.
b. Weighted averages based on the value of consumption at undistorted prices.

Table 7: Shares of production exported (100X/Q) and of consumption imported (100M/C) for major covered products,[a] by region, 2000-03
(percent)

		Africa	Asia	LAC	ECA	HIC
Grains	**X/Q**	**2**	**7**	**11**	**13**	**29**
	M/C	**17**	**9**	**22**	**11**	**27**
Rice	X/Q	6	6	1	2	32
	M/C	28	1	12	59	15
Wheat	X/Q	4	3	46	13	49
	M/C	44	4	51	6	27
Maize	X/Q	4	8	15	10	20
	M/C	14	5	14	9	5
Tropical	**X/Q**	**52**	**38**	**45**	**32**	**47**
crops	**M/C**	**13**	**18**	**12**	**42**	**42**
Sugar	X/Q	27	12	40	20	31
	M/C	20	9	4	46	25
Cotton[b]	X/Q	29	1	5	2	31
	M/C	2	4	9	21	3
Coconut	X/Q	-	9	-	-	-
	M/C	-	-	-	-	-
Coffee	X/Q	77	78	73	-	-
	M/C	2	3	5	-	-
Livestock	**X/Q**	**1**	**4**	**10**	**7**	**20**
	M/C	**8**	**6**	**5**	**9**	**14**
Pigmeat	X/Q	-	1	12	6	21
	M/C	-	2	8	12	20
Milk	X/Q	0	0	5	2	7
	M/C	1	1	5	1	3
Beef	X/Q	1	2	10	6	23
	M/C	9	48	5	14	20
Poultry	X/Q	1	10	16	7	19
	M/C	9	11	5	28	10
Total of above 12	**X/Q**	**16**	**22**	**19**	**11**	**24**
products	**M/C**	**13**	**14**	**12**	**11**	**19**

Source: Authors' calculations based on and FAO commodity balance and production data.

a. The group averages refer to 30 key products, and in total there are more than 70 products covered by the project, even though only 12 are shown separately here. These data include intra-European Union trade which, if excluded, would have lowered substantially the numbers in the HIC column. LAC, ECA and HIC refer to Latin America and the Caribbean, Europe and Central Asia's transition economies, and high-income countries.
b. Excluding data for the 5 cotton countries of Benin, Burkina Faso, Chad, Mali and Togo.

Table 8: Focus countries' shares of global production of seven mostly-nontraded staple crops, by region, 1995-2004

(percent)

	Regional shares of global volume of crop production							
	Focus countries						Non-focus countries	World
	Africa	Asia	LAC	All DCs	HIC+ ECA	All		
Cassava	37	28	14	79	0	79	19	100
Potato	2	29	4	35	52	87	13	100
Sweet potato	5	89	1	95	1	96	4	100
Yams	88	0	1	89	0	89	11	100
Millet	31	45	0	76	5	81	19	100
								100
Banana	6	48	26	80	1	81	19	100
Plantain	56	2	13	70	0	70	30	100
ALL 7 crops	**23**	**41**	**11**	**75**	**11**	**86**	**14**	**100**

Source: Authors' calculations based on and FAO production data.

Table 9: Average of focus developing countries' self-sufficiency ratios for seven mostly-nontraded staple crops, by region, 1961 to 2005

(production divided by production plus net imports)

	1961-69	**1970-79**	**1980-89**	**1990-99**	**2000-05**
Africa					
Cassava	1.00	1.00	1.00	1.00	1.00
Potato	1.02	1.03	1.02	1.03	1.02
Sweet potato	1.00	1.00	1.00	1.00	1.00
Yam	1.00	1.00	1.00	1.00	1.00
Millet	1.00	0.99	1.00	1.00	1.00
Banana	1.23	1.13	1.05	1.09	1.13
Plantain	1.00	1.00	1.00	1.00	1.00
Asia					
Cassava	1.04	1.10	1.18	1.13	1.04
Potato	1.00	1.00	1.00	1.00	1.00
Sweet potato	1.00	1.00	1.00	1.00	1.00
Yam	1.00	1.00	1.00	0.98	0.87
Millet	1.00	1.00	1.00	1.00	1.00
Banana	1.04	1.08	1.06	1.04	1.04
Plantain	1.00	1.00	1.00	1.00	1.00
Latin America					
Cassava	1.00	1.00	1.00	1.00	1.00
Potato	1.00	0.99	1.00	0.99	0.99
Sweet potato	1.00	1.00	1.01	1.01	1.01
Yam	1.00	1.02	1.04	1.02	1.01
Millet	4.21	2.21	2.15	1.97	1.03
Banana	1.23	1.21	1.25	1.48	1.52
Plantain	1.00	1.00	1.00	1.03	1.06

Source: Authors' calculations based on and FAO production and trade data.

Table 10: Additional contribution of 7 non-covered staples[a] to values of agricultural production (VOP) and to aggregate NRAs in focus developing countries, 1966 to 2004

(percent at undistorted prices)

	s countries of:			
	Africa	Asia	LAC	All DCs
Covered products' share of regional VOP (with 7 staples' share in brackets)				
1966-1974	71 (16.5)	63 (1.3)	58 (1.2)	64 (2.7)
1975-1984	69 (18.2)	71 (1.1)	69 (0.4)	71 (3.5)
1985-1994	67 (18.6)	76 (1.3)	66 (0.5)	73 (4.0)
1995-2004	67 (22.1)	69 (2.6)	69 (0.9)	69 (5.8)
Non-covered 7 staples' share of regional VOP				
1966-1974	1.7	4.6	7.2	4.5
1975-1984	2.4	5.9	8.3	5.8
1985-1994	2.4	5.4	10.1	5.8
1995-2004	2.7	5.7	10.3	6.0
Covered products' weighted average NRA				
1966-1974	-20.1	-0.2	-19.8	-8.1
1975-1984	-16.2	-10.7	-17.1	-13.8
1985-1994	-5.8	-9.9	-6.7	-9.1
1995-2004	-7.7	8.3	1.8	5.3
Covered plus 7 non-covered wted. av. NRA[b]				
1966-1974	-19.6	-0.2	-17.6	-7.6
1975-1984	-15.7	-9.9	-15.3	-12.8
1985-1994	-5.6	-9.2	-5.8	-8.4
1995-2004	-7.4	7.7	1.6	4.9

[a] The staples considered here are banana, cassava, millet, plantain, potato, sweet potato and yam. The undistorted prices for these products are assumed to be the domestic producer prices.

[b] Assumes the NRA and CTE for each of the 7 staples is zero.

Source: Authors' calculations based on FAO production data and on NRAs from the project's national country studies as summarized in Anderson and Valenzuela (2008).

Table 11: Global Trade Reduction Indexes, by commodity, 1965 to 2004

(percent)

	1965-69	1970-74	1975-79	1980-84	1985-89	1990-94	1995-99	2000-04
Grains and oilseeds	**18**	**15**	**15**	**20**	**19**	**18**	**15**	**9**
Rice	50	58	42	41	58	53	32	43
Wheat	15	1	1	9	28	20	11	4
Maize	8	4	9	-3	9	10	2	3
Soybean	1	0	6	8	11	8	6	6
Tropical Crops	**34**	**26**	**36**	**42**	**32**	**31**	**19**	**9**
Sugar	143	27	40	47	56	44	41	55
Cotton	2	13	14	1	13	4	9	-4
Coconut	24	8	3	12	21	35	23	9
Coffee	30	31	37	46	33	13	12	2
Livestock products	**53**	**37**	**48**	**53**	**49**	**37**	**23**	**25**
Milk	83	79	133	131	125	63	53	45
Beef	20	17	18	32	47	32	33	32
Pigmeat	37	28	25	47	25	11	9	8
Poultry	22	29	26	24	27	27	18	18
All of above	**29**	**21**	**23**	**30**	**30**	**29**	**19**	**15**

Source: Derived from estimates in Anderson and Croser (2009), based on NRA and CTE estimates in Anderson and Valenzuela (2008).

Table 12: Global Welfare Reduction Indexes, by commodity, 1965 to 2004

(percent)

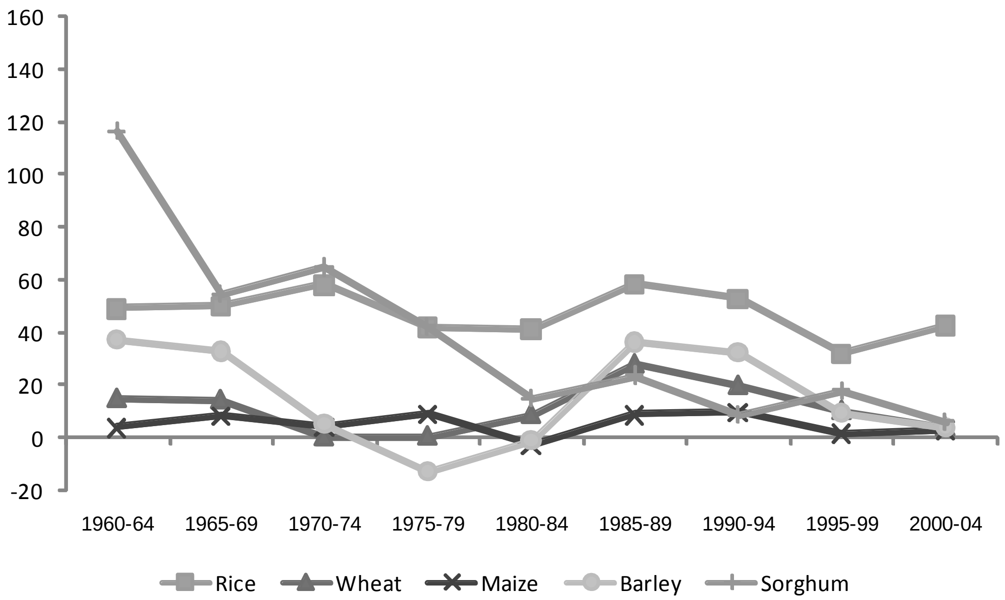
	1965-69	1970-74	1975-79	1980-84	1985-89	1990-94	1995-99	2000-04
Grains and oilseeds	**44**	**42**	**47**	**49**	**89**	**82**	**61**	**58**
Rice	65	86	75	75	150	152	116	141
Wheat	45	36	30	30	59	47	29	20
Maize	29	23	29	30	48	29	21	20
Soybean	6	10	16	28	31	27	24	25
Tropical crops	**97**	**48**	**47**	**49**	**63**	**58**	**52**	**59**
Sugar	224	58	68	72	99	76	77	87
Cotton	46	47	32	29	39	38	34	45
Coconut	24	12	14	19	24	38	27	12
Coffee	32	35	44	50	38	31	22	15
Livestock products	**83**	**76**	**91**	**89**	**88**	**68**	**54**	**52**
Milk	161	149	218	182	191	111	83	73
Beef	43	42	47	66	93	76	72	68
Pigmeat	79	66	59	70	42	33	27	28
Poultry	43	54	48	50	48	54	46	45
All of above	**67**	**58**	**65**	**66**	**86**	**73**	**57**	**55**

Source: Derived from estimates in Anderson and Croser (2009), based on NRA and CTE estimates in Anderson and Valenzuela (2008).

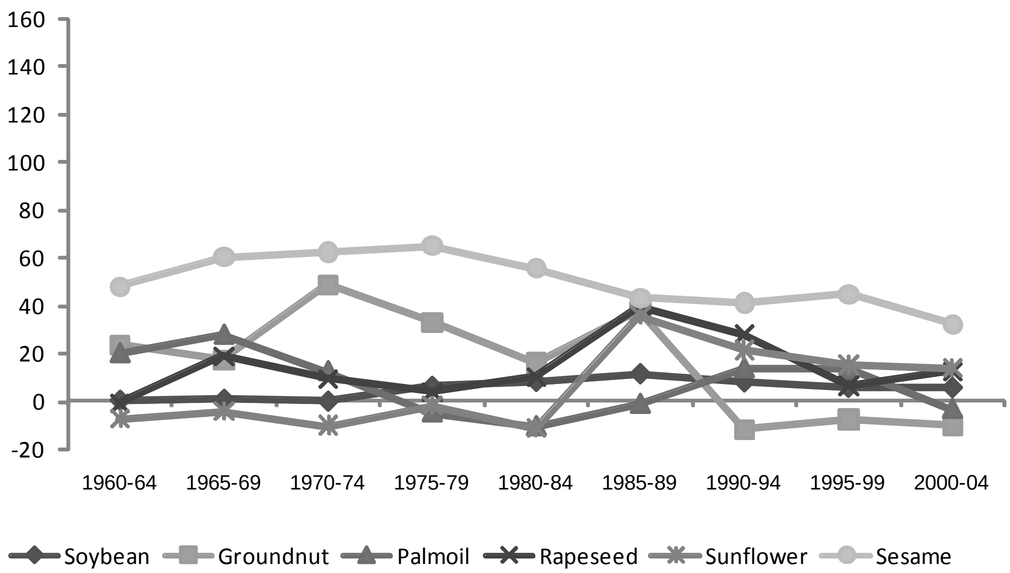
Appendix Figure 1: Global Trade Reduction Indexes, 1960 to 2004

(percent)

(a) Grains



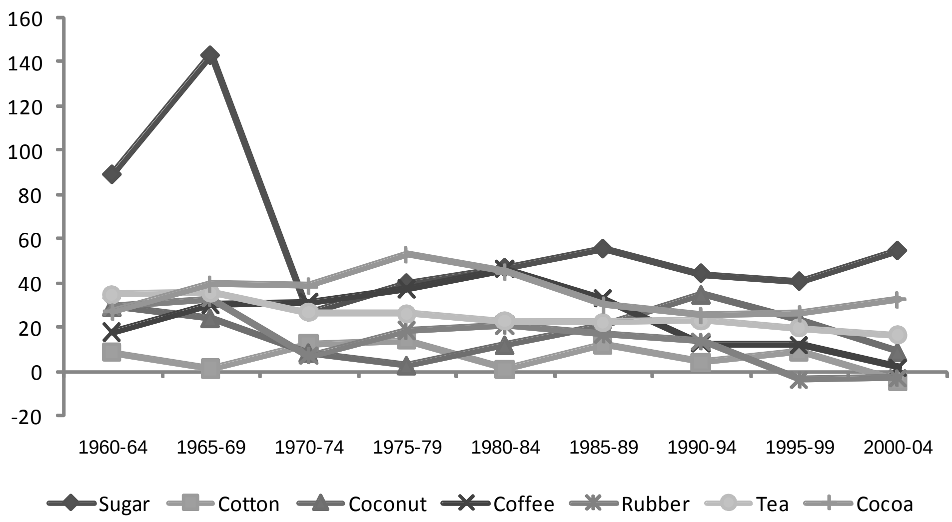
(b) Oilseeds



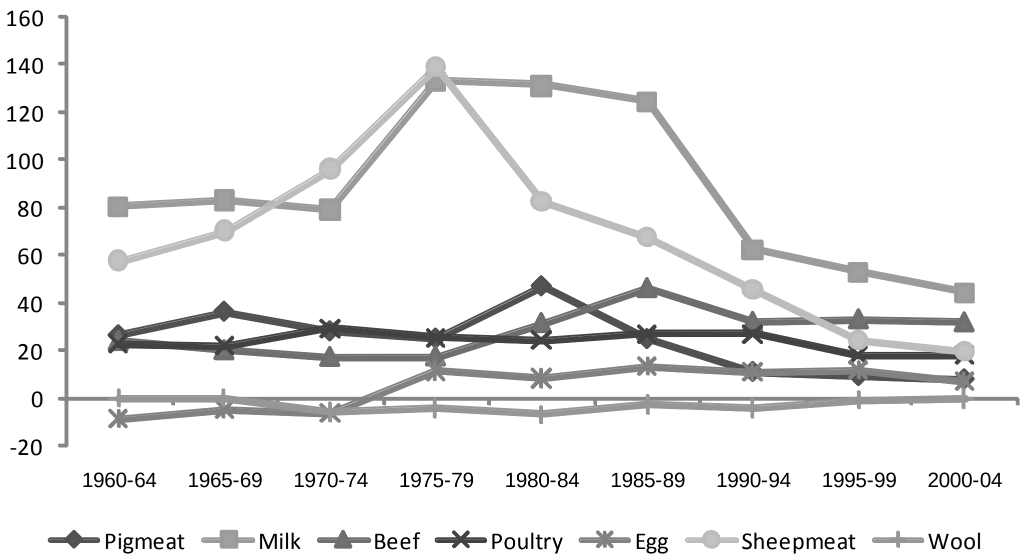
Appendix Figure 1 (continued). Global Trade Reduction Indexes, 1960 to 2004

(percent)

(c) Tropical crops



(d) Livestock products

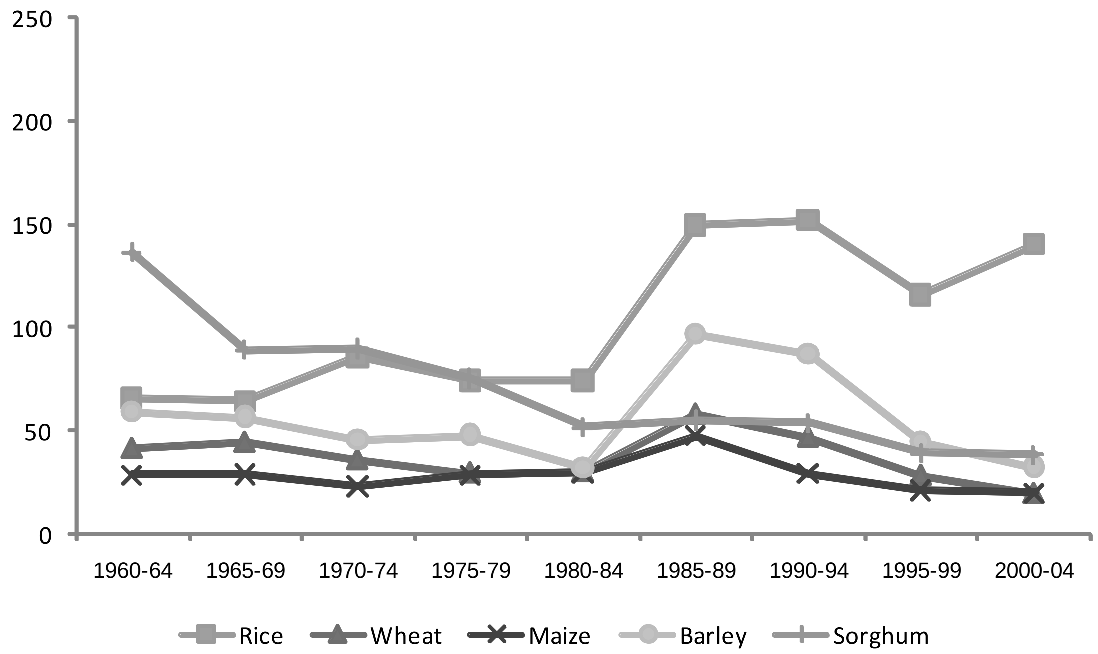


Source: Derived from estimates in Anderson and Croser (2009), based on NRA and CTE estimates in Anderson and Valenzuela (2008).

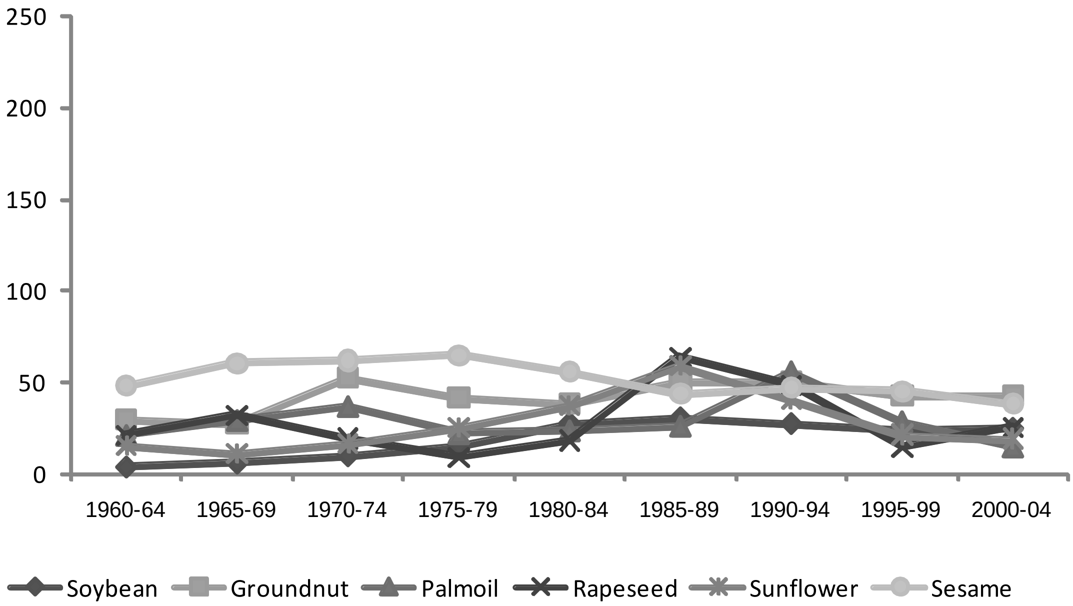
Appendix Figure 2: Global Welfare Reduction Indexes, 1960 to 2004

(percent)

(a) Grains

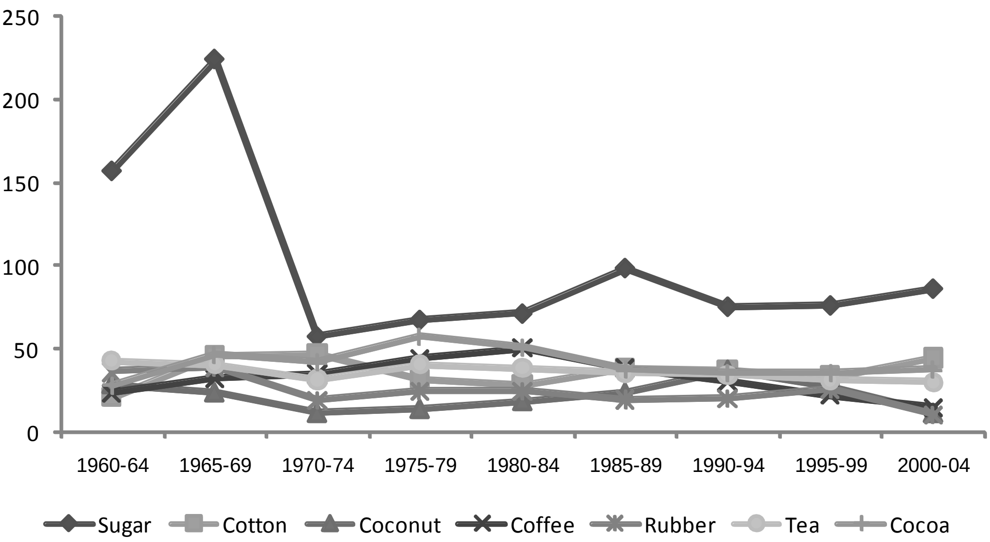

250
200
150
100
50
0
1960-64
1965-69
1970-74
1975-79
1980-84
1985-89
1990-94
1995-99
2000-04
Rice
Wheat
Maize
Barley
Sorghum

(b) Oilseeds


250
200
150
100
50
0
1960-64
1965-69
1970-74
1975-79
1980-84
1985-89
1990-94
1995-99
2000-04
Soybean
Groundnut
Palmoil
Rapeseed
Sunflower
Sesame

Appendix Figure 2 (continued): Global Welfare Reduction Indexes, 1960 to 2004
(percent)

(c) Tropical crops



(d) Livestock products

Source: Derived from estimates in Anderson and Croser (2009), based on NRA and CTE estimates in Anderson and Valenzuela (2008).

Appendix Table 1: Summary of NRA estimates by major product, Africa, Asia and Latin America, 2000-04
(a) Africa

Product	Number of countries	Weighted average NRA	Gross Value of Prod'n[a]	Countries included (by ISO code)
Apple [b]	1	0.3	0.15	ZA
Banana	1	1.1	0.08	CM
Bean	3	-25.1	0.49	MZ, TZ, UG
Beef	3	-26.0	5.89	EG, ZA, SD
Camel	1	87.7	0.10	SD
Cashew	2	-9.9	0.06	MZ, TZ
Cassava	13	-2.6	8.45	BJ, BF, CM, TD, CI, GH, MG, ML, MZ, NG, TZ, TG, UG
Chat	1	-39.5	0.07	ET
Clove	1	-18.7	0.05	MG
Cocoa	5	-35.8	2.59	CM, CI, GH, MG, NG
Coffee	7	-12.0	0.70	CM, CI, ET, KE, MG, TZ, UG
Cotton	16	-46.1	1.94	BJ, BF, CM, CI, TD, EG, ML, MZ, NG, SN, SD, TZ, TG, UG, ZM, ZW
Fruit & veg [b]	1	0.0	0.14	KE
Grape [b]	1	7.4	0.21	ZA
Groundnut	8	-40.3	1.72	GH, MZ, NG, SN, SD, UG, ZM, ZW
Gumarabic	1	-67.1	0.02	SD
Hides & skins	1	-48.4	0.03	ET
Maize	13	-5.4	7.24	CM, EG, ET, GH, KE, MG, MZ, NG, ZA, TZ, UG, ZM, ZW
Milk	2	14.6	2.99	EG, SD
Millet	13	-2.3	1.79	BJ, BF, CM, TD, ML, MZ, NG, SN, SD, TZ, TG, UG, ZM
Oilseed	1	-39.4	0.08	ET
Orange [b]	1	8.4	0.23	ZA
Roots &tubers	1	0.0	0.38	CM
Palmoil	1	-12.6	0.73	NG
Pepper	1	-10.2	0.00	MG
Plantain	5	-0.1	1.93	CM, CI, GH, TZ, UG
Potato	2	0.0	0.07	MZ, TZ
Poultry	1	2.7	1.36	ZA
Pulse	1	-20.4	0.16	ET
Pyrethrum	1	-47.7	0.00	TZ
Rice	10	-5.5	2.45	CI, EG, GH, MG, MZ, NG, SN, TZ, UG, ZM
Sesame	1	-38.1	0.20	SD
Sheepmeat	2	-21.4	1.57	ZA, SD
Sisal	1	0.0	0.01	TZ
Sorghum	13	20.7	2.13	BJ, BF, CM, TD, ML, MZ, NG, SD, TZ, TG, UG, ZM, ZW
Soybean	2	-54.2	0.04	ZM, ZW
Sugar	8	43.7	1.03	EG, KE, MG, MZ, ZA, SD, TZ, UG
Sunflower	3	-3.5	0.15	ZA, ZM, ZW
Sweet potato	4	-0.2	0.34	MG, MZ, TZ, UG
Tea	3	-16.4	0.58	KE, TZ, UG
Teff	1	-7.1	0.37	ET
Tobacco	4	-63.0	0.51	MZ, TZ, ZM, ZW
Vanilla	1	-12.8	0.06	MG
Wheat	8	-1.1	4.03	EG, ET, KE, ZA, SD, TZ, ZM, ZW
Yam	12	-3.3	5.73	BJ, BF, TD, CI, GH, ML, NG, TG
All covered products	**21**	**-8.9**	**58.8**	

Appendix Table 1 (continued): Summary of NRA estimates by major product, Africa, Asia and Latin America, 2000-04
(b) Asia

Product	Number of Countries	Weighted Average NRA	Gross Value of Production[a]	Countries included (by ISO Code)
Banana	1	0.0	0.47	PH
Barley	1	562.8	0.04	KP
Beef	3	85.2	1.00	KP, PH, TW
Cabbage	1	27.6	0.39	KP
Cassava	1	-10.0	0.42	TH
Chickpea	1	18.7	1.43	IN
Chillies	1	67.2	0.03	LK
Cocoa	1	0.0	0.02	MY
Coconut	3	-7.9	3.80	ID, MY, PH, LK
Coffee	2	-1.7	0.68	ID, VN
Cotton	3	5.1	4.79	CH, IN, PK
Egg	2	51.3	0.64	KP, TW
Fruit & veg	1	-8.9	23.10	IN
Fruits	1	0.0	9.23	CH
Garlic	1	122.6	0.26	KP
Groundnut	1	12.9	1.79	IN
Jute	1	-38.7	0.18	BD
Maize	6	12.6	16.30	CH, IN, ID, PK, PH, TH
Milk	4	31.6	22.00	CH, IN, KP, PK, TW
Onion	1	53.4	0.02	LK
Palmoil	3	-2.6	6.66	ID, MY, TH
Peppers	1	197.0	0.28	KP
Pigmeat	6	4.2	52.10	CH, KP, PH, TW, VN
Potato	2	6.2	0.44	BN, LK
Poultry	7	12.2	17.50	CH, KP, PH, TW, VN
Rapeseed	1	64.8	1.09	IN
Rice	12	18.5	67.00	BN, CH, IN, ID, KP, MY, PK, PH, LK, TW, TH, VN
Rubber	5	3.9	4.47	ID, MY, LK, TH, VN
Sorghum	1	15.7	0.83	ID
Soybean	5	16.9	5.22	CH, IN, ID, KP, TH
Sugar	8	43.1	9.18	TH, CH, IN, ID, PK, PH, TH, VN
Sunflower	1	14.6	0.26	IN
Tea	3	-7.5	0.56	BN, ID, LK
Vegetables	1	0.0	49.90	CH
Wheat	6	10.7	22.50	BN, CH, IN, KP, PK, TW
All covered products	**12**	**10.4**	**324.6**	

Appendix Table 1 (continued): Summary of NRA estimates by major product, Africa, Asia and Latin America, 2000-04
(c) Latin America

Product	Number of countries	Weighted Average NRA, %	Gross value of production[a]	Countries included (by ISO Code)
Apple	1	-0.2	0.15	CL
Banana	2	-24.3	0.69	DO, EC
Barley	1	-6.8	0.18	MX
Bean	3	-3.3	0.88	DO, MX, NI
Beef	7	-1.3	14.30	AR, BR, CL, CO, EC, MX, NI
Cassava	1	0.0	0.02	DO
Cocoa	1	-6.7	0.08	EC
Coffee	6	3.3	3.20	BR, CO, DO, EC, MX, NI
Cotton	2	10.7	0.86	BR, CO
Egg	1	-15.7	1.84	MX
Garlic	1	361.9	0.00	DO
Grape	1	-0.4	0.20	CL
Groundnut	1	-34.5	0.04	NI
Maize	7	-3.1	8.07	AR, BR, CL, CO, EC, MX, NI
Milk	6	45.3	4.26	AR, CL, CO, EC, MX, NI
Onion	1	74.0	0.01	DO
Palmoil	1	47.4	0.14	CO
Pigmeat	3	4.5	2.93	BR, EC, MX
Poultry	5	18.8	5.78	BR, DO, EC, MX, NI
Rice	6	33.7	1.87	BR, CO, DO, EC, MX, NI
Sesame	1	-40.5	0.01	NI
Sorghum	3	-10.3	0.87	CO, MX, NI
Soybean	6	-9.9	13.00	AR, BR, CO, EC, MX, NI
Sugar	7	26.5	3.71	BR, CL, CO, DO, EC, MX, NI
Sunflower	1	-31.9	0.91	AR
Tomato	2	-37.0	1.68	DO, MX
Wheat	5	2.0	2.91	AR, BR, CL, CO, MX
All covered products	**8**	**2.7**	**68.6**	

Source: Drawn from estimates in Anderson and Valenzuela (2008).
a. Annual average gross value of covered production at undistorted prices (US$billion).
b. Even though apple, fruit and vegetables, grape and orange are covered only by one country, the weighted and simple averages differ because traded and nontraded products are treated separately.

Appendix Table 2: Nominal Rates of Assistance of Policies Assisting Producers of 28 Covered Farm Products, All 75 Focus Countries, 1960 to 2004 (percent)

	1960-64	1965-69	1970-74	1975-79	1980-84	1985-89	1990-94	1995-99	2000-04
Grains and tubers	**20**	**15**	**9**	**9**	**-1**	**25**	**20**	**14**	**17**
Rice	39	6	11	12	-10	26	25	23	39
Wheat	15	22	7	2	9	30	23	12	6
Maize	4	8	5	2	-3	11	3	6	7
Cassava	0	0	-3	1	1	-1	-2	-4	-3
Barley	40	38	23	33	10	85	73	20	2
Sorghum	61	56	47	17	14	24	11	12	9
Millet	-19	-6	-4	-1	1	0	1	-3	-2
Oat	38	52	33	69	12	54	45	28	0
Oilseeds	**-3**	**2**	**-3**	**-7**	**-2**	**10**	**8**	**2**	**1**
Soybean	0	1	0	-2	-1	-2	1	7	4
Groundnut	-21	2	-14	-27	-1	34	3	-10	-14
Palmoil	-20	-24	-23	-15	-4	-5	8	-5	-3
Rapeseed	12	29	14	5	12	72	47	7	13
Sunflower	13	1	-9	-14	-23	46	19	-10	-12
Sesame	-53	-64	-65	-68	-60	-48	-46	-49	-39
Tropical crops	**1**	**22**	**-8**	**-13**	**-10**	**0**	**3**	**9**	**21**
Sugar	78	157	-4	9	15	38	28	39	60
Cotton	-10	0	9	-9	-12	-8	-10	-6	3
Coconut	-29	-24	-8	-3	-11	-19	-34	-22	-8
Coffee	-20	-31	-33	-43	-43	-31	-8	-10	0
Rubber	-16	-14	-8	-19	-19	-14	-16	5	4
Tea	-32	-31	-26	-26	-25	-24	-27	-19	-12
Cocoa	-27	-50	-45	-56	-47	-32	-32	-31	-35
Livestock products	**38**	**41**	**36**	**48**	**29**	**39**	**33**	**28**	**25**
Pigmeat	33	47	36	31	-16	-12	4	10	10
Milk	96	97	91	140	138	152	85	62	53
Beef	15	14	12	13	25	42	29	31	23
Poultry	21	20	26	26	29	20	26	20	19
Egg	-8	-3	-6	12	11	17	15	19	6
Sheepmeat	41	48	61	99	64	51	30	13	11
Wool	0	0	6	4	7	4	5	1	1
All of the above 28 commodities	**26**	**27**	**17**	**19**	**9**	**27**	**23**	**19**	**20**

Source: Anderson and Valenzuela (2008), based on NRA estimates reported in national studies covering 75 focus countries.
Note: The countries for which there are NRA (and CTE) estimates of these commodities account on average for 77 percent of global production (85 percent for grains, 74 percent for oilseeds, 74 percent for tropical crops, and 72 percent for livestock products).

Appendix Table 3: Consumer Tax Equivalents of Policies Assisting Producers of 28 Covered Farm Products, All 75 Focus Countries, 1960 to 2004 (percent)

	1960-64	1965-69	1970-74	1975-79	1980-84	1985-89	1990-94	1995-99	2000-04
Grains and tubers	**23**	**7**	**1**	**7**	**4**	**20**	**15**	**10**	**13**
Rice	42	-14	-11	4	1	24	25	22	38
Wheat	19	19	2	3	12	27	16	6	2
Maize	7	11	7	8	2	4	-3	-2	-2
Cassava	0	0	-1	-1	-2	-1	0	3	3
Barley	44	39	24	33	10	28	27	11	6
Sorghum	62	32	43	20	5	17	7	10	7
Millet	-15	-4	-2	0	2	3	4	6	6
Oat	39	54	33	68	11	24	17	4	-3
Oilseeds	**-4**	**-2**	**-8**	**-8**	**0**	**3**	**2**	**4**	**2**
Soybean	0	1	-3	-1	3	1	0	7	4
Groundnut	-21	-8	-20	-30	-7	26	-6	-12	-15
Palmoil	-19	-30	-35	-15	-7	-9	33	-2	-6
Rapeseed	3	13	7	5	9	13	15	5	11
Sunflower	10	1	-9	-17	-23	-2	-6	-5	-8
Sesame	-43	-56	-58	-61	-51	-38	-36	-40	-26
Tropical crops	**28**	**56**	**-2**	**-2**	**-1**	**11**	**19**	**15**	**27**
Sugar	116	175	1	13	19	38	42	44	63
Cotton	-8	0	3	-12	-15	-11	-18	-11	-6
Coconut	-29	-24	-9	-3	-12	-22	-36	-25	-10
Coffee	-16	-30	-30	-32	-49	-35	-18	-14	-4
Rubber	-43	-52	-6	-19	-23	-19	-11	2	1
Tea	-38	-41	-28	-26	-21	-21	-19	-21	-21
Cocoa	-28	-29	-33	-50	-43	-29	-19	-22	-31
Livestock products	**41**	**43**	**37**	**49**	**31**	**39**	**28**	**26**	**24**
Pigmeat	34	47	35	30	-12	-11	0	7	8
Milk	96	98	89	137	130	139	69	54	46
Beef	19	16	14	16	25	46	30	36	31
Poultry	24	23	28	27	28	17	21	18	19
Egg	-6	-1	-6	11	8	17	15	17	8
Sheepmeat	64	77	107	161	94	70	39	19	19
Wool	0	0	6	4	6	2	4	1	0
All of the above 28 commodities	**32**	**26**	**15**	**23**	**15**	**26**	**21**	**18**	**19**

Source: Anderson and Valenzuela (2008), based on CTE estimates reported in national studies covering 75 focus countries.

Appendix Table 4: Country Share of the Global Commodity-Specific TRI for Sugar, Milk, Rice, Beef and Cotton, 2000–04

(percent)

	Sugar	Milk	Rice	Beef	Cotton
TRI Global Average	**54.8**	**44.5**	**42.9**	**32.0**	**-4.1**
Decomposition					
Argentina		0.1		-4.6	
Australia	0.0	0.5	0.0	0.0	0.0
Austria	0.7	0.8		0.9	
Bangladesh	1.5		0.0		
Benin					
Brazil	0.7		0.2	5.2	16.5
Bulgaria	0.0	-0.1		0.0	
Burkina Faso					
Cameroon					0.1
Canada		3.7		7.6	
Chad					
Chile	0.4	0.1		0.1	
China	4.8	1.3	5.9		109.0
Colombia	6.7	3.9	0.2	-3.8	0.0
Cote d'Ivoire			0.1		-3.7
Czech Rep	0.9	0.5		3.4	
Denmark	0.7	1.1		0.7	
Dominican Republic	0.1		0.1		
Ecuador	0.2	0.1	1.4	0.5	
Egypt	0.3	-0.4	-0.8	0.0	-101.4
Estonia		0.1		0.0	
Finland	0.3	0.6		0.4	
France	5.4	5.9	0.1	7.7	
Germany	5.7	6.7		5.4	
Ghana			0.0		
Hungary	0.4	1.3		0.2	
Iceland		0.1		0.4	
India	9.4	10.8	36.8		-2.8
Indonesia	8.7		1.9		
Ireland	0.4	1.3		1.6	
Italy	2.6	3.0	1.0	6.0	
Japan	5.4	18.3	16.5	21.1	
Kazakhstan	0.6	0.0		-0.2	

Continued over

	Sugar	Milk	Rice	Beef	Cotton
TRI Global Average	**54.8**	**44.5**	**42.9**	**32.0**	**-4.1**
Kenya	0.4				
Korea		1.3	6.5	4.9	
Latvia	1.6	0.0		0.0	
Lithuania	3.5	-0.2		1.4	
Madagascar	0.0		0.0		
Malaysia			0.1		
Mali					
Mexico		3.0	0.0	55.8	
Mozambique	0.6		0.0		-0.1
Netherlands	1.5	2.6		1.7	
New Zealand		0.1		0.9	
Nicaragua	0.3	0.0	0.0	-11.3	
Nigeria			0.0		-125.6
Norway		1.1		1.0	
Pakistan	3.0	0.8	1.0		35.0
Philippines	3.4		1.4	0.2	
Poland	1.2	1.8		-13.4	
Portugal	0.4	0.5	0.1	0.7	
Romania	0.2	1.5		0.3	
Rep South Africa	2.8			-0.3	
Russia	3.2	2.3		2.8	
Senegal			0.0		-0.2
Slovakia	0.2	0.4		0.0	
Slovenia	0.0	0.4		4.7	
Spain	2.0	1.9	0.7	3.1	
Sri Lanka			0.0		
Sudan	1.5	1.3		-9.1	-0.7
Sweden	0.6	0.9		1.0	
Switzerland	0.9	6.4		1.0	
Taiwan			15.4	0.4	
Tanzania	0.1		0.0		-30.9
Thailand	1.6		-2.0		
Togo					
turkey	2.6	1.6	0.1	3.1	-530.3
Uganda	0.1		0.0		0.0
UK	2.7	3.7		4.3	
Ukraine	0.9	-2.9		-2.7	

Continued over

	Sugar	Milk	Rice	Beef	Cotton
TRI Global Average	**54.8**	**44.5**	**42.9**	**32.0**	**-4.1**
US	7.3	11.9	5.5	-3.2	769.3
Vietnam	1.5		7.6		
Zambia			0.0		-8.3
Zimbabwe					-26.0
Sum	100.0	100.0	100.0	100.0	100.0

Source: Derived from estimates in Anderson and Croser (2009), based on NRA and CTE estimates in Anderson and Valenzuela (2008).
Note: the decomposition over the 5-year period can be greater than or less than 100, even though the decomposition sums to 100 in any one year. We have scaled the 5-year averages, so that the decompositions sum to 100.

Appendix Table 5: Country Shares of the Global Commodity-Specific WRI for Sugar, Milk, Rice, Beef and Cotton, 2000–04

(percent)

	Rice	Sugar	Milk	Beef	Cotton
WRI global average	**140.9**	**86.7**	**72.8**	**68.1**	**44.7**
Decomposition					
Argentina			0.0	0.2	
Australia	0.0	0.0	0.1	0.0	0.0
Austria		1.1	0.4	0.8	
Bangladesh	0.0	2.8			
Benin					0.0
Brazil	0.0	0.1		0.2	0.4
Bulgaria		0.0	0.0	0.0	
Burkina Faso					0.1
Cameroon					0.0
Canada			4.3	0.0	
Chad					0.0
Chile		0.1	0.0	0.0	
China	3.9	2.4	0.4		8.2
Colombia	0.1	7.8	2.5	1.4	0.3
Cote d'Ivoire	0.0				0.1
Czech Rep		0.9	0.3	1.6	
Denmark		1.0	0.6	0.6	
Dominican Republic	0.0	0.1			
Ecuador	0.4	0.1	0.0	0.1	
Egypt	1.4	0.2	0.1	0.1	4.3
Estonia			0.0	0.0	
Finland		0.4	0.3	0.4	
France	0.1	8.0	3.3	6.8	
Germany		8.4	3.7	4.8	
Ghana	0.0				
Hungary		0.7	0.7	0.5	
Iceland			0.2	0.2	
India	3.0	3.2	3.8		0.6
Indonesia	0.1	3.5			
Ireland		0.6	0.7	1.5	
Italy	0.3	3.9	1.6	5.3	
Japan	27.8	7.0	46.9	21.8	
Kazakhstan		0.1	0.0	0.2	

Continued over

	Rice	Sugar	Milk	Beef	Cotton
WRI global average	**140.9**	**86.7**	**72.8**	**68.1**	**44.7**
Kenya		0.3			
Korea	7.1		1.9	5.6	
Latvia		1.8	0.0	0.0	
Lithuania		5.2	0.2	0.5	
Madagascar	0.0	0.0			
Malaysia	0.0				
Mali					0.1
Mexico	0.0	1.6	1.7	2.7	
Mozambique	0.0	0.5			0.0
Netherlands		2.2	1.5	1.5	
New Zealand			0.0	0.0	
Nicaragua	0.0	0.1	0.0	0.9	
Nigeria	0.0				17.0
Norway			1.6	2.1	
Pakistan	1.5	2.5	0.2		0.2
Philippines	0.2	2.3		0.0	
Poland		1.3	1.0	3.2	
Portugal	0.1	0.6	0.3	0.6	
Romania		0.3	1.4	0.2	
Rep South Africa		1.7		0.1	
Russia		1.8	0.7	0.8	
Senegal	0.0				0.0
Slovakia		0.2	0.2	0.0	
Slovenia		0.0	0.2	2.6	
Spain	0.2	3.0	1.1	2.8	
Sri Lanka	0.0				
Sudan		1.5	0.5	19.9	0.2
Sweden		0.9	0.5	0.9	
Switzerland		1.7	6.2	1.2	
Taiwan	36.1			0.2	
Tanzania	0.0	0.1			1.7
Thailand	0.6	0.2			
Togo					0.0
Turkey	0.0	2.5	0.9	3.0	20.1
Uganda	0.0	0.0			0.0
UK		4.0	2.1	3.8	

Continued over

	Rice	Sugar	Milk	Beef	Cotton
WRI global average	**140.9**	**86.7**	**72.8**	**68.1**	**44.7**
Ukraine		0.3	0.4	0.9	
US	4.5	8.5	7.2	0.2	43.8
Vietnam	12.5	2.0			
Zambia	0.0				0.3
Zimbabwe					2.6
Sum	100.0	100.0	100.0	100.0	100.0

Source: Derived from estimates in Anderson and Croser (2009), based on NRA and CTE estimates in Anderson and Valenzuela (2008).

Note: the decomposition over the 5-year period can be greater than or less than 100, even though the decomposition sums to 100 in any one year. We have scaled the 5-year averages, so that the decompositions sum to 100.