

Can the WTO Reduce Agricultural Trade Distortions?

Kym Anderson

School of Economics
University of Adelaide
Adelaide, SA 5005, Australia
Phone +61 8 8303 4712
kym.anderson@adelaide.edu.au

August 2009

This paper draws on results from a recent multi-country World Bank research project (see www.worldbank.org/agdistortions). Financial assistance from World Bank Trust Funds (particularly those provided by the governments of Japan, the Netherlands and the United Kingdom), and the Australian Research Council is gratefully acknowledged, as are the contributions of the country case study contributors to the Agricultural Distortions project, computational assistance by a team of research assistants led by Ernesto Valenzuela, and helpful comments from numerous commentators on numerous conference and seminar papers over the past year. Views expressed are the authors' alone and not necessarily those of the World Bank or its Executive Directors, nor the countries they represent, nor of the institutions providing funds for this research project. Forthcoming in the *Journal of International Trade and Economic Development* 19(1), March 2010.

Abstract

Earnings from farming in many developing countries have been depressed by anti-agricultural biases in own-country price and trade policies, as well as by governments of richer countries favoring local farmers with import barriers and subsidies. Both sets of policies reduce national and global economic welfare, add to global inequality and poverty, and are mostly the result of trade restrictions. Yet until recently they have not been disciplined by the GATT or WTO. New evidence illustrates where the GATT and WTO have failed to prevent rises in agricultural protectionism, including in developing countries. Global economy wide modeling results reveal that substantial trade policy reform has been achieved since the mid-1980s in ways that have helped developing country farmers, but that there remains very considerable scope for further farm policy reform. In the decades ahead, effects of policies on farmers and others in developing countries depend on whether an ambitious Doha Round agreement is signed and countries continue the recent trends towards free trade. Should Doha fail, agricultural protectionism may well grow in emerging economies, suggesting that the stakes in the Doha Round are much higher than is traditionally believed.

Keywords: Agricultural policy reforms, WTO, Uruguay Round, Doha Development Agenda

JEL codes: F13, F14, Q17, Q18

Author's contact details:

Kym Anderson

School of Economics

University of Adelaide

Adelaide SA 5005

Australia

Phone +61 8 8303 4712

Fax +61 8 8223 1460

kym.anderson@adelaide.edu.au

Can the WTO Reduce Agricultural Trade Distortions?

Kym Anderson

The remarkable development of the multilateral trading system since World War II has been accompanied by at least a doubling of the proportion of global goods output that is exported. The GATT was a major contributor to that growth, as it proved to be a powerful vehicle through which nations were able not only to prise open foreign markets but also to overcome domestic resistance to trade liberalization. GATT rules outlawing quantitative restrictions on trade, and successive GATT rounds of negotiations that resulted in cuts in bound tariffs on imports, brought industrial country rates of protection to manufacturing down hugely.

That success in regulating and liberalizing international trade was limited, however, to industrial products. Agricultural trade in many ways was exempt from GATT rules, and multilateral trade negotiators failed to agree on how to reduce food import barriers. At the same time as industrial tariffs were falling, agricultural protectionism was rising – including in developing countries. It took until the end of the eighth round of GATT negotiations (the Uruguay Round) in 1994 before a multilateral Agreement on Agriculture was signed (along with new agreements on services trade and trade-related intellectual property, which were all incorporated with the GATT in the new World Trade Organization from 1995). Despite that agricultural agreement, today tariffs on farm products are still many times those on manufactures, domestic farm subsidies are still rife, and rules for agricultural export trade have yet to be brought into line with those for other goods. Partly as a result, litigious agricultural trade disputes at the GATT/WTO account for more than one-third of dispute settlement cases to date, even though agriculture accounts for only about seven per cent of global output and trade. Meanwhile in the two decades to 2000-04, the share of primary agricultural GDP exported globally, including intra-European Union trade, rose from only 13 percent to just 16 percent, whereas the value of global exports of all products 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).

This situation is unfortunate, because it means the earnings from farming in many developing countries have been depressed by anti-agricultural biases in own-country price and trade policies as well as by governments of richer countries favoring local farmers with import barriers and subsidies. Both sets of policies are mostly the result of trade restrictions which have remained effectively undisciplined by the GATT and WTO. They not only reduce national and global economic welfare, but also add 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).¹

The present paper begins with a brief history of the ways agriculture has been dealt with or overlooked by the GATT Contracting Parties through to the end of implementation (in 2004) of the Uruguay Round Agreement on Agriculture that was signed in 1994. New evidence of the changing extent of distortions to agricultural prices and trade is then presented, to illustrate where the GATT and WTO have failed to prevent rises in agricultural protectionism, including in developing countries. The third section summarizes some new global economy wide modeling results which show, nonetheless, that (a) substantial trade policy reform has been achieved since the early 1980s in ways that have helped developing country farmers but (b) there remains very considerable scope for further reform, especially in agriculture. The final section points to the likely effects on farmers and others in developing countries of two alternative scenarios for the decades ahead: one in which an ambitious Doha Round agreement is signed and countries continue the recent trends towards free trade, and the other in which a Doha Round agreement is not reached and agricultural protectionism grows in emerging economies. The paper concludes that the stakes are much higher than is traditionally believed because the extent of farm protection growth has been under-appreciated and hence the counterfactual adopted by modelers typically has been the status quo rather than continued growth in agricultural protection.

GATT negotiations and agricultural policies up to the Uruguay Round

¹ 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.

From its inception in 1948 the GATT has treated agriculture differently from other goods. Even though the rules were quite appropriate for farm products, exceptions were carved out for the use of quantitative restrictions (when domestic supply is also restrained) and export subsidies (with weak imprecation against their use in markets for primary products). Even this was considered by the United States to be inadequate isolation of national agricultural policy from the constraints of multilaterally agreed trade rules. As a result, an export subsidy waiver was granted in 1955 that in essence removed even the weak constraints that had been put in place to that point in time (Dam 1970).

After a decade of operation the GATT Contracting Parties sought a review of world trade trends by a top-level panel of independent trade experts chaired by Haberler (1958). That report lays out with clarity the problems that faced the trade system as a result of agricultural protectionism, and recommended that “There should be some gradual moderation of the degree of agricultural protection in exporting and importing countries; that whenever practicable there should be some shift of the means of protection away from price support and toward deficiency payments systems ...” The report also pointed out the difficulty of comparing the trade impacts of different types of policies and called for a way to measure the “degrees of agricultural protectionism whenever this would be reasonably practicable.” Notwithstanding the Haberler recommendations, by 1962 the European Economic Community (EEC) put in place its Common Agricultural Policy (CAP) that was to increasingly exacerbate the problems identified by Haberler.

The situation did not improve markedly in the 1960s and 1970s. What appeared to be lacking was a common will to tackle the problem. The Kennedy and Tokyo Rounds ended with weak agricultural agreements based more on the notion of managing world markets (against surpluses in the Kennedy Round and against shortages in the Tokyo Round) than about liberalizing markets. Also, the rules failed, according to Davey (1993), because market access was denied either legally (e.g., through reliance on waivers) or illegally (e.g., by relying on balance of payments exceptions, ignoring the rules, or refusing to comply with dispute settlement decisions).

The controversy over the appropriate trade rules for agriculture, and their relationship to domestic policies, continued unabated until the 1980s, when serious institutional attention was finally given to the problem. This included the establishment of the GATT Committee on Agriculture in 1982 and the launching of the Uruguay Round in 1986 which, for the first time, would involve a process of institutionalizing negotiations on the liberalization of

temperate zone agricultural markets through binding rules and commitments, including on domestic policies (Josling, Tangermann and Warley 1996).

For two decades the trade tensions between the United States and the European Community had defined the climate and scope for any multilateral agreement on agricultural trade. After a bold but less-than-credible proposal by the United States for a removal of all trade-distorting support, the talks regressed into a confrontation between the two agricultural “superpowers” (with the so-called Cairns Group of unsubsidized food-exporting countries an interested bystander but other countries keeping away from the action). The breakthrough came when the European Community reformed its own Common Agricultural Policy sufficiently to allow it to agree to the terms of a draft agreement as modified in some crucial negotiations at Blair House in Washington DC in November 1992. That interaction between CAP reform (which was part of the creation of the 1992 Single Market of the European Union) and the Uruguay Round was a key turning point in the regulation of global agricultural trade (Swinbank and Tanner 1996; Coleman and Tangermann 1999; Josling 2009). As well, the role of the Cairns Group deserves mention: on two occasions, in Montreal in 1988 and in Heysel in 1990, the Group essentially blocked progress in the negotiations until its members were convinced that agriculture was not again going to be “swept under the rug” (Higgott and Cooper 1990).

Ultimately the Uruguay Round did conclude with an Agreement on Agriculture, implementation of which was phased in from 1995 over six years for developed countries and ten years for developing countries (WTO 1995). The agreement involved legal bindings on farm tariffs, export subsidies and domestic supports and commitments to reduce those bindings over that implementation period. However, initial bindings were set well above applied rates (“dirty tariffication” – see Hathaway and Ingco 1996) so that, even after the lowering required for full implementation of the agreement, distortions to agricultural incentives remained substantial as of 2004, as demonstrated by new evidence summarized in the next section.

How much have agricultural distortions changed over the past half century?

A recent study has sought to estimate, for a sample of 75 countries (accounting for 90+ percent of global agriculture) over the period from 1955 to 2007, the extent to which

government-imposed distortions have created a gap between domestic prices of farm products and what they would be under free markets each year (Anderson 2009).² Specifically, the study computed a Nominal Rate of Assistance (NRA) for each farm product, defined 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 $NRA < 0$). A weighted average NRA for all covered products is derived using the value of production at undistorted prices as weights. To that NRA for covered products is added a 'guesstimate' of the NRA for non-covered products 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 assistance to farmers that is somewhat 'decoupled' from production and so in principle is less distortionary of resource allocation (but see de Gorter, Just and Kropp 2008), its NRA has been computed separately and is not included for direct comparison with the NRAs for other sectors or for developing countries. Each farm 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. Also generated is 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:

$$RRA = 100 * [(100 + NRA_{ag}^t) / (100 + NRA_{nonag}^t) - 1]$$

where NRA_{ag}^t and NRA_{nonag}^t are the percentage NRAs for the tradables parts of the agricultural (including non-covered) and non-agricultural sectors, respectively.³ Since the NRA cannot be less than -100 percent if producers are to earn anything, neither can the RRA (since the weighted average NRA_{nonag}^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.

² The methodology used in that study is summarized in Anderson et al. (2008), and the full panel dataset of estimates is freely available on-line (Anderson and Valenzuela 2008).

³ 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.

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 greater the variation of NRAs across industries within the sector then the higher will be the welfare cost of those market interventions. High NRAs matter also because the welfare cost of a price distortion is proportional to the square of the NRA. A simple indicator of dispersion is the standard deviation of the covered industries' NRAs.

The Anderson (2009) study also considers the extent to which consumers are taxed or subsidized. To do so, it calculates 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.

For the purposes of that study, the world economy is divided into high-income countries (Western Europe, the United States/Canada, Japan, and Australia/New Zealand), three developing country regions (Africa, Asia and Latin America), and Europe's economies that were in transition from socialism in the 1990s plus Turkey. 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 (including the former Soviet Union). 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 there is a vast range of national per capita incomes and endowments of agricultural land per capita, and thus agricultural comparative advantages, across those country groups, and a strong concentration of poor people in Asia (Sandri, Valenzuela and Anderson 2007).

The NRA estimates reveal that aggregate support for farmers in high-income countries rose steadily throughout the period from the 1950s to the late 1980s before declining slightly over the 15 years to 2004. On the other hand, the price and trade policies of developing countries heavily taxed their farmers in aggregate from the early 1960s to the late 1970s/early 1980s before gradually reducing that taxation and, by the mid-1990s, switching to slightly positive assistance to them in aggregate (table 1). Thus the contributions of the two groups to the global trend are additive in the 1980s but then offsetting from 1990 to 2004.⁴

Figure 1 provides NRA estimates for two sub-groups of covered farm products, namely exportables and import-competing goods. Two striking points about that figure are worth noting. One is the marked difference in the levels of support to import-competing versus exportable farm 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 temporarily 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. The second point to note is that the long-run fitted trend line for the import-competing sub-sector has almost the same slope for both sets of countries (albeit with a lower intercept for developing countries). Two lessons can be drawn from this: first, there has been a strong anti-trade bias for agricultural goods in high-income and developing countries that got worse in the 1980s but has diminished somewhat since then; and second, growth in agricultural import protection appears to have accompanied global economic growth. True, the NRA for the agricultural sector has reversed slightly since the 1980s for Western Europe (table 1), but less so when the decoupled payments are included (figure 2).⁵

⁴ 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 (as happened also in 1973-74). There are not 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 added to, rather than offset, the high-income country downward trend in those most recent years.

⁵ NRA estimates for most developing countries go only to 2004, but those for OECD countries are available to 2007. Table 1 reveals that the NRAs tend to be lower in 2005-07 because international prices were rising over that period for food and other primary commodities (they peaked in mid-2008), and not all of those rises were being transmitted to domestic markets. In the case of the European Union, an additional force was at work: reform efforts by the EU’s Agricultural Commissioner from 1996 to 2004, Franz Fischler, took a major step forward in 2003 (the so-called Mid-term Review of the EU’s Agenda 2000 reform program). At that time it was announced that price supports for key farm products were to be cut severely, and replaced by a Single Farm

That anti-trade bias means that the rates of assistance are not uniform across farm commodities, which indicates that the resources that are employed 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 the 8 regions in table 2, has fluctuated across time and varied between regions, but the global average has remained around 70 percent throughout the period, with no discernable trend.

Nor is the NRA dispersion randomly distributed across products. On the contrary, figure 3 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. This suggests tariff or subsidy peaks prevail within the agricultural sector, which means the welfare cost of these distortions is even higher than it would be if NRAs were equal for each farm industry within the sector.

Table 3 shows the various contributions of different policy measures to the overall estimated NRAs as of 1981-84 and 2000-04. In both periods, trade measures accounted for around three-fifths of the total NRA for both developing and high-income countries.⁶ Even when the relatively new decoupled payments to farm households are counted, it is still the case that trade measures at the border (export and import taxes or subsidies and their equivalent from quantitative trade restrictions and multiple exchange rates) are the dominant form of intervention. Leaving those decoupled measures aside, these estimates suggest import barriers are responsible for all but one-quarter of the NRA of high-income countries and all but one-ninth of the NRA of developing countries on average in 2000-04.

Payment by way of partial compensation. Unlike with the MacSharry reforms of the CAP in 1992, pressure from WTO members was acknowledged within the EU as a contributing force for reform. Just how important that external influence was in contributing to the reform outcome is impossible to say, but see Swinnen (2008) and Josling (2009) for further details.

⁶ If one assumes that the price elasticities of supply and demand for farm products are equal, and that there are no costs of collecting taxes and dispersing them as subsidies, then the trade-reducing effects of trade measures would be twice as high as for an equally high NRA provided by production subsidies – and an even bigger multiple of the effects of so-called decoupled payments, depending on the extent to which the latter are in practice truly decoupled from production decisions. Furthermore, since the welfare-reducing effects of trade measures are in proportion to the square of the trade tax-cum-subsidy, the border measures would be responsible for much more than three-fifths of the global welfare cost of distortions to agricultural prices, and possibly not much below the more-limited but widely quoted estimate for 2001 of 93 percent by Anderson, Martin and Valenzuela (2006).

The anti-agricultural policy biases of the past are due to not just agricultural policies. Also important in developing countries, according to Krueger, Schiff and Valdés (1988, 1991), was border protection to the manufacturing sector (the dominant intervention in the tradables part of non-agricultural sectors). Contributors to the Anderson (2009) study typically had to rely on applied trade taxes (for exports as well as imports) rather than undertake price comparisons for non-farm tradables, 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 does that study 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 almost certainly dominates, so the estimates in Anderson (2009) 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.

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 non-farm NRA has declined steadily throughout the past four or five decades, from around 45 percent in the 1960s to around 30 percent in the 1970s, 16 percent in the 1980s and less than 10 percent since the mid-1990s as policy reforms spread (see near bottom of table 4). 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 4, where the falling positive NRAs for non-farm producers can be seen to have 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 (table 4) and, within Asia, it is China and India that contributed most to that outcome (Anderson and Martin 2009).

In summary, the above estimates reveal five things of relevance to agriculture in the WTO:

- Growth in agricultural protection from import competition as per capita incomes rise is as much a phenomenon of developing countries as it is of high-income countries (so tariff bindings in the WTO matter);
- Most assistance to farmers – all but one-quarter in high-income countries and all but one-ninth in developing countries – is due to barriers to farm imports (so tariff reductions matter far more than cuts to production subsidies, although the latter also need to be disciplined through WTO if re-instrumentation to that other coupled form of assistance to farmers is to be avoided);
- Within the import-competing part of the agricultural sector there are still high tariff peaks for some commodities (so larger proportional reductions in high tariffs and a commitment to place a cap on farm tariffs would be helpful) ;
- The improvement in incentives for farmers in developing countries has come as much from reduced tariff protection in manufacturing as it has from reforms to agricultural policies (both of which were mainly driven by forces other than the GATT or WTO); and
- The contribution of farm policy reforms to the improvement in incentives for farmers in developing countries has come mostly from reduced export taxation (again driven by forces other than the GATT or WTO).

Economy-wide effects of past reforms and remaining policies

Before turning to the implications of the above findings for the WTO, it is helpful to first assess the global trade and welfare effects of the reforms of the past quarter of a century in policy distortions to agricultural incentives, and to compare them with the effects of remaining distortions. Key among the above findings are that 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 most regions, notwithstanding the Uruguay Round Agreement on Agriculture that aimed to bind and reduce farm tariffs.

To assess the net economic effects of agricultural price and trade policy changes around the world since the early 1980s and the effects of price distortions still in place, Valenzuela, van der Mensbrugghe and Anderson (2009) use a global economy-wide model (the World Bank's Linkage Model – see van der Mensbrugghe 2005) to provide a combined retrospective and prospective analysis to show how far the world has come, and how far it still has to go, in removing the disarray in world agriculture (to use the title of the seminal book by Johnson 1973). It quantifies the impacts both of past reforms and current policies by comparing the effects of the NRA and CTE distortion estimates summarized in Anderson (2009) for the period 1980-84 with those of 2004.⁷

Several key findings from that economy-wide modeling study are worth emphasizing. First, the policy reforms from the early 1980s to the mid-2000s improved global economic welfare by \$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: a significant achievement, with the Uruguay Round contributing slightly in so far as it pressured the EU to lower farm price supports from the early 1990s and begin to replace them with more-decoupled payments.

Second, developing economies benefited proportionately more than high-income economies from those past policy reforms (a boost to national income that averaged 1.0 percent, compared with 0.7 percent for high-income countries), and they 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 trade are less than 7 percent. The contribution of farm and food policy reform to the prospective welfare gain for just developing countries is even greater than for the world as a whole, 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. Primary 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

⁷ Those alternative estimates of distortions for global modelers are available in Valenzuela and Anderson (2008).

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 reforms between the early 1980s and 2004, with rises in nearly all agricultural industries except rice and sugar. Removing remaining goods market distortions would boost the developing countries' 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, 2008).

How can WTO contribute to further improving agricultural incentives in developing countries?

The above modeling results not only confirm the results from earlier analyses, such as Anderson and Martin (2005), that agricultural reform could contribute far more than manufacturing to global welfare from goods trade reform, but they also make clear that developing country farmers – who are by far the largest group of poor people in the world – could be major beneficiaries from such further reform. Within that group, those who would benefit most would be the more-competitive producers of exportable farm products, while the most protection-dependent, import-competing farmers would need to adjust.

It is political pressures from that latter group, and from the counterpart group of import-competing farmers in high-income countries, that are the main source of resistance to multilateral liberalization of farm trade (Anderson 1995). It matters more than is commonly believed as to whether those farmers or the liberal trade lobby determine the outcome of the current Doha round of negotiations at the WTO – and more than is suggested by the modeling results quoted above. The reason it matters so greatly is that if governments of farm protectionist countries insist on no or minimal reductions to agricultural tariffs and subsidies, farm exporting countries may well walk away from a Doha agreement. That would mean no gains from reform not only in agriculture but also in non-agricultural goods, and also in services trade (the potential benefits of which are not included in the above modeling results). More than that, the trends in figures 1 and 4 above suggest that without further WTO discipline on raising agricultural supports, the appropriate counterfactual is not the status quo but rather a further spreading of agricultural protectionism.

To provide a sense of how much the prospect of further farm protection growth matters, Bouet and Laborde (2009) model the implementation of the July 2008 draft text for the Doha Round⁸ against several alternative counterfactuals of rising agricultural protection over the implementation period, which they assume to be through to 2025. One of those counterfactuals in the absence of a Doha agreement assumes countries raise their farm tariffs up to the maximum they attained during the 1995-2004 period in which the Uruguay Round was implemented, or to the relevant bound rate if that was lower. A more extreme

⁸ See WTO Document TN/AG/W/4/Rev.2

counterfactual assumes countries raise their farm tariffs up to the maximum allowed by their ceiling bindings as of 2004. Their estimated global welfare gains of the July 2008 Doha package of goods trade reform, assuming the relevant counterfactual is the status quo, is \$59 billion per year. However, if the first (or second) alternative counterfactual of rising agricultural protection over the implementation period is used instead of the status quo as the baseline, the estimated global welfare gain of the July 2008 Doha package rises to \$193 billion per year (or to \$412 billion with the second, more-extreme counterfactual). For developing countries the cost of failure to reach a Doha agreement as in the July 2008 package is thus not just 0.1 percent of their GDP (the estimate assuming the counterfactual is a continuation of 2004 policies) but rather 1.1 or 1.5 percent (depending on whether the less- or more-extreme of the two alternative protection growth counterfactuals is assumed).

The above estimate of the global welfare gains from the goods part of the Doha Round are small using the status quo baseline, but that is because Bouet and Laborde (2009) appropriately take into account the draft provision to allow lesser reform for ‘sensitive’ and ‘special’ farm products: their results are consistent with the earlier findings of Anderson and Martin (2005), who showed how the estimated gains from Doha are progressively eroded to almost zero as more and more of the demanded exceptions are included and the provision of a cap on agricultural tariffs is abandoned.

One additional point needs to be made about the WTO’s potential role, and it is not derived from the above global modeling because those models are comparative static rather than dynamic. An additional provision in the July 2008 Draft package for the Doha Round is to have a Special Safeguard Mechanism (SSM). The SSM would enable developing countries to limit agricultural imports more than their bindings would otherwise allow if there is a sudden surge in import prices or quantities. Such a provision thus would add to the instability of international food markets, which is contrary to what the WTO in general seeks to achieve through liberalizing and thereby ‘thickening’ global markets.⁹ It is the opposite of what happened in 2008, when international food prices spiked upwards and many developing countries responded by suspending their food import tariffs or restricted food exports. That recent experience suggests the WTO could play a greater stabilizing role by introducing disciplines on the use of export restrictions in addition to import restrictions. Yet the demand

⁹ 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.

by developing countries for a SSM would have the opposite effect on fluctuations around trend prices, diminishing the potential role of the WTO in reducing year-to-year volatility in prices and quantities in world food markets.

In conclusion, the WTO has a potentially huge role to play in reducing agricultural trade distortions, but so far its contribution has been minor. The bindings committed to Uruguay Round may have helped slowed the growth in agricultural protection in rich countries, and possibly even contributed somewhat to its reversal in the European Union (although the budgetary cost of eastward expansion of its membership was probably much more important). Binding so far have been much less constraining for developing countries and, unless very ambitious cuts are agreed to under Doha, the extent of binding overhang and hence scope for raising trade barriers will remain large. This is true even for China, despite the strong commitments it made on its accession to WTO in 2001 when (according to the Anderson (2009) study) its NRA was less than 5 percent, 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 higher-income countries 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 only 0.3 percent of the gross value of farm production (Anderson 2009), 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.

References

- Anderson, K. (1995), “Lobbying Incentives and the Pattern of Protection in Rich and Poor Countries”, *Economic Development and Cultural Change* 43(2): 401-23, January.
- Anderson, K. (ed.) (2009), *Distortions to Agricultural Incentives: A Global Perspective, 1955-2007*, London: Palgrave Macmillan and Washington DC: World Bank.
- Anderson, K., M. Kurzweil, W. Martin, D. Sandri and E. Valenzuela (2008), ‘Measuring Distortions to Agricultural Incentives, Revisited’, *World Trade Review* 7(4):1-30, October.
- Anderson, K. and W. Martin (2005), “Agricultural Trade Reform and the Doha Development Agenda”, *The World Economy* 28(9): 1301-27, September.
- Anderson, K. and W. Martin (eds.) (2009), *Distortions to Agricultural Incentives in Asia*, Washington DC: World Bank.
- Anderson, K., W. Martin and E. Valenzuela (2006), “The Relative Importance of Global Agricultural Subsidies and Market Access”, *World Trade Review* 5(3): 357-76, November.
- Anderson, K., W. Martin and E. Valenzuela (2009), “Long Run Implications of WTO Accession for Agriculture in China”, in *China's Agricultural Trade: Issues and Prospects*, edited by C. Carter and I. Sheldon, London: CABI (forthcoming).

- Anderson, K., W. Martin and D. van der Mensbrugge (2006), 'Market and Welfare Implications of Doha Reform Scenarios', Ch. 12 in *Agricultural Trade Reform and the Doha Development Agenda*, edited by W. Martin and K. Anderson, London: Palgrave Macmillan and Washington DC: World Bank.
- Anderson, K. and E. Valenzuela (2008), *Global Estimates of Distortions to Agricultural Incentives, 1955 to 2007*, core database at www.worldbank.org/agdistortions
- Bouet, A. and D. Laborde (2009), "The Potential Cost of a Failed Doha Round", IFPRI Discussion Paper, International Food Policy Research Institute, Washington DC.
- Chen, S. and M. Ravallion (2007), 'Absolute Poverty Measures for the Developing World, 1981-2004', Policy Research Working Paper 4211, World Bank, Washington DC, April.
- Chen, S. and M. Ravallion (2008), 'The Developing World is Poorer Than We Thought, But No Less Successful in the Fight Against Poverty', Policy Research Working Paper 4703, World Bank, Washington DC, August.
- Coleman, W.D. and S. Tangermann (1999), 'The 1992 CAP Reform, the Uruguay Round and the Commission: Conceptualizing Linked Policy Games', *Journal of Common Market Studies*, 37(3): 385-405, September.
- Dam, K.W. (1970), *The GATT: Law and International Economic Relations*, Chicago: University of Chicago Press.
- Davey, W.J. (1993), 'The Rules for Agricultural Trade in GATT', Ch 1 in M. Honma, A. Shimizu and H. Funatsu (eds.), *GATT and Trade Liberalization in Agriculture*, Japan: Otaru University of Commerce.
- de Gorter, H., D.R. Just and J.D. Kropp (2008), 'Cross-Subsidization Due to Inframarginal Support in Agriculture: A General Theory and Empirical Support', *American Journal of Agricultural Economics* 90(1): 42-54, February.
- Haberler, G. (1958), *Trends in International Trade: A Report by a Panel of Experts*, Geneva: General Agreement on Tariffs and Trade, October.
- Hathaway, D.E. and M.D. Ingco (1996), 'Agricultural Liberalization and the Uruguay Round', Ch. 2 (pp. 30-58) in W. Martin and L.A. Winters (eds.), *The Uruguay Round and the Developing Countries*, Cambridge and New York: Cambridge University Press.

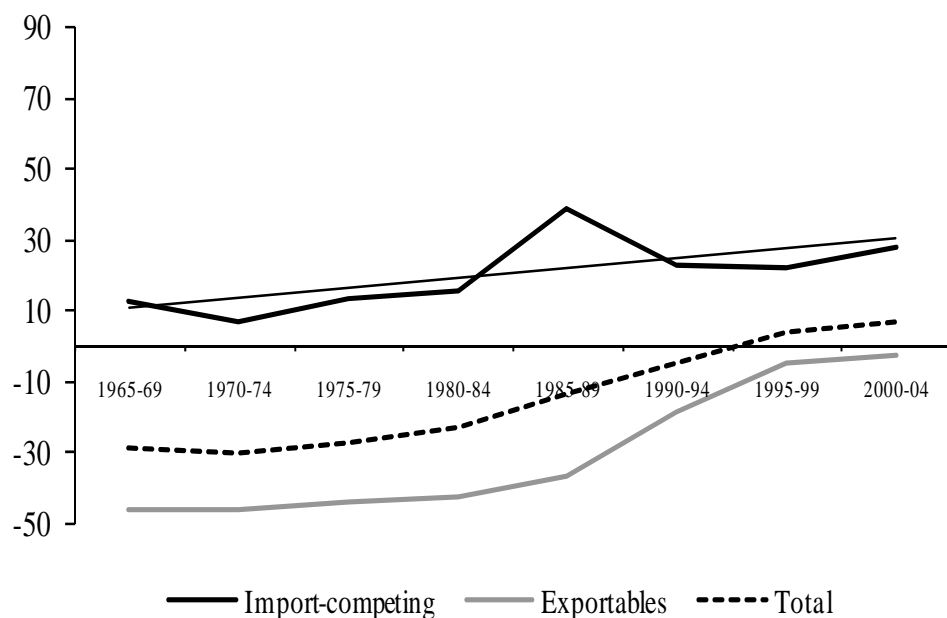
- Higgott, R.A. and A.F. Cooper (1990), 'Middle Power Leadership and Coalition Building: Australia, the Cairns Group, and the Uruguay Round of Trade Negotiations', *International Organization*, 44(4): 589-632, Autumn.
- Johnson, D.G. (1973), *World Agriculture in Disarray* (revised 1991), London: St Martin's Press.
- Josling, T.E. (2009), "Western Europe", Ch. 3 in *Distortions to Agricultural Incentives: A Global Perspective, 1955-2007*, edited by K. Anderson, London: Palgrave Macmillan and Washington DC: World Bank.
- Josling, T.E., S. Tangermann and T.K. Warley (1996), 'Trade Rules in Crisis: The GATT Committee on Trade in Agriculture', Chi. 6 in *Agriculture in the GATT*, London: Macmillan and New York: St. Martin's Press.
- Krueger, A.O., M. Schiff and A. Valdés (1988), 'Agricultural Incentives in Developing Countries: Measuring the Effect of Sectoral and Economy-wide Policies', *World Bank Economic Review* 2(3): 255-72, September.
- Krueger, A.O., M. Schiff and A. Valdés (1991), *The Political Economy of Agricultural Pricing Policy, Volume 1: Latin America, Volume 2: Asia, and Volume 3: Africa and the Mediterranean*, Baltimore: Johns Hopkins University Press for the World Bank.
- Lerner, A. (1936), 'The Symmetry Between Import and Export Taxes', *Economica* 3(11): 306-13, August.
- Otsuka, K., J.P. Estudillo and Y. Sawada (eds.) (2009), *Rural Poverty and Income Dynamics in Asia and Africa*, London and New York: Routledge.
- Otsuka, K. and T. Yamano (2006), 'Introduction to the Special Issue on the Role of Nonfarm Income in Poverty Reduction: Evidence from Asia and East Africa', *Agricultural Economics* 35 (supplement): 373-97, November.
- Sandri, D., E. Valenzuela and K. Anderson (2007), 'Economic and Trade Indicators, 1960 to 2004', Agricultural Distortions Working Paper 02, World Bank, Washington DC. Posted at www.worldbank.org/agdistortions.
- Swinbank, A. and C. Tanner (1996), *Farm Policy and Trade Conflict: The Uruguay Round and CAP Reform*, Ann Arbor: University of Michigan Press.

- Swinnen, J.F.M. (ed.) (2008), *The Perfect Storm: The Political Economy of the Fischler Reforms of the Common Agricultural Policy*, Brussels: Centre for European Policy Studies.
- Tyers, R. and K. Anderson (1992), *Disarray in World Food Markets: A Quantitative Assessment*, Cambridge and New York: Cambridge University Press.
- Valenzuela, E. and K. Anderson (2008), 'Alternative Agricultural Price Distortions for CGE Analysis of Developing Countries, 2004 and 1980-84', *GTAP Research Memorandum* No. 13, Purdue University, West Lafayette IN, December. Freely downloadable at https://www.gtap.agecon.purdue.edu/resources/res_display.asp?RecordID=2925
- Valenzuela, E., D. van der Mensbrugghe and K. Anderson (2009), 'General Equilibrium Effects of Price Distortions on Global Markets, Farm Incomes and Welfare', Ch. 13 in Anderson (2009).
- van der Mensbrugghe, D. (2005), 'LINKAGE Technical Reference Document: Version 6.0', Unpublished, World Bank, Washington DC, January 2005. Accessable at www.worldbank.org/prospects/linkagemodel
- World Bank (2007), *World Development Indicators*, Washington DC: The World Bank.
- WTO (1995), *The Results of the Uruguay Round of Multilateral Trade Negotiations: The Legal Texts*, Geneva: World Trade Organization.
- WTO, ITC and UNCTAD (2007), *Tariff Profiles 2006*, Geneva: World Trade Organization.

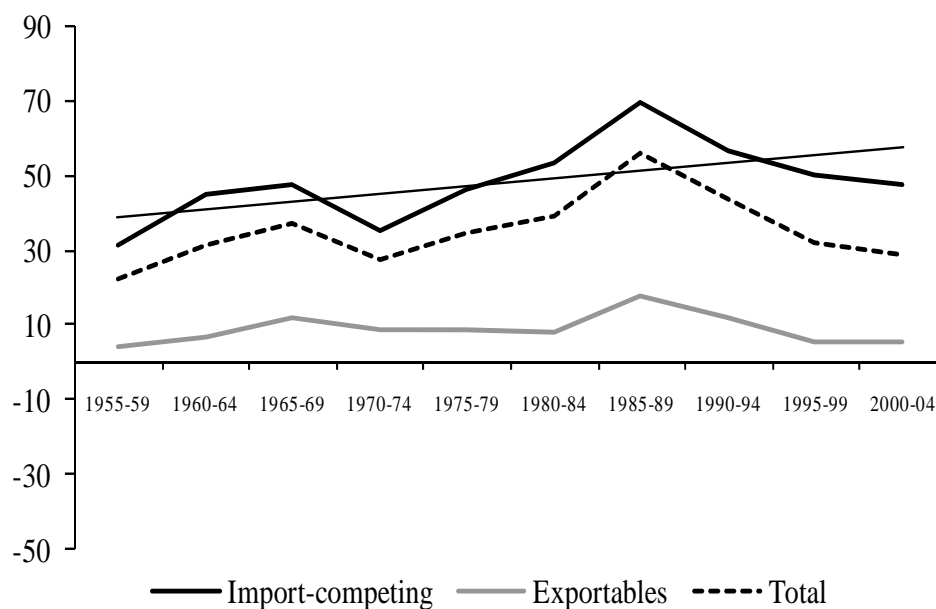
Figure 1: Nominal rates of assistance to exportable, import-competing and all^a covered agricultural products, high-income and developing countries, 1955 to 2004

(percent)

(a) Developing countries



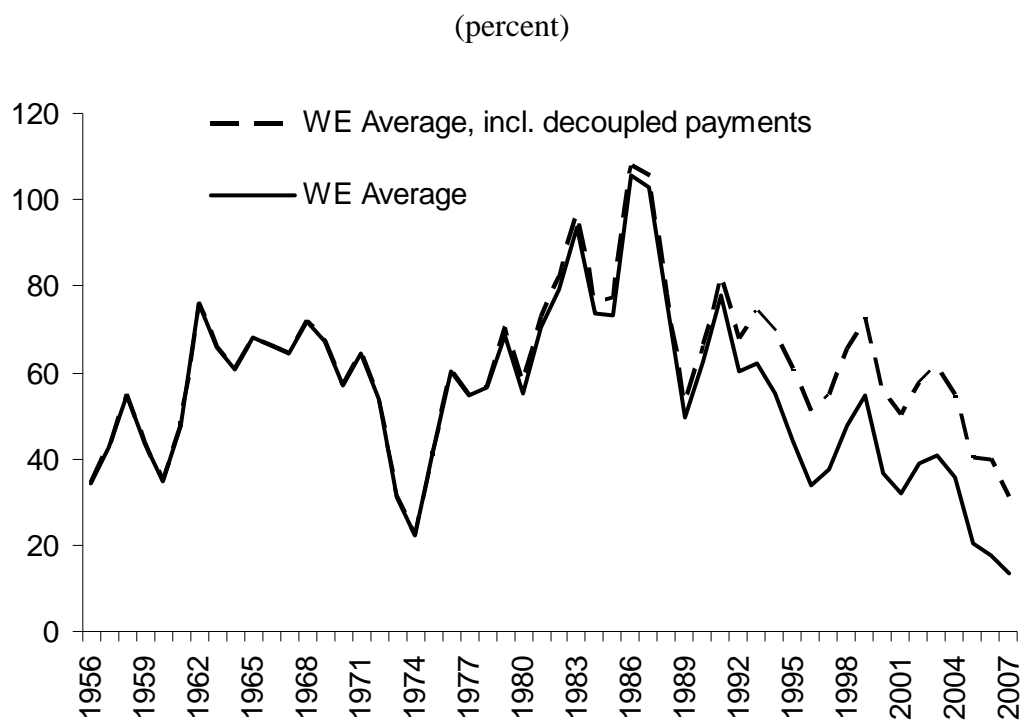
(b) High-income countries plus Europe's transition economies



Source: Anderson and Valenzuela (2008), based on estimates reported in the national country studies summarized in Anderson (2009).

a. The total also includes nontradable farm products.

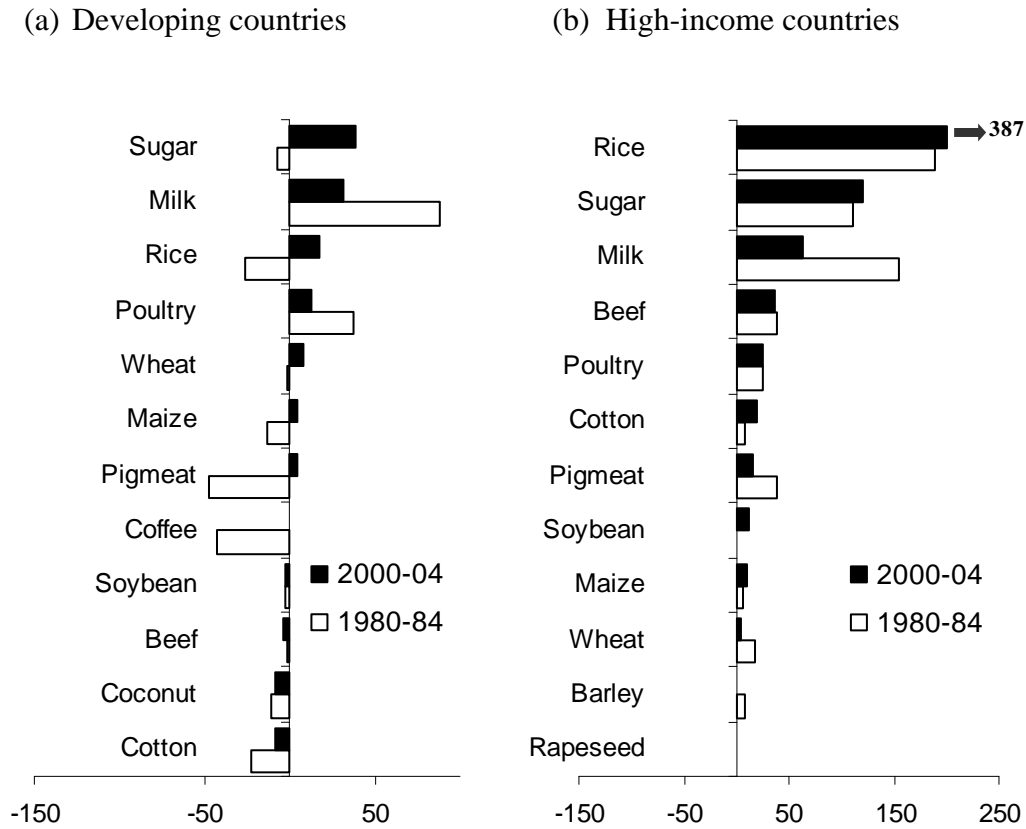
Figure 2: NRA to agriculture without and with decoupled payments, Western Europe, 1956 to 2007



Source: Anderson and Valenzuela (2008) as reported in Josling (2009), which draws heavily on OECD (2008) for calculations from 1979.

Figure 3: Nominal rates of assistance, key covered products, high-income and developing countries, 1980-84 and 2000-04

(percent)

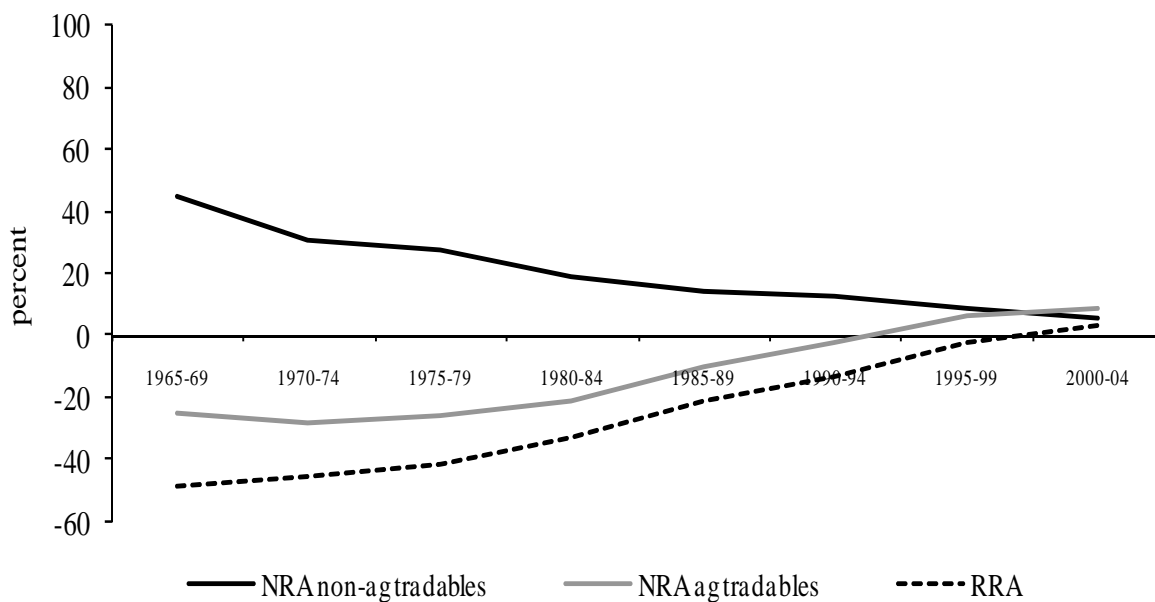


Source: Anderson and Valenzuela (2008), based on estimates reported in the national country studies summarized in Anderson (2009).

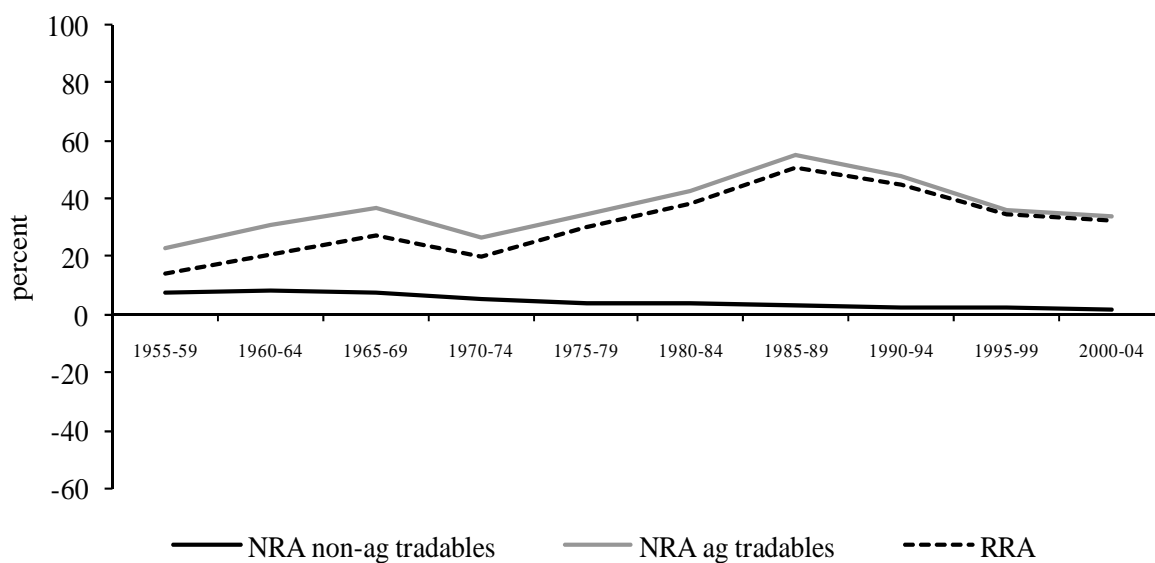
Figure 4: Nominal rates of assistance to agricultural and non-agricultural tradable products and relative rate of assistance,^a all focus countries, 1955 to 2004

(percent)

(a) Developing countries^b



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



Source: Anderson and Valenzuela (2008), based on estimates reported in the national country studies summarized in Anderson (2009).

a. The RRA is defined as $100 * [(100 + \text{NRA}_{\text{ag}}^t) / (100 + \text{NRA}_{\text{nonag}}^t) - 1]$, where NRA_{ag}^t and $\text{NRA}_{\text{nonag}}^t$ 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.

Table 1: Nominal rates of assistance to agriculture^a in 75 focus countries, by region, 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											17
	22	29	35	25	32	41	53	46	35	32	
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 national country studies summarized in Anderson (2009).

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 2: 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
<i>Product coverage</i> ^b	68	70	71	73	73	72	71	68	70

Source: Anderson and Valenzuela (2008), based on estimates reported in the national country studies summarized in Anderson (2009).

- 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 3: Contributions to total agricultural NRA from different policy instruments,^a by region, 1981-84 and 2000-04

	(percent)			
	1981-84		2000-04	
	All developing countries	High-income countries	All developing countries	High-income countries
Border measures				
Import tax equivalent	6	34	8	24
Export subsidies	1	2	1	1
Export tax equivalent	-20	0	-3	0
Import subsidy equivalent	-2	0	-1	0
<i>ALL BORDER MEASURES</i>	-15	36	5	25
Domestic measures				
Production subsidies	1	2	1	1
Production taxes	-5	0	-1	0
Net subsidies to farm inputs	1	3	2	2
Non-product-specific assistance (except to inputs)	1	1	2	5
<i>ALL DOMESTIC PRODUCTION SUPPORTS</i>	-2	6	4	8
Decoupled payments to farm households	0	6	0	11
NRA including decoupled payments	-17	48	9	44
<i>Gross subsidy equivalent, in real 2000 US\$ billion</i>	-113	223	58	173

^a In the absence of data, the share of input tax/subsidy, domestic production tax/subsidy and border tax/subsidies for non-covered farm products are assumed to be the same as that for covered farm products. The first period begins in 1981 because that was the first year for which estimates for China are available.

^b All table entries have been generated by dividing the Gross Subsidy Equivalent of all (including decoupled) measures by the total agricultural sector's gross production valued at undistorted prices.

Source: Author's derivation, using distortion data in Anderson and Valenzuela (2008).

Table 4: 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 national country studies summarized in Anderson (2009).

a. The RRA is defined as $100 * [(100 + \text{NRA}_{\text{ag}}^t) / (100 + \text{NRA}_{\text{nonag}}^t) - 1]$, where NRA_{ag}^t and $\text{NRA}_{\text{nonag}}^t$ 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.