Agricultural Trade Challenges: Doha and Beyond

Kym Anderson

University of Adelaide, CEPR and World Bank

December 2010

First draft of a Paper for the 30th Anniversary Conference of the International Agricultural Trade Research Consortium (IATRC), Berkeley CA, 12-14 December 2010. This is a by-product of a World Bank research project on Distortions to Agricultural Incentives (www.worldbank.org/agdistortions). The author is grateful for the efforts of nearly 100 authors who provided the country case studies for the Agricultural Distortions project; for computational assistance from a team of assistants led by Ernesto Valenzuela that brought together the global Agricultural Distortions database; for the collaboration with Dominique van der Mensbrugghe of the World Bank in generating Linkage Model results; and for funding from various World Bank Trust Funds, particularly those provided by the governments of the Netherlands (BNPP) and the United Kingdom (DfID), as well as the Australian Research Council. Views expressed are the authors' alone and not necessarily those of the World Bank or its Executive Directors.

Agricultural Trade Challenges: Doha and Beyond

Abstract

A decline in governmental distortions to agricultural and other trade since the 1980s has taken the world three-fifths of the way towards freeing merchandise trade. Farm policy interventions are still substantial though, accounting for 70 percent of the welfare cost of remaining distortions to global goods markets. Meanwhile, new drivers are affecting the mean and variance of world prices of farm products, including climate change and associated policy responses. This paper briefly reviews trends and fluctuations in past distortions to agricultural incentives and trade, as background for then speculating on how they might evolve in coming decades alongside other market and policy developments. It concludes that agricultural trade policy economists are unlikely to become redundant in the foreseeable future, notwithstanding the substantial policy reforms of the past three decades.

Keywords: Distorted incentives, agricultural and trade policy reforms, trade restrictiveness indexes

JEL codes: F13, F14, Q17, Q18

Author 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

Agricultural Trade Challenges: Doha and Beyond

Kym Anderson

In the companion featured paper at this conference, Stefan Tangermann (2010) focuses on the progress since 1980 in reducing what D. Gale Johnson described in the title of his seminal book as the 'disarray in world food markets' (Johnson 1973). He draws attention to the fact that agricultural protection and subsidies in high-income (and some middle-income) countries have been depressing international prices of farm products for many decades. Those policies have been thereby lowering the earnings of farmers and associated rural businesses in lower-income countries, and may have added to global inequality and poverty, bearing in mind that three-quarters of the world's poorest people depend directly or indirectly on agriculture for their main income. The fact that those price-distorting forms of intervention have declined somewhat over the past two-plus decades is therefore good news. However, Tangermann rightly points out that much farm policy reform is still needed in protectionist countries.

My brief is to focus on the decades ahead.[1] Before doing so, I'd like to first add one other piece of good news about the past two to three decades. It has been common for agricultural development economists to bemoan the de-emphasis of agriculture in national government spending in and bilateral and multilateral assistance programs for emerging economies. Elements of this were highlighted in the World Bank's *World Development Report* of 2008. In one very important respect, though, many developing country governments unilaterally helped their farmers via trade policy reform. They did so directly through the phasing out of agricultural export subsidies, and also indirectly through reducing manufacturing protection rates.

The paper thus begins by summarizing recent evidence on these additional elements of the progress made since IATRC's formation 30 years ago. It then examines briefly what if anything might come out of a Doha agreement. Attention then turns to drivers of change in agricultural trade and in trade-related policies beyond Doha. The paper concludes with thoughts on priority areas for further international agricultural trade research.

[1] For a review of agricultural trade analyses by the profession over the past century, see Josling et al. (2010).

Changes in agricultural distortions since the 1980s

From the 1950s to the 1980s, the governments of many developing countries directly taxed their farmers, overvalued their currency, and pursued an import-substituting industrialization strategy by restricting imports of manufactures. Together those measures indirectly taxed producers of non-protected tradable products in developing economies, by far the most numerous of them being farmers (Krueger, Schiff and Valdés 1988, 1991). As a result there was over-production of farm products in high-income countries and under-production in more-needy developing countries. It also means there was less international trade in farm products than would have been the case under free trade, thereby thinning markets for these weather-dependent products and thus making them more volatile. That volatility was exacerbated by the tendency for both rich and poor countries to alter their border measures from year to year in an attempt to stabilize prices and quantities in domestic food markets: using a stochastic model of world food markets, Tyers and Anderson (1992, Table 6.14) found that instability of international food prices in the 1980s was three times greater than it would have been under free trade in those products.

However, numerous countries began to reform their agricultural price and trade policies during the past quarter century. To get a sense of how much that has reduced the distortions to global markets for farm products, a recent World Bank research project examined policies affecting agricultural producer incentives since 1955 in 75 countries that together account for more than 90 percent of the world's population and agricultural GDP (Anderson 2009).

Measures used

The Nominal Rate of Assistance (NRA) for each farm product was computed as the percentage by which government policies have directly 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 (an average of 11 per country so as to cover more than two-thirds of the gross value of national farm production) was derived using the value of production at undistorted prices as weights (unlike the producer and consumer support estimates (PSEs and CSEs) computed by OECD (2010), which are expressed as a percentage of the distorted price). To that NRA for covered products is added a 'guesstimate' of the NRA for non-covered products and an estimate of the NRA from non-product-specific

forms of assistance or taxation.[2] 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 computed 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+NRAag^t)/(100+NRAnonag^t)-1] where NRAag^t and NRAnonag^t are the percentage NRAs for the tradables parts of the agricultural (including non-covered) and non-agricultural sectors, respectively.[3] Since the NRA cannot be less than -100 percent if producers are to earn anything, neither can the RRA (since the weighted average NRAnonag^t is non-negative in all 75 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 (Anderson et al. 2008).

The extent to which consumers are taxed or subsidized also is examined by the World Bank project. To do so, a Consumer Tax Equivalent (CTE) is calculated by comparing the price that consumers pay for their food and the international price of each food product at the border. Differences between the NRA and the CTE arise from distortions in the domestic economy that are caused by transfer policies and taxes/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.

The cost of government policy distortions to incentives in terms of resource misallocation tends to be greater the greater the variation of NRAs across industries within the sector. A simple indicator of dispersion is the standard deviation of the covered industries' NRAs. However, it is helpful to have a single indicator of the overall welfare effect of each country's regime of agricultural price distortions in place at any time, and to

[2] Since the 1980s governments of some high-income countries have also provided so-called 'decoupled' assistance to farmers but, because that support in principle does not distort resource allocation, its NRA has been computed separately and is not included for direct comparison with the NRAs for other sectors or for developing countries.

[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 (Vousden 1990).

trace its path over time and make cross-country comparisons. To that end, the family of indexes first developed by Anderson and Neary (2005) under the catch-all name of trade restrictiveness indexes has been drawn upon to generate indicators of distortions imposed by each country's agricultural policies on its economic welfare, and also on its agricultural trade. Lloyd, Croser and Anderson (2010) define and estimate a Welfare Reduction Index (WRI) and a Trade Reduction Index (TRI) for the same 75 countries, taking into account the fact that for some covered products the NRA and CTE differ. As their names suggest, these two new indexes respectively capture in a single indicator the direct welfare- or trade-reducing effects of distortions to consumer and producer prices of covered farm products from all agricultural and food price and trade policy measures in place. Specifically, the TRI (or WRI) is that ad valorem trade tax rate which, if applied uniformly to all farm commodities in a country that year would generate the same reduction in trade (or economic welfare) as the actual cross-commodity structure of agricultural NRAs and CTEs for that country, other things equal.

The WRI measure reflects the partial equilibrium welfare cost of agricultural price-distorting policies better than the NRA because it recognizes that the welfare cost of a government-imposed price distortion is related to the square of the price wedge. It thus captures the disproportionately higher welfare costs of peak levels of assistance or taxation, and is larger than the mean NRA/CTE and is positive regardless of whether the government's agricultural policy is favoring or hurting farmers.

Price distortion estimates

A global summary of the new results from the World Bank project is provided in Figure 1. It confirms that agricultural prices in developing countries were set well below international levels and that high-income countries were increasingly protecting their farmers. It also reveals how much those patterns have changed since the latter 1980s: after peaking at more than 50 per cent, the average NRA for high-income countries has fallen somewhat, depending on the extent to which one believes that some new farm programs are 'decoupled' in the sense of no longer influencing production decisions (see dashed line in Figure 1). For developing countries, by contrast, the average (negative) NRA for agriculture has been rising since the 1980s and, since the latter 1990s, has been slightly above zero.

The average NRA for developing countries conceals the fact that the exporting and import-competing subsectors of agriculture have very different NRAs. Figure 2 shows that

while the average NRA for exporters has been negative throughout (going from almopst −50 per cent prior to the latter 1980s to almost zero in 2000-04), the NRA for import-competing farmers in developing countries has been positive and fluctuating around a rising trend (spiking at 40 per cent in the mid-1980s period of low international prices). The anti-trade bias within agriculture (the effective taxing of both exports and imports of farm products) for developing countries has diminished since the mid-1980s, but the gap between the NRA averages of the import-competing and export subsectors is still around 20 percentage points.

The straight-line regressions in Figure 2 also reveals that the trend NRA for import-competing farmers in developing countries has increased at virtually the same pace as that in high-income countries. This suggests that growth in agricultural protection from import competition is something that begins at low levels of per capita income rather than being a phenomenon exclusive to high-income countries.

The improvement in farmers' incentives in developing countries is understated by the above NRA estimates, because those countries have also reduced their assistance to producers of non-agricultural tradable goods, most notably manufactures. The decline in the weighted average NRA for the latter, depicted as the upper line in Figure 3a, was greater than the increase in the average NRA for tradable agricultural sectors for the period to the mid-1980s but since the mid-1980s the changes in the NRAs of both sectors have contributed almost equally to the improvement in incentives to farmers. As a result, the relative rate of assistance (RRA) for developing countries as a group went from −46 per cent in the second half of the 1970s to 1 per cent in 2000-04. This increase (from a coefficient of 0.54 to 1.01) is equivalent to an almost doubling in the relative price of farm products, which is a huge change in the fortunes of developing country farmers from that depicted by Krueger, Schiff and Valdés (1988, 1991) just two decades ago.[4] This is mostly because of the changes in Asia, but even for Latin America this relative price hike is one-half, while for Africa this indicator improves by only one-eighth. As for high-income countries, assistance to manufacturing was on average much less than assistance to farmers, even in the 1950s, and its decline since then has had only a minor impact on that group's average RRA (Figure 3b).

It is the move from negative to positive RRAs for China and India that matter most for the world's food markets. Both countries have remained very close to self sufficient in agricultural products over the past four decades, and the steady rise in their RRAs has

[4] See Anderson (2010a) for a direct comparison of the Krueger, Schiff and Valdés estimates with the most recent ones by the World Bank.

contributed to that outcome. It may also have helped ensure that the trend in China's ratio of urban to rural mean incomes (adjusted for cost of living differences) has been flat since 1980 (Ravallion and Chen 2007, Figure 3), and that the Gini coefficient for India hardly changed between 1984 and 2004 (World Bank 2008). A major question, addressed at the final section of the paper, is: will those countries' RRAs remain at their current neutral level of close to zero, or will they continue to rise in the same way as observed in Korea and Taiwan and, before them, in Japan and Western Europe?

Turning to the single partial equilibrium indicators of the impact of agricultural distortions on national economic welfare and trade, the estimates by Lloyd, Croser and Anderson (2010) indicate that the trade-reducing impact of agricultural policies for developing countries as a group was roughly constant until the late 1980s and thereafter it declined, while for high-income countries the TRI first rose and then declined equally rapidly from the latter 1980s (Figure 4(a)). The TRI for developing countries is driven by the exportables subsector which was being taxed until recently and the import-competing subsector which was, and is increasingly, being protected (albeit less than in high-income countries – see Figure 2 above). For high-income countries, policies have supported both exporting and import-competing agricultural products and, even though they strongly favor the latter, the assistance to exporters has offset somewhat the anti-trade bias from the protection of those countries' import-competing producers.

The WRI estimates, shown in Figure 4(b), indicate a steady rise from the 1960s to the 1980s but some decline in the 1990s. This reflects the fact that NRAs for high-income and developing countries diverged (in opposite directions) away from zero in the first half of the period under study and then converged toward zero in the most recent quarter-century. The global weighted average NRA thus traces out a fairly flat trend whereas the global WRI traces out a hill-shaped path and thus provides a less misleading indicator of the trend in resource misallocation in world agricultural markets.

There is a great deal of NRA diversity also across commodities within each economy's farm sector, and the extent (as measured by the standard deviation) has not diminished over the past five decades. Hence the WRIs are generally much higher than the NRAs. There is also a great deal of sectoral NRA diversity also across countries. As well, the global TRIs and WRIs differ greatly across commodities (Croser, Lloyd and Anderson 2010). All of this suggests there is still much that could be gained from improved resource reallocation both between economies and within the agricultural sector of individual

economies, were cross-country and cross-commodity differences in rates of assistance to be reduced.

One other important feature of government intervention in markets for farm products is their propensity in both rich and poor countries to alter their nation's border measures from year to year in an attempt to stabilize prices and quantities in their domestic market. That behavior is clearly evident in the WRIs and TRIs for the years surrounding the upward price spike of 1974 and the downward spike of 1986 (Table 1), and it showed up also in the NRAs for rice and wheat during the 2008 upward price surge (Anderson and Nelgen 2010). Those data also reveal that both exporting and import-competing countries respond in spike periods. The beggar-thy-neightbor behavior of the two groups thus exacerbates the international price change but reduces the effectiveness of each group in dampening the domestic price change (Martin and Anderson 2010).

To summarize, one of the most salient features of agricultural price and trade policies in the world since the 1950s is the growth in distortions in the first half of that period and the major economic reforms since. Overall levels of non-agricultural protection have declined considerably, which has improved the competitiveness of the agricultural sector in many developing economies – just as it has in Australia and New Zealand. Two other salient features in developing countries have been the gradual policy movement away from taxing agricultural exportables, but at the same time – and in contrast to non-agriculture – a rise in agricultural import protection. The latter means there is still scope for reducing distortions in resource use within agriculture even in countries with an average NRA for agriculture and an RRA close to zero. In particular, an anti-trade bias in assistance rates within the farm sector remains in place, and domestic market stabilizing adjustments to border measures continue in response to price fluctuations. This may be understandable from a national political economy viewpoint (see, e.g., Krueger 1990), but it nonetheless means that resources continue to be allocated inefficiently within the farm sector and, since openness tends to promote economic growth, that total factor productivity growth in developing country agriculture is probably slower than it would be if remaining interventions were removed.

Welfare estimates: results from economy-wide modelling

What have been the net economic effects of agricultural price and trade policy changes around the world since the early 1980s? And how do those effects on global markets, farm incomes and economic welfare compare with the effects of policy distortions that were still in place as of 2004? Valenzuela, van der Mensbrugghe and Anderson (2009) use a global

economy-wide model known as Linkage (van der Mensbrugghe 2005) to provide a combined retrospective and prospective analysis that sought to assess how far the world had come, and how far it still has to go, in rectifying the disarray in world agriculture. It quantifies the impacts both of past reforms and of current policies by comparing the effects of the recent World Bank project's distortion estimates for the period 1980-84 with those of 2004.

Several key findings from that economy-wide modelling study are worth emphasizing. First, the policy reforms from the early 1980s to the mid-2000s is estimated to have 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 moved three-fifths of the way towards global free trade in goods over that quarter century. That finding from a general equilibrium model is similar in magnitude to the extent of the decline in the partial equilibrium Welfare Reduction Index shown in Figure 4b.

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

Third, the share of global farm production exported (excluding intra-European Union (EU) trade) in 2004 has been slightly smaller as a result of those reforms since 1980-84, because of the cuts in farm export subsidies offsetting the cuts in export taxation. The 8 per cent share for agriculture in 2004 contrasts with the 31 per cent share for other primary products and the 25 per cent for all other goods. 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 per cent, thereby reducing instability of international prices and the quantities of those products traded – assuming governments also refrained from intervening at the border to reduce fluctuations in domestic markets even further.

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 the

reforms since the 1980s, with rises in nearly all agricultural industries except rice and sugar. Removing remaining goods market distortions would boost their global export and output shares to 64 and 65 percent, respectively.

Fifth, 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.

Inequality and poverty estimates: results from economy-wide modelling

Together, the above findings suggest that international inequality and global poverty could be alleviated by further farm policy reform, given that three-quarters of the world's poor are farmers in developing countries. To examine that issue more carefully, the World Bank research project undertook some economy-wide studies using global and national models with detailed household information (Anderson, Cockburn and Martin 2010). In doing so, careful consideration was given to impacts on household income and expenditure. The fact that the poorest households in the poorest countries are concentrated in agriculture means those households are likely to benefit from farm producer price increases engendered by trade policy reform, other things equal. However, the outcome is not certain because poor households also spend the majority of their income on staple foods, so if food prices rise as a consequence of reform then this adverse effect on household expenditure may more than offset any beneficial effect of higher earnings. Also, the urban poor would be adversely affected by a rise in consumer prices of staple food, which may be more or less than offset by any induced rise in the demand for their unskilled labor.

The approach adopted in the Anderson, Cockburn and Martin (2010) study to operationalize the above theory is a variant on the path-breaking approach pioneered by Hertel and Winters (2005, 2006) in their study of the poverty consequences of a prospective Doha round agreement under the WTO. The new country case studies examine full unilateral reforms that individual developing countries might implement, the effects of which are compared with what full liberalization abroad would generate, so as to be able to assess the relative importance domestically for each nation of own-country policies as distinct from

those of other countries. The national CGE models are able on their own to estimate the effects of unilateral reform of agricultural or all merchandise trade-distorting policies. The World Bank's global Linkage model was chosen to provide the national modelers with estimates of the effects of other countries' policies (amended to incorporate the above estimates of agricultural distortions).

As found in previous studies, whether based on *ex post* econometrics (as in Harrison 2007) or *ex ante* economy-wide simulation (as in Hertel and Winters 2006), the results are mixed and so not easy to summarize, particularly with regard to the poverty effects. There is nonetheless a high degree of similarity in the most important sign: the extreme poverty alleviating effect of freeing all merchandise trade globally. Furthermore, this beneficial impact of full liberalization of global merchandise trade on the world's poor would come more from agricultural than non-agricultural policy reform; and, within agriculture, more from the removal of substantial support provided to farmers in high-income countries than from developing country policy reform. Such reform would raise real earnings of unskilled workers in developing countries, most of whom work in agriculture. Their earnings would rise relative to both unskilled workers in developed countries and to other income earners in developing countries. This would thus reduce inequality both within developing countries and between developing and high-income countries, in addition to reducing poverty. Full trade liberalization of all goods, or just of agricultural products, also would cause inequality to decline within each of the three developing country regions covered by that sample of countries, and both for own-country and rest-of-world reform. Inequality within the rural or urban household groupings would not alter much following full trade reform, suggesting that trade reform's predominant distributional impact would be to reduce urban-rural inequality.

What might the WTO's Doha Development Agenda deliver?

If the reform processes of the past quarter century continue, such that national RRAs converge towards zero, there would continue to be a re-location of global farm production (in global share terms) from high-income to developing countries, reversing the policy distortion-driven opposite trend in the quarter century prior to the mid-1980s. According to the global CGE modeling exercise outlined in the previous section, if all goods market distortions as of 2004 were removed globally the net change in international prices would be

very small – but, international markets would be 'thicker' because of such reform so their volatility from year to year would be less than otherwise.

Such a policy scenario would imply that the early 1960s to the mid-1980s was an aberrant period of welfare-reducing policy divergence (negative and very low RRAs in newly independent developing countries, positive and rising RRAs in most high-income countries) that has given way to growth-enhancing, welfare-improving and inequality- and poverty-reducing reforms. In this view, the recent reforms could be seen as the result of learning from the differing growth experiences of more- and less-open economies, and appreciating that it is wiser for economies to be more open. In that case we could anticipate that a Doha agreement would at least lock in the reforms of the recent past through tighter tariff and subsidy bindings, and possibly lower those rates below current applied rates. Agreement to so reform agriculture presumably would then be accompanied by reform commitments in non-agricultural goods and services: they would be necessary to ensure most WTO members' merchantilist demands were met.

An alternative interpretation of history is that it is the most recent 25-year period of RRA changes that is aberrant. The RRA declines in high-income countries, according to this alternative view, are associated more with, in the case of the EU, its 1992 Single Market initiative and subsequent EU enlargements than with external reform pressure from other World Trade Organization (WTO) members.[5] The steady rise in international food prices over recent years also has contributed to a closing of the gap between border and domestic prices in protective countries, which may reverse if international prices trend downwards again. As for the rise of developing country RRAs, in this alternate view that is simply following the example provided earlier by higher-income countries and will not stop when those RRAs reach zero. Inspection of the NRAs in Figure 2a for exporting and import-competing sub-sectors of developing country agriculture reveals that the convergence of their aggregate NRAs to near zero is mainly with respect to the exporting sub-sector. NRAs for import-competing farmers in developing countries, by contrast, are positive and (if one ignores the latter 1980s when international food prices spiked downwards) are trending upwards over time.

[5] See Swinnen (2008). As explained by Josling (2009), the budgetary cost of continuing with the EU's past levels of support would have sky-rocketed following the EU membership expansion eastwards, with little if any of those extra payments going to the traditional lobbyists for the Common Agricultural Policy.

Moreover, in developing countries there are few signs of a slowdown of the upward trend in agricultural protection from import competition over the time period studied.[6] On the contrary, there are numerous signs that developing country governments want to keep open their options to raise agricultural NRAs in the future, particularly via import restrictions. One indicator is the high tariff bindings developing countries committed themselves to following the Uruguay Round: as of 2001, actual applied tariffs on agricultural products averaged less than half the corresponding bound tariffs for developing countries of 48 percent, and less than one-sixth in the case of least-developed countries (Anderson and Martin 2006, table 1.2). Another indicator of agricultural trade reform reluctance is the unwillingness to date of many developing countries to agree to major cuts in bound agricultural tariffs in the Doha Round of multilateral trade negotiations. More than that, the current negotiations have brought to prominence a new proposal for agricultural protectionism in developing countries. This is based on the notion that agricultural protection is helpful and needed for food security, livelihood security and rural development. This view has succeeded in bringing "Special Products" and a "Special Safeguard Mechanism" into the multilateral trading system's agricultural negotiations, despite the fact that such policies may worsen poverty and the food security of the poor by raising domestic food price levels in developing countries and also international food price fluctuations (Ivanic and Martin 2008; Hertel, Martin and Leister 2010).

These two alternative interpretations of history have profoundly different implications for the future. The first suggests that the WTO's Doha Round of multilateral trade negotiations is likely to conclude with substantial cuts to agricultural tariff and subsidy bindings that lock in recent reforms and also promote cuts to restrictions on trade in other goods and services. Such an outcome could go close to relegating protectionism in agricultural markets, and farm export subsidies, to history – except that both developed and developing countries would seek to have some of their farm products classified as "sensitive" and thus subject to lesser tariff cuts.[7]

---

[6] True, applied tariffs were lowered or suspended as a way of dealing with the international food price spike in 2008, but food export taxes or quantitative restrictions were imposed that year by numerous food-exporting developing countries (Anderson and Nelgen 2010; Jones and Kwiecinski 2010). Those changes aer likely to be reversed when international prices return to trend, as happened following the 1974 and 1986 price spikes.

[7] According to recent analysis, even if such "sensitive" exceptions applied to only 2 to 4 percent of agricultural tariff lines, they would eliminate most of the gains that would otherwise come from a Doha agricultural agreement (Anderson and Martin 2006; Jean, Laborde and Martin 2010). If an additional "Special Products" category is allowed for developing countries, that would reduce even further the welfare gains from a Doha agreement.

The other interpretation of history – one that views as normal a movement from taxing to subsidizing farmers as an economy develops – suggests the Doha Round will struggle to reach an ambitious reform outcome in agriculture, and hence may not reach any agreement. In that case developing countries are even more likely to make use of the legal wiggle room they have allowed themselves in their WTO bindings to follow Japan, Korea and Taiwan into higher levels of agricultural protection. As well, protection and subsidy cuts and reforms to regulations affecting services that have already been undertaken but not yet bound in WTO commitments could unravel. The benefits of a Doha round come thus not just from new reforms but also from securing past reforms (Hoekman, Martin and Mattoo 2010) and reducing the scope, via reduced binding overhang, to raise protection when international prices fall (Francois and Martin 2004). Moreover, if the counterfactual were to be rising protectionism rather than retaining the status quo, the gains could be several times the standard estimates of welfare benefits vis-à-vis existing policies (Bouët and Laborde 2010). And even if agricultural tariff bindings are reached, many countries have ample scope to re-instrument their assistance to domestic support measures (Orden, Blandford and Josling 2011).

Beyond Doha: what next?

The prospects for further policy reform will be conditioned in part on developments in markets for farm and other products. On the demand side, the projected growth in national incomes for coming decades is likely to be highest in relatively low-income countries including China and India. This implies significant changes to the economic centers of gravity of food and livestock feed consumption in the global economy, given that price and income elasticities of demand for food tend to decline with per capita income and earlier for lower-valued foods such as staple grains and tubers than for livestock and horticultural products. On its own this change is likely to put upward pressure on international prices of grain, oilseed and livestock products.

Another important development on the demand side has to do with the new linkage between markets for fossil fuels and biofuel sources of energy. The rising user price of fossil fuels from 2003, together with concerns about the effect of burning such fuels on climate change, led the governments in the EU, US and elsewhere to provide user subsidies and to mandate a certain degree of use of biofuels. With those policies in place, it has become

privately profitable for such products as corn, sugar and oilseeds to be used as inputs into ethanol or biodiesel. As a result, food and energy raw material prices have move together much more in r3ecent years than in the past (see Figure 5). If the user price of crude petroleum (including the price of carbon emissions) remains at historically high levels as is assumed by the International Energy Agency (2010) and is forecast by the World Bank (2010), that new source of demand for crop products will possibly continue, adding to the upward pressure on their prices.[8] And to the extent biofuel mandates are inflexible, they could add to the volatility of international prices of food because that component of demand will not be price-responsive.

On the supply side of the market for farm products, there is the possibility of technological catch-up by lagging regions through faster generation and importation of modern farm technologies, for example via the Green Revolution for Africa initiative of the Gates and Rockefeller foundations. The new agricultural biotechnology revolution can contribute to that to the extent that government regulations and consumer sentiment allow, including through partnerships between public sector researchers and private life science firms. Policies towards transgenic crops have already caused major transformations of much of the cropping in North and South America; and biotech food crop policy reforms that began in China in 2010 (allowing field experiments in Bt rice) may soon spread to other crops and other developing countries. Such reforms are likely to be necessary, though, to reduce the prospect of global crop yields falling in the wake of the slowdown in agricultural R&D over the past two decades and the diversion of more of the remaining funds towards conserving natural resources and the environment (Alston, Beddow and Pardey 2009).

Also affecting supply trends is climate change. Its effects on aggregate global agricultural production and its location across countries and regions without and with mitigation and adaptation are great unknowns, not least because many possible government policy responses are being considered unilaterally and multilaterally. Moreover, the uncertainties about what policy instruments will be adopted by whom and when will be spread over decades rather than just the next few years. Land use undoubtedly will be affected non-trivially. Carbon credits and emissions trading will have unknown and possibly major effects depending, among other things, on whether/how/when agriculture and forestry are included in the schemes of various countries. The same is true of border tax adjustments

[8] The cost of fuel and fertilizer needed to produce crops will rise with petroleum prices as well though, making biofuels less competitive than otherwise. Also, biofuels probably have a higher carbon footprint than most other renewable energy sources, and so over time governments may be dissuaded from continuing with biofuel subsidies and mandates as a route to reducing dfependence on imported fossil fuels.

or other sanctions imposed on imports from countries deemed to be not sharing the burden of reducing greenhouse gases. Crop yield fluctuations will be greater because of weather volatility, and especially more extreme weather events, leading to further triggers for trade policy interventions aimed at stabilizing domestic food markets.

The literature on these and myriad other ways in which agricultural markets are expected to be affected directly and indirectly by climate change and associated policy and technological responses is growing exponentially. One of the more widely cited is by Cline (2007), who predicts that by the 2080s, even with carbon fertilization, agricultural output will be 8 percent lower in developing countries, 8 percent higher in high-income countries, and 3 percent lower globally. Projections in a more recent study by IFPRI, assuming no carbon fertilization, suggest that by 2050 climate change will have reduced global rice, wheat and coarse grain production each by around 9 percent (Nelson et al. 2010, Table 2.5).

True, climate mitigation policies could have an adverse effect on industrialization in the more advanced developing countries such as China and lead to their agricultural sector in aggregate benefitting indirectly (Mattoo et al. 2009), but the consensus nonetheless seems to be that expected climate change over the coming decades and its impact on water availability and demand will add to the difficulty of growth in global supplies of farm products outstripping growth in demand this century, in contrast to the 20th century. The OECD and FAO project average wheat and coarse grain prices to be between 15 and 40 percent higher in real terms in 2019 relative to 1997–2006 (OECD 2010b). Hertel, Burke, and Lobell (2010) suggest prices for major staples will rise between 10 and 60 percent by 2030. IFPRI also is within that range but over a longer period: it projects rice and wheat prices to be a little more than one-third higher in 2050 than in 2010 and maize prices nearly two-thirds higher in the absence of climate change; and with climate change they expect them to be higher again, by up to one-fifth for rice, one-quarter for wheat and one-third for maize (Nelson et al. 2010, Table A4.1). Bearing in mind that the real food price index in 2009 was about 70 percent above its 2000 level (Figure 5), those projections suggest climate change could be enough to prevent real food prices from falling over the first half of this century. Other preliminary studies, however, are more optimistic about farm productivity growth and less pessimistic about yield losses from climate change in temperate areas and so expect much more modest price rises (e.g., van der Mensbrugghe and Rosen 2010; Valenzuela and Anderson 2010).

What this suggests is there are wide confidence bands around price, production and hence trade projections without climate change and even wider bands with climate change. Added to that are uncertainties about not only Doha but also possible unilateral reforms to

policies distorting agricultural incentives, preferential/regional trade agreements, environmental and food safety regulations, reforms to water institutions and policies, and of course national and multilateral policy responses to climate change (biofuels, carbon taxes, emission trading schemes, border tax adjustments).

Areas for further agricultural trade research

The agenda for further research on agricultural trade issues is as rich as or richer than ever. With the greater uncertainty associated with climate change and associated policies, and the related intermittent linking of food and fuel prices via biofuels, the demand for reliable market projections has grown. Baseline projections are also a pre-requisite for much contemporary trade policy analysis. Ex ante analysis of multilateral and preferential trade agreements ideally require a dynamic model, not least for showing the adjustment path to phased partial reforms. Analyzing such proposals as the Special Safeguard Mechanism for developing country members of WTO requires such models to also be stochastic. That feature would also enhance our modeling of climate change, whose most costly characteristic for farmers may well be an increased frequency of extreme weather events. Other stochastic events worthy of the attention of trade modelers are invasive species and pandemics, both of which could impact non-trivially on national and possibly even global food security.

The baseline in global trade models requires up-to-date estimates of price distortions in national markets. Fortunately the Gates Foundation is funding an FAO/OECD effort to expand the OECD's annual PSE/CSE to a selection of countries in Africa (see www.fao.org/mafad), building on the World Bank's recent time series to the middle of this decade (Anderson and Valenzuela 2008). That will need to be broadened and institutionalized if it is to serve the policy monitoring and modeling communities on a continuing basis. The methodology for doing that also will need to be enhanced to incorporate the distortionary effects of measures such as biofuel and water policies, not to mention the ever-growing list environmental and food safety regulations that are substituting for traditional trade measures.

Time series of price distortions are also required for political econometric research aimed at improving our understanding of why governments intervene in markets in the ways they do. The challenges include explaining differences in NRA/PSE trends across countries and products, in the choices of policy instruments, in annual fluctuations around trend NRAs, and in the timing and sustainability of reforms and policy reversals. A recent collection of

such studies (Anderson 2010b) has barely begun to mine the 75-country time series distortions database now available at www.worldbank.org/agdistortions.

The findings from such political econometric research would have numerous immediate uses. One would be to offer alternative counterfactuals to national and global modelers: most simply assume a continuation of current policies is the appropriate counterfactual against which to compare alternative policies. Another immediate use would be in devising politically feasible alternatives to variations in border restrictions for responding to food security concerns with fluctuations in international food prices.

One area not mentioned above but possibly very important for future farmer welfare and therefore worthy of mention by way of conclusion relates to the effect of globalization on supply chains for farm products. The ICT and biotechnology/nanotechnology revolutions have resulted in a great deal of consolidation in the farm input-supplying, processing and retailing industries around the world. The ICT revolution will continue to lower trade and foreign investment costs, including for supermarkets as they search globally for the lowest-cost suppliers of products with the attributes desired by their customers. One consequence is that first-stage processors, food and beverage manufacturers, and distributors will be under pressure to become more concentrated so as to better match the bargaining power of supermarkets. Even so, supermarkets will exploit their capacity to develop their own brands and even their own processing and distribution. In turn these developments will alter dramatically the way farmers supply those markets, with the emphasis on timely delivery of uniform-quality products leading to more-efficient (possibly larger) farmers displacing less-efficient ones and thereby raising agricultural productivity growth (Swinnen 2007; Reardon et al. 2009). Incorporating those features in national and global economic models, in the form of imperfect competition in parts of the supply chain, will become increasingly necessary if modelers are to provide reliable estimates of the effects on farmers, international traders and final consumers of policy and other developments in global markets.

References

Alston, J.M., J.M. Beddow and P.G. Pardey (2009), 'Mendel versus Malthus: Research, Productivity and Food Prices in the Long Run', Staff Paper P09-1, Department of Applied Economics, University of Minnesota, St. Paul MN, revised September.

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

Anderson, K. (ed.) (2009), *Distortions to Agricultural Incentives: A Global Perspective, 1955-2005,* London: Palgrave Macmillan and Washington DC: World Bank.

Anderson, K. (2010a), 'Krueger/Schiff/Valdés Revisited: Agricultural Price and Trade Policy Reform in Developing Countries Since 1960', *Applied Economic Perspectives and Policy* 32(2): 195-231, Summer.

Anderson, K. (ed.) (2010b), *The Political Economy of Agricultural Price Distortions.* Cambridge and New York: Cambridge University Press.

Anderson, K., J. Cockburn and W. Martin (eds.) (2010), *Agricultural Distortions, Inequality, and Poverty,* 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): 675-704, October.

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

Anderson, K. and S. Nelgen (2010), 'Trade Barrier Volatility and Agricultural Price Stabilization', CEPR Discussion Paper 8102, London, November.

Anderson, K. and E. Valenzuela (2008), *Global Estimates of Distortions to Agricultural Incentives, 1955 to 2005*, data spreadsheet at www.worldbank.org/agdistortions

Bouët, A. and D. Laborde (2010), 'Assessing the Potential Cost of a Failed Doha Round', *World Trade Review* 9(2): 319–51.

Cline, W.R. (2007), *Global Warming and Agriculture: Impact Estimates by Country,* Washington DC: Peterson Institute for International Economics.

Croser, J.L., P.J. Lloyd and K. Anderson (2010), 'How Do Agricultural Policy Restrictions to Global Trade and Welfare Differ Across Commodities?' *American Journal of Agricultural Economics* 92(3): 698-712, April.

Francois, J.F. and W. Martin (2004), 'Commercial Policy, Bindings and Market Access', *European Economic Review* 48(3): 665-79, June.

Harrison, A.E. (ed.) (2007), *Globalization and Poverty,* Chicago: University of Chicago Press.

Hertel, T.W., M. Burke and D. Lobell (2010), 'The Poverty Implications of Climate-Induced Crop Yield Changes by 2030', GTAP Working Paper No. 59, Purdue University, West Lafayette.

Hertel, T., W. Martin and A. Leister (2010), 'Potential Implications of a Special Safeguard Mechanism in the World Trade Organization: The Case of Wheat', *World Bank Economic Review* 24(2): 330–59.

Hertel, T.W. and L.A. Winters (2005), "Estimating the Poverty Impacts of a Prospective Doha Development Agenda" *The World Economy* 28(8): 1057-71, August.

Hertel, T.W. and L.A. Winters (eds.) (2006), *Poverty and the WTO: Impacts of the Doha Development Agenda,* London: Palgrave Macmillan and Washington DC: World Bank.

Hoekman, B., W. Martin and A. Mattoo (2010), 'Conclude Doha: It Matters!' *World Trade Review* 9(3): 505-30.

International Energy Agency (2010), *World Energy Outlook 2010,* Paris: International Energy Agency.

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

Jean, S., D. Laborde and W. Martin (2010), 'Formulas and Flexibility in Trade Negotiations', Policy Research Working Paper 5200, World Bank, Washington DC, February.

Johnson, D.G. (1973, revised 1991), *World Agriculture in Disarray*, London: Fontana.

Jones, D. and A. Kwiecinski (2010), 'Policy Responses in Emerging Economies to International Agricultural Commodity Price Surges', *OECD Food, Agriculture and Fisheries Working Papers* No. 34, Paris: OECD. doi: 10.1787/5km6c61fv40w-en

Josling, T. (2009), 'Western Europe', Ch. 3 in Anderson, K (ed.) *Distortions to Agricultural Incentives: A Global Perspective, 1955 to 2007.* London: Palgrave Macmillan and Washington, DC: World Bank.

Josling, T., K. Anderson, A. Schmitz and S. Tangermann (2010), 'Understanding International Trade in Agricultural Products: One Hundred Years of Contributions by Agricultural Economists', *American Journal of Agricultural Economics* 92(2): 424-46, April.

Krueger, A.O. (1990), 'Asymmetries in Policy Between Exportables and Import-competing Goods', in Jones, R.W. and A.O. Krueger (eds.), *The Political Economy of International Trade,* Oxford: Basil Blackwell.

Krueger, A.O., M. Schiff and A. Valdés (1988), 'Measuring the Impact of Sector-specific and Economy-wide Policies on Agricultural Incentives in LDCs', *World Bank Economic Review* 2(3): 255-272.

Krueger, A., M. Schiff and A. Valdés (1991), *The Political Economy of Agricultural Pricing Policy*, *Volume 2: Asia*, Baltimore: Johns Hopkins University Press for World Bank.

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

Lloyd, P.J, J.L. Croser and K. Anderson (2010), 'Global Distortions to Agricultural Markets: New Indicators of Trade and Welfare Impacts, 1960 to 2007', *Review of Development Economics* 14(2): 141-60, May.

Martin, W. and K. Anderson (2010), 'Trade Distortions and Food Price Surges', paper presented at the World Bank-UC Berkeley Conference on *Agriculture for Development – Revisited*, Berkeley CA, 1-2 October.

Mattoo, A., A. Subramanian, D. van der Mmensbrugge and J. He (2009), 'Can Global De-Carbonization Inhibit Developing Country Industrialization?', Policy Research Working Paper 5121, World Bank, Washington DC, November.

Nelson, G.C., M.W. Rosegrant, A. Palazzo, I. Gray, C. Ingersoll, R. Robertson, S. Tokgoz, T. Zhu, T.B. Sulser, C. Ringler, S. Msangi and L. You (2010), *Food Security, Farming, and Climate Change to 2050: Scenarios, Results, Policy Options,* IFPRI Research Monograph, Washington DC: International Food Policy Research Institute, December.

OECD (2010a), *Agricultural Policies in OECD Countries: Monitoring and Evaluation,* Paris: OECD. www.oecd.org/document/54/0,3343,en_2649_33773_43202422_1_1_1_37401,00.html

OECD (2010b), *OECD-FAO Agricultural Outlook 2010-2019,* Paris: OECD.

Orden, D., D. Blandford and T. Josling (eds.) (2011), *WTO Disciplines on Agricultural Support: Seeking a Fair Basis for Trade*, Cambridge and New York: Cambridge University Press (forthcoming).

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

Reardon, T., Barrett, C.B., Berdegue, J.A. and Swinnen, J.F.M. (2009), 'Agrifood Industry Transformation and Farmers in Developing Countries', *World Development* 37(11): 1717-27, November.

Swinnen, J.F.M. (ed.) (2007), *Global Supply Chains, Standards and the Poor,* London: CABI Publishing.

Swinnen, J.F.M. (ed.) (2008), *The Perfect Storm: The Political Economy of the Fischler Reforms of the CAP*, Brussels: Centre for European Policy Studies.

Tangermann, S. (2010), 'Agricultural Trade 1980 vs. 2010: Some Progress, But Still So Far To Go', Featured Paper for the 30th Anniversary Conference of the International Agricultural Trade Research Consortium, Berkeley CA, 12-14 December.

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 (2010), 'Climate Change and Food Security to 2050: A Global Economy-wide Perspective', background paper for a CSIRO Centre for Complex Systems project, Canberra, November.

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, K. (ed.), *Distortions to Agricultural Incentives: A Global Perspective, 1955 to 2007,* London: Palgrave Macmillan and Washington, DC: World Bank.

van der Mensbrugghe, D. (2005), "LINKAGE Technical Reference Document: Version 6.0", Unpublished, World Bank, Washington DC, January 2005. Accessible at www.worldbank.org/prospects/linkagemodel

van der Mensbrugghe, D. and R. Rosen (2010), 'Climate, Trade and Development', Paper presented at the 13th Global Economic Analysis Conference, Penang, 9-11 June.

Vousden, N. (1990), *The Economics of Trade Protection,* Cambridge: Cambridge University Press.

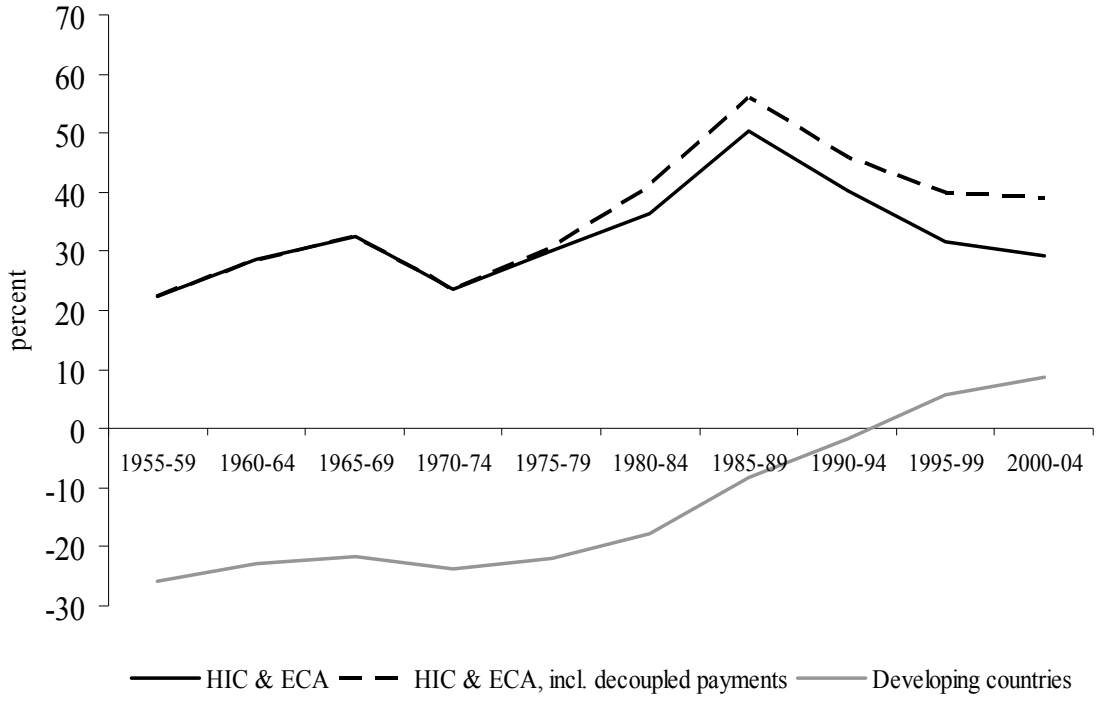
World Bank (2007), *World Development Report 2008: Agriculture for Development*, Washington DC: World Bank.

World Bank (2008), *World Development Indicators*, Washington DC: World Bank.

World Bank (2010), *Commodity Price Data*, Washington DC: World Bank. Accessible at http://go.worldbank.org/5AT3JHWYU0

Figure 1: Nominal rates of assistance to agriculture in high-income, transition[a] and developing countries, 1955 to 2004

(per cent, weighted averages, with 'decoupled' payments included in the dashed line)



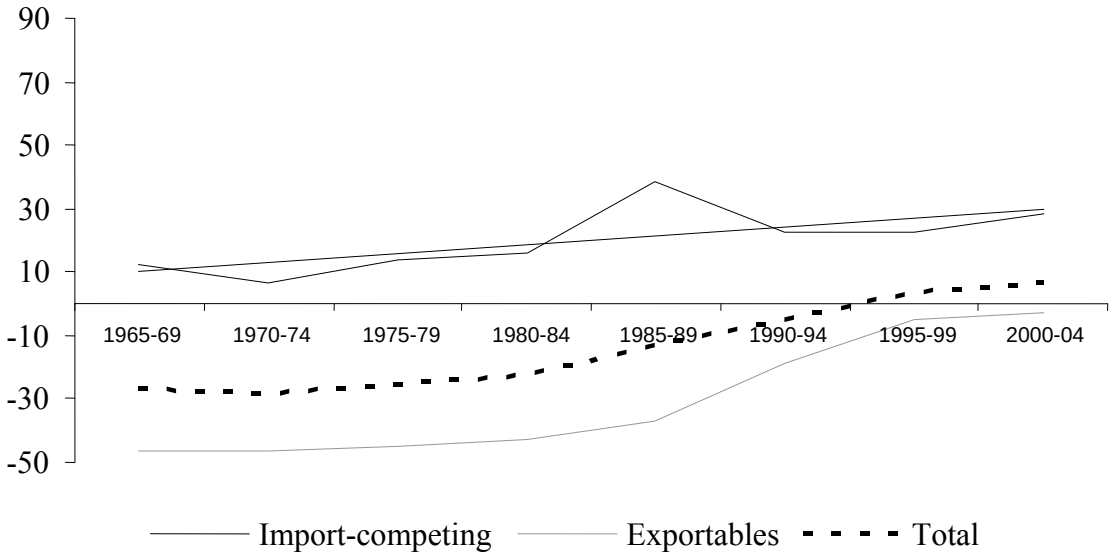
[a] Denoted by the World Bank as ECA, for (Central and Eastern) Europe and Central Asia.

Source: Anderson (2009, Ch. 1), based on estimates in Anderson and Valenzuela (2008).

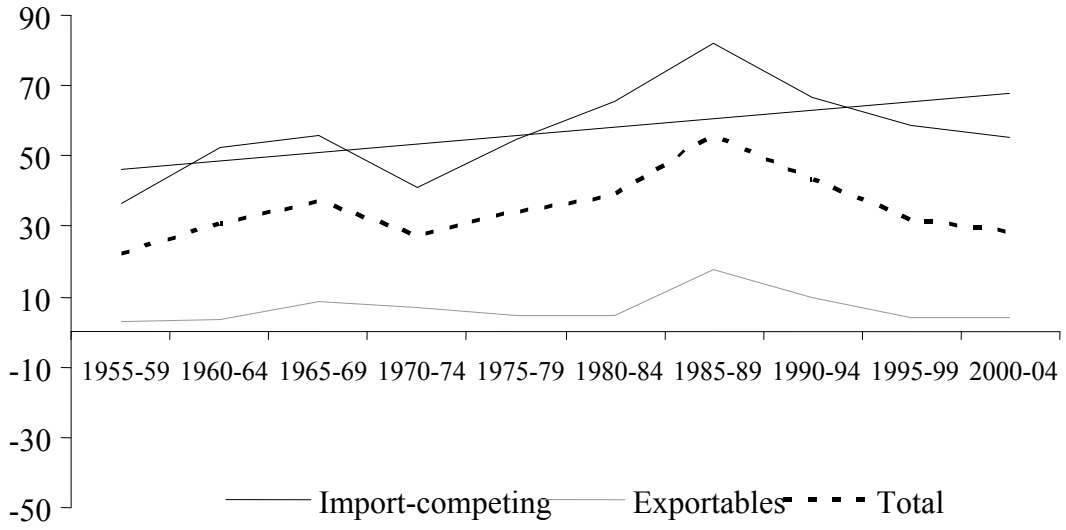
Figure 2: Nominal rates of assistance to exportable, import-competing and all covered agricultural products,[a] high-income, transition and developing countries, 1955 to 2004

(per cent)

(a) Developing countries



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

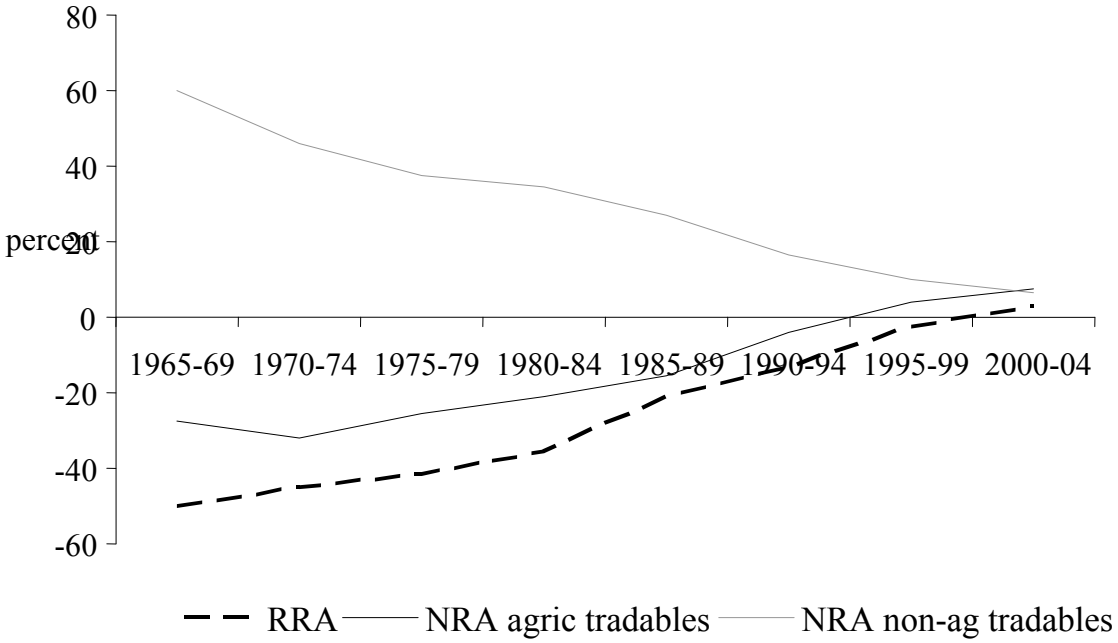


[a]Covered products only. The total also includes nontradables. The straight line in the upper segment of each graph is from an ordinary-least-squares regression based on annual NRA estimates.

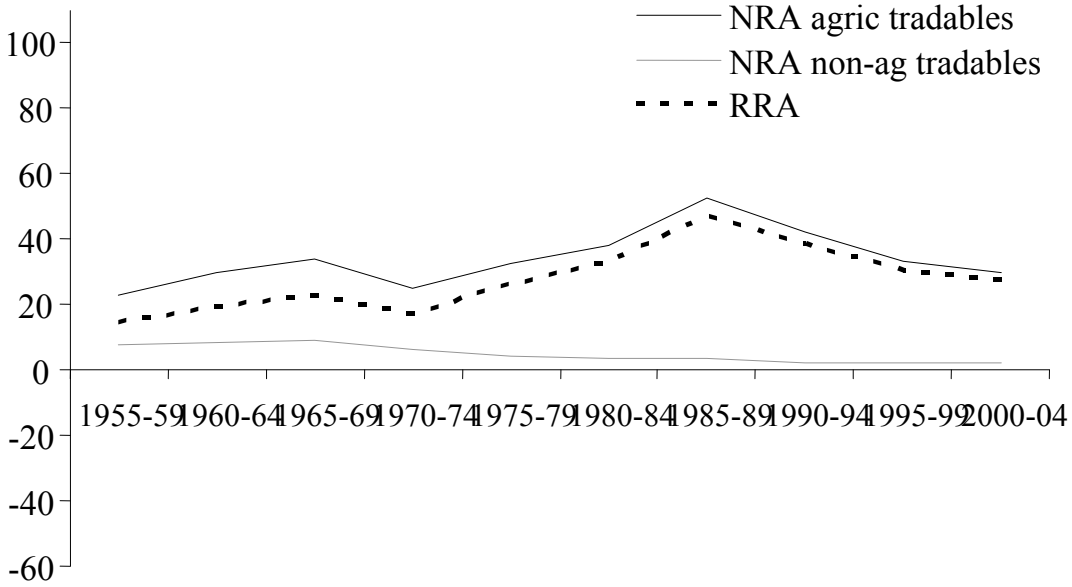
Source: Anderson (2009, Ch. 1), based on estimates in Anderson and Valenzuela (2008).

Figure 3: Nominal rates of assistance to agricultural and non-agricultural tradable sectors and relative rate of assistance,[a] developing and high-income countries, 1955 to 2004
(per cent, farm production-weighted averages across countries)

(a) Developing countries



(b) High-income countries



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

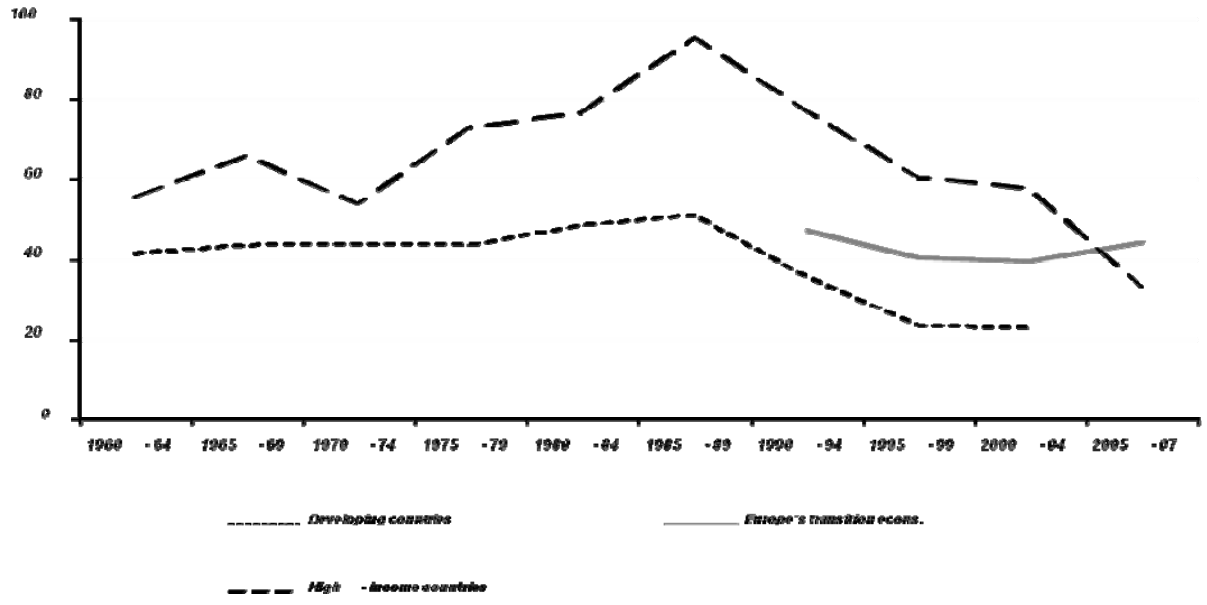
Source: Anderson (2009, Ch. 1), based on estimates in Anderson and Valenzuela (2008).

Figure 4: Trade and welfare reduction indexes for tradable farm products, by region, 1960 to 2007

(percent)

(a) Trade reduction index

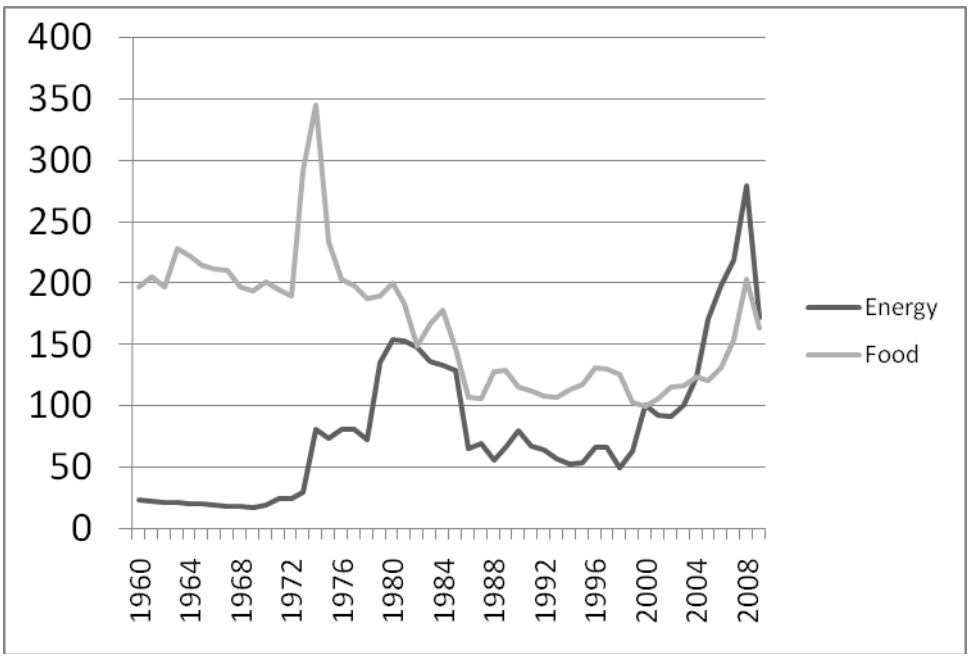
(b) Welfare Reduction Index



Source: Lloyd, Croser and Anderson (2010), based on NRAs and CTEs in Anderson and Valenzuela (2008).

Figure 5: Real international price indexes for food and fossil fuel energy raw materials, 1960 to 2009

(2000 = 100)



Source: World Bank (2010).

Table 1: Contributions to total agricultural WRI and TRI from different policy instruments, developing and high-income countries, 1965-2004 (percent)

(a) WRI

Developing countries	1965-71	1972	1973	1974	1975	1976	1977-83	1984	1985	1986	1987	1988	1989-2004
Import tax equivalent	12	15	4	3	11	13	12	12	17	18	17	13	11
Export tax equivalent	19	16	31	34	28	18	23	30	22	28	33	32	10
Import subsidy equivalent	3	4	8	7	3	2	4	2	2	1	2	2	2
All (incl. domestic) measures	**38**	**42**	**47**	**55**	**53**	**38**	**51**	**60**	**46**	**53**	**58**	**51**	**29**
High-income countries													
Import tax equivalent	48	39	25	24	37	53	58	61	64	86	99	73	51
Export subsidies	7	6	3	1	3	3	4	4	7	11	11	8	5
All (incl. domestic) measures	**57**	**46**	**34**	**31**	**41**	**60**	**66**	**68**	**77**	**113**	**119**	**83**	**61**

(b) TRI

Developing countries	1965-71	1972	1973	1974	1975	1976	1977-83	1984	1985	1986	1987	1988	1989-2004
Import tax equivalent	9	13	3	2	10	11	9	10	13	14	15	11	9
Export tax equivalent	19	15	29	32	26	17	22	28	20	26	32	30	9
Import subsidy equivalent	-3	-3	-8	-7	-3	-2	-4	-2	-2	-1	-2	-2	-2
All (incl. domestic) measures	**25**	**22**	**20**	**28**	**37**	**25**	**27**	**39**	**32**	**38**	**45**	**39**	**15**
High-income countries													
Import tax equivalent	34	29	20	17	24	35	37	40	41	60	60	51	35
Export subsidies	-4	-4	-2	-1	-2	-2	-3	-3	-5	-8	-8	-6	-3
All (incl. domestic) measures	**29**	**24**	**16**	**12**	**22**	**32**	**33**	**37**	**37**	**53**	**53**	**47**	**32**

Source: Anderson and Nelgen (2010), based on NRAs and CTEs in Anderson and Valenzuela (2008).