

Distortions to agricultural versus nonagricultural producer incentives

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Abstract

For more than a century, government policies have grossly distorted resource use in agriculture, both within and between countries. Earnings from farming in many developing countries have been depressed by a pro-urban bias in own-country policies, as well as by governments of richer countries favoring their farmers with import barriers and subsidies. Both sets of policies reduce national and global economic welfare and inhibit economic growth, and add to inequality and poverty in developing countries. Since the 1980s, however, numerous developing and some high-income country governments have reduced their sectoral and trade policy distortions. This paper draws on new empirical studies to show the changing extent of policy distortions to prices faced by the world's farmers since the 1950s. Modeling results provide an indication of how far those reforms proceeded between the early 1980s and 2004, and how much scope remains for removing remaining inefficiencies in global agricultural resource use.

Keywords: Distorted farm prices, trade policy reforms, inefficient resource use

JEL codes: F13, N50, Q17, Q18, Q21

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Acronyms

| | |
|------|---|
| CGE | Computable general equilibrium (model) |
| CSE | Consumer subsidy equivalent |
| CTE | Consumer tax equivalent |
| EU | European Union |
| GSE | Gross subsidy equivalent |
| NRA | Nominal rate of assistance |
| OECD | Organization for Economic Cooperation and Development |
| PSE | Producer support estimate (or earlier, producer subsidy equivalent) |
| RRA | Relative rate of assistance |
| TBI | Trade bias index |
| TRI | Trade reduction index |
| WRI | Welfare reduction index |
| WTO | World Trade Organization |

Distortions to agricultural versus nonagricultural producer incentives

The Issue and its Importance

Resource use in agriculture, both within and between countries, has been grossly distorted for more than a century by government price and trade policies in both rich and poor countries. Earnings from farming in many developing countries have been depressed by a pro-urban bias in own-country policies, as well as by governments of richer countries favoring their farmers with import barriers and subsidies. Both sets of policies reduce national and global economic welfare and inhibit economic growth. They also add to inequality and poverty in developing countries, and slow structural adjustment in growing economies. Since the 1980s, however, numerous developing and some high-income country governments have been reducing their sectoral and trade policy distortions and relying on more-direct forms of taxation and support that are less wasteful of resources.

For growing economies, the most common reason for restrictions on imports of farm products has been to protect the value of assets of domestic farmers and associated agribusinesses producers from import competition as they come under competitive pressure to shed labour in the course of economic development. But, in the process, those protective measures hurt not only domestic consumers and exporters but also foreign producers and traders of farm products. Their distorting effects on resource use and consumer purchases reduce national and global economic welfare, the latter through depressing international prices of farm products which lowers the earnings of farmers and associated rural businesses in other countries.

This external policy influence on other countries is not the only one affecting their farmers though. The governments of many (especially newly independent) developing countries have a history of taxing their farmers heavily. A well-known example is the taxing of exports of plantation crops in post-colonial Africa (Bates 1981). The use of multiple exchange rates also introduced an anti-trade bias in many developing countries. As well, most developing countries chose to also pursue an import-substituting industrialization strategy, predominantly by restricting imports of manufactures. This indirectly taxed other tradable sectors in those developing economies, including agriculture.

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

During the past quarter century, however, numerous countries have begun to reform their agricultural price, trade and exchange rate policies. That raises the question as to how far the world has come in reducing market distortions relative to how far it still has to go before agricultural and other resources are free to be attracted to their most productive uses.¹

¹ Of course *laissez faire* may not be optimal in the presence of externalities. Nor should it be forgotten that raising tax revenue to provide public goods is a legitimate goal of government. But agricultural price and trade policies are almost never first-best ways to overcome externalities or raise taxes (Corden 1997, Chs. 4 and 13). Throughout this chapter it is assumed that reducing government distortions to product prices is a step in the direction of improving resource allocation, in the sense that it then allows governments to find more-efficient

The paper begins with a survey of the methodology required to measure the extent of own-country distortions to incentives faced by farmers relative to producers of other tradable goods. It then surveys analyses of the effects of price and trade policies on producer and consumer incentives over time, focusing on the worsening of that situation between the 1950s and mid-1980s and the progress that has been made over the subsequent 25 years. Economy wide computable general equilibrium modeling results then provide a further indication of how far those reforms have proceeded between the early 1980s and 2004, and how much scope remains for removing remaining inefficiencies in global agricultural resource use. The paper concludes by assessing the prospects for reducing remaining distortions.

National Distortions to Incentives: Basic Theory²

Bhagwati (1971) and Corden (1997) define the concept of a policy distortion to a product market as something that governments impose which creates a gap between the marginal social return to a seller and the marginal social cost to a buyer in a transaction. Such a distortion imposes an economic cost on society which can be estimated using welfare techniques such as those pioneered by Harberger (1971). As Harberger notes, this focus allows a great simplification in evaluating the marginal costs of a set of distortions: changes in economic costs can be evaluated taking into account the changes in volumes directly affected by such distortions, ignoring all other changes in prices. In the absence of divergences such as externalities, the measure of a distortion is the gap between the price

domestic policy measures for dealing with externalities and raising taxes. Such reforms may incidentally also contribute to those goals (eg by lowering pollutive farm production or expanding the volume of imports enough to more than compensate for the reduction in the rate of import taxation).

² This section draws heavily on Anderson, Kurzweil, Martin, Sandri and Valenzuela (2008).

paid and the price received, irrespective of whether the level of these prices is affected by the distortion.³

Other developments that change incentives facing producers and consumers can include flow-on consequences of the distortion, but these should not be confused with the direct price distortion that needs to be estimated. If, for instance, a country is large in world trade for a given commodity, imposition of an export tax may raise the price in international markets, reducing the adverse impact of the distortion on producers in the taxing country. Other flow-on consequences include the effect of trade distortions on the real exchange rate, which is the price of traded goods relative to non-traded goods, or on the market for substitutes or complements in production or consumption. None of these flow-on effects are of immediate concern, however, because if the product market's direct distortions are accurately estimated, they can be incorporated as price wedges into an appropriate national or global economy-wide computable general equilibrium (CGE) model which in turn will be able to capture the full general equilibrium impacts (inclusive of terms of trade, real exchange rate and substitution effects) of the various direct distortions to the producer and consumer prices of the product.

The total effect of distortions on the agricultural sector will depend not just on the size of the direct agricultural policy measures, but also on the magnitude of distortions generated by direct policy measures altering incentives in non-agricultural sectors. It is relative prices and hence relative rates of government assistance that affect producers' incentives. In a two-sector model of an economy, an import tax has the same effect on the export sector as an export tax: the Lerner (1936) Symmetry Theorem. This carries over to a

³ Just, Hueth and Schmitz (2004). Once the extent of that price wedge is measured for a product, it can be used as an input into a model of the market for that good to estimate what the market price effect is of that distortion, if any.

model that has many sectors, and is unaffected if there is imperfect competition domestically or internationally or if some of those sectors produce only nontradables (Vousden 1990, pp. 46-47). The symmetry theorem is therefore also relevant for considering distortions *within* the agricultural sector. In particular, if import-competing farm industries are protected, for example via import tariffs, this has similar adverse effects on incentives to produce exportables as does an explicit tax on agricultural exports; and if both measures are in place, this is a double imposition on farm exporters.

In what follows, we begin by focusing first on direct distortions to agricultural incentives, before turning to those affecting the sector indirectly via policies directed at non-agricultural sectors.

Direct agricultural distortions

Consider a small, open, perfectly competitive national economy with many firms producing a homogeneous farm product with just primary factors. In the absence of externalities, processing, producer-to-consumer wholesale plus retail marketing margins, exchange rate distortions, and domestic and international trading costs, that country would maximize national economic welfare by allowing both the domestic farm product price and the consumer price of that product to equal E times P , where E is the domestic currency price of foreign exchange and P is the foreign currency price of this identical product in the international market. That is, any government-imposed diversion from that equality, in the absence of any market failures or externalities, would be welfare-reducing for that small economy.

Price-distorting trade measures at the national border

The most common distortion is an ad valorem tax on competing imports (usually called a tariff), t_m . Such a tariff on an imported product that is perfect substitute for the domestically produced good is the equivalent of a production subsidy and a consumption tax both at rate t_m . If that tariff on the imported primary agricultural product is the only distortion, its effect on producer incentives can be measured as the nominal rate of assistance to farm output conferred by border support (NRA_{BS}), which is the unit value of production at the distorted price less its value at the undistorted free market price expressed as a fraction of the undistorted price:⁴

$$(1) \quad NRA_{BS} = \frac{E \times P(1 + t_m) - E \times P}{E \times P} = t_m$$

The effect of that import tariff on consumer incentives in this simple economy is to generate a consumer tax equivalent (CTE) on the agricultural product for final consumers:

$$(2) \quad CTE = t_m$$

The effects of an import subsidy are identical to those in equations (1) and (2) for an import tax, but t_m in that case would have a negative value.

Governments sometimes also intervene with an export subsidy s_x (or an export tax in which case s_x would be negative). If that were the only intervention:

$$(3) \quad NRA_{BS} = CTE = s_x$$

If any of these trade taxes or subsidies were specific rather than ad valorem (e.g., \$/kg rather than z percent), its ad valorem equivalent can be calculated using slight modifications of equations (1), (2) and (3).

⁴ The NRA_{BS} thus differs from the producer support estimate (PSE) as calculated by the OECD, in that the PSE is expressed as a fraction of the distorted value. It is thus $t_m / (1 + t_m)$ and so for a positive t_m the PSE is smaller than the NRA_{BS} and is necessarily less than 100 percent.

Domestic producer and consumer price-distorting measures

Governments sometimes intervene with a direct production subsidy for farmers, s_f (or production tax, in which case s_f is negative, including via informal taxes in kind by local and provincial governments). In that case, if only this distortion is present, the effect on producer incentives can be measured as the nominal rate of assistance to farm output conferred by domestic price support (NRA_{DS}), which is as above except s_f replaces t_m or s_x , but the CTE in that case is zero. Similarly, if the government just imposes a consumption tax c_c on this product (or consumption subsidy, in which case c_c is negative), the CTE is as above except c_c replaces t_m or s_x , but the NRA_{DS} in that case is zero.

The combination of domestic and border support provides the total rate of assistance to output, NRA_o , where

$$(4) \quad NRA_o = NRA_{BS} + NRA_{DS}$$

If there are distortions to input costs, their ad valorem equivalent can be accounted for by summing each input's NRA times its input-output coefficient to obtain the combined NRA_i , and adding that to the farm industry's nominal rate of direct assistance to farm output, NRA_o , to get the total nominal rate of assistance to farm production

What if the exchange rate system also is distorting prices?

Should a multi-tier foreign exchange rate regime be in place, then another policy-induced price wedge exists. A simple two-tier exchange rate system creates a gap between the price received by all exporters and the price paid by all importers for foreign currency, changing both the exchange rate received by exporters and that paid by importers from the equilibrium

rate E that would prevail without this distortion in the domestic market for foreign currency (Bhagwati 1978).

Exchange rate overvaluation of the type considered here requires controls by the government on current account transfers. A common requirement is that exporters surrender their foreign currency earnings to the central bank for changing to local currency at a low official rate. This is equivalent to a tax on exports to the extent that official rate is below what the exchange rate would be in a market without government intervention. That implicit tax on exporters reduces their incentive to export and hence the supply of foreign currency flowing into the country. With less foreign currency, demanders are willing to bid up its purchase price. That provides a potential rent for the government, which can be realized by auctioning off the limited supply of foreign currency extracted from exporters or creating a legal secondary market. Either mechanism will create a gap between the official and parallel rates (de Melo and Robinson 1989; Dervis, de Melo and Robinson 1981). Should the government allow the exporters to exchange part of their foreign exchange earnings in the secondary market (or not be able to prevent them creating an unofficial secondary market), this would reduce the gap between the official and secondary market prices.

What matters for present purposes is that where a country has distortions in its domestic market for foreign currency, the exchange rate relevant for calculating the NRA_o or the CTE for a particular tradable product depends, in the case of a dual exchange rate system, on whether the product is an importable or an exportable, while in the case of multiple exchange rates it depends on the specific rate applying to that product each year.

What about post-farmgate costs?

If a state trading corporation is charging excessively for its marketing services and thereby lowering the farm-gate price of a product, for example as a way of raising government

revenue in place of an explicit tax, the extent of that excess should be treated as if it is an explicit tax.

Some farm products, including some that are not internationally traded, are inputs into a processing industry that may also be subject to government interventions. In that case the effect of those interventions on the price received by farmers for the primary product also needs to be taken into account.

The mean of agricultural NRAs

When it comes to averaging across countries, each polity is an observation of interest, so a simple average is meaningful for the purpose of political economy analysis. But if one wants a sense of how distorted is agriculture in a whole region, a weighted average is needed. The weighted average *NRA* for covered primary agriculture can be generated by multiplying each primary industry's value share of production (valued at the farm-gate equivalent undistorted prices) by its corresponding *NRA* and adding across industries.⁵ The overall sectoral rate, *NRA_{ag}*, could also include actual or assumed information for the non-covered commodities and, where it exists, the aggregate value of non-product-specific assistance to agriculture.

A weighted average can be similarly generated for the tradables part of agriculture – including those industries producing products such as milk and sugar that require only light

⁵ Corden (1971) proposed that free-trade volume be used as weights, but since they are not observable (and an economy-wide model is needed to estimate them) the common practice is to compromise by using actual distorted volumes but undistorted unit values or, equivalently, distorted values divided by $(1 + NRA)$. If estimates of own-and cross-price elasticities of demand and supply are available, a partial equilibrium estimate of the quantity at undistorted could be generated, but if those estimated elasticities are unreliable this may introduce more error than it seeks to correct.

processing before they can be traded – by assuming that its share of non-product-specific assistance equals its weight in the total. Call that NRA_{ag}^t .

The dispersion of agricultural NRAs

In addition to the mean, it is important to provide also a measure of the dispersion or variability of the NRA estimates across the covered products. 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 (Lloyd 1974). 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, the higher will be the welfare cost of those market interventions. A simple indicator of dispersion is the standard deviation of industry *NRAs* within agriculture.

Anderson and Neary (2005) show that it is possible to develop a single index that captures the extent to which the mean and standard deviation of protection together contribute to the welfare cost of distortionary policies. That index recognizes that the welfare cost of a government-imposed price distortion is related to the square of the price wedge, and so is larger than the mean and is positive regardless of whether the government's agricultural policy is favoring or hurting farmers. In the case where it is only import restrictions that are distorting agricultural prices, the index provides a percentage tariff equivalent which, if applied uniformly to all imports, would generate the same welfare cost as the actual intra-sectoral structure of protection from import competition. Lloyd, Croser and Anderson (2009) show that, once *NRAs* and *CTEs* have been calculated, they can be used to generate such an index even in the more complex situation where there may be domestic producer or consumer taxes or subsidies in addition to not only import tariffs but any other trade taxes or subsidies or quantitative restrictions. They call it a Welfare Reduction Index (WRI). Such a measure is

the percentage agricultural trade tax (or uniform NRA and CTE) which, if applied uniformly to all agricultural tradables, would generate the same reduction in national economic welfare as the actual intra-sectoral structure of distortions to domestic prices of tradable farm goods. They also show that, if one is willing to assume that domestic price elasticities of supply (demand) are equal across farm commodities, then the only information needed to estimate the WRI, in addition to the *NRA*s and *CTE*s, is the share of each commodity in the domestic value of farm production (consumption) at undistorted prices.

Trade bias in agricultural assistance

A trade bias index also is needed, to indicate the changing extent to which a country's policy regime has an anti-trade bias within the agricultural sector. This is important because, as indicated by Lerner (1936), a tariff assisting import-competing farm industries has a similar effect on farmers' incentives as a tax on agricultural exports; and if both measures are in place, this is a double imposition on farm exports. And a dual exchange rate system adds further to the anti-trade bias. The higher is the nominal rate of assistance to import-competing agricultural production ($NRAag_m$) relative to that for exportable farm activities ($NRAag_x$), the more incentive producers in that sub-sector will have bid for mobile resources that would otherwise have been employed in export agriculture, other things equal.

Once each farm industry is classified either as import-competing, or a producer of exportables, or as producing a non-tradable (its status could change over time), it is possible to generate for each year the weighted average *NRA*s for the two different groups of tradable farm industries. They can then be used to generate an agricultural trade bias index defined as:

$$(7) \quad TBI = \left[\frac{1 + NRAag_x}{1 + NRAag_m} - 1 \right]$$

where $NRAag_m$ and $NRAag_x$ are the average NRAs for the import-competing and exportable parts of the agricultural sector (their weighted average being $NRAag^t$). This index has a value of zero when the import-competing and export sub-sectors are equally assisted, and its lower bound approaches -1 in the most extreme case of an anti-trade policy bias.

Anderson and Neary (2005) show also that it is possible to develop a single index that captures the extent to which import protection reduces the volume of trade. Once NRAs and CTEs have been calculated, Lloyd, Croser and Anderson (2009) show how they can be used to generate a more-general Trade Reduction Index (TRI), that allows for the trade effects also of domestic price-distorting policies, and regardless of whether they (or the trade measures) are positive or negative. Such a measure is the percentage agricultural trade tax (or uniform NRA and CTE) which, if applied uniformly to all agricultural tradables, would generate the same reduction in trade volume as the actual intra-sectoral structure of distortions to domestic prices of tradable farm goods. They also show that, if the domestic price elasticities of supply (demand) are equal across farm commodities, then again the only information needed to estimate the TRI, in addition to the NRAs and CTEs, is the share of each commodity in the domestic value of farm production (consumption) at undistorted prices.

Indirect agricultural assistance/taxation via non-agricultural distortions

In addition to direct assistance to or taxation of farmers, the Lerner (1936) Symmetry Theorem demonstrates that their incentives are also affected indirectly by government assistance to non-agricultural production in the national economy. The higher is the nominal rate of assistance to non-agricultural tradables production ($NRAnonag^t$), the more incentive producers in other tradable sectors will have bid up the value of mobile resources that would otherwise have been employed in agriculture, other things equal. If $NRAag^t$ is below

NRA_{nonag}^t , one might expect there to be fewer resources in agriculture than there would be under free market conditions in the country, notwithstanding any positive direct assistance to farmers, and conversely.

One way to capture this is to calculate a Relative Rate of Assistance, RRA , defined as:

$$(8) \quad RRA = \left[\frac{1 + NRA_{ag}^t}{1 + NRA_{nonag}^t} - 1 \right]$$

Since an NRA cannot be less than -1 if producers are to earn anything, neither can RRA . This measure is a useful indicator for providing international comparisons over time of the extent to which a country's policy regime has an anti- or pro-agricultural bias.

National Distortions to Agricultural Incentives: Empirical Estimates

The history of agricultural protection growth in high-income countries is well known and well documented, so it need not be rehearsed here. The evolution of price distortions in developing countries from the 1950s, as many of them became independent from their colonial masters, is somewhat more heterogeneous, and so is worth briefly summarizing before turning to empirical estimates of the magnitude of price distortions. We begin with the first of the newly industrializing regions, namely Northeast Asia.

The evolution of policies in developing countries

In South Korea and Taiwan in the 1950s, as in many newly independent developing countries, an import-substituting industrialization strategy was initially adopted, which harmed agriculture. But in those two economies – unlike in most other developing countries – that policy was replaced in the early 1960s with a more-neutral trade policy that resulted in their very rapid export-oriented industrialization. That development strategy in those densely

populated economies imposed competitive pressure on the farm sector which, just as in Japan in earlier decades, prompted farmers to lobby (successfully, as it happened) for ever-higher levels of protection from import protection (Anderson, Hayami and Others 1986, Ch. 2).

Many less-advanced and less-rapidly growing developing countries not only adopted import-substituting industrialization strategies in the late 1950s/early 1960s (Little Scitovsky and Scott 1970; Balassa 1971) but also imposed direct taxes on their exports of farm products (Bates 1981). It was common in the 1950s and 1960s, and in some cases through to the 1980s also, to use dual or multiple exchange rates so as to indirectly tax both exporters and importers (Bhagwati 1978, Krueger 1978). This added to the anti-trade bias of developing countries' trade policies. Certainly within the agricultural sector of each country, import-competing industries tended to enjoy more government support than those that were more competitive internationally (Krueger, Schiff and Valdés 1988, 1991; Herrmann et al. 1992). The Krueger et al. study also reveals, at least up to the mid-1980s, that direct disincentives for farmers such as agricultural export taxes were less important than indirect disincentives in the form of import protection for the manufacturing sector or overvalued exchange rates, both of which attracted resources away from agricultural industries producing tradable products.

In short, historically agrarian developing countries have tended to tax agriculture relative to manufacturing but those that manage to have an industrial take-off gradually change from taxing to subsidizing agriculture relative to other sectors in the course of their economic development although less so, and at a later stage of development, the stronger a country's comparative advantage in agriculture (Anderson, Hayami and others 1986; Lindert 1991). Hence at any point in time farmers in poor countries tended to face depressed terms of trade relative to product prices in international markets, while the opposite was true for farmers in rich countries (Anderson 1995). The exceptions were not only poor countries with

an extreme comparative disadvantage in agriculture (such as South Korea) but also rich countries with an extreme comparative advantage in agriculture (Australia, New Zealand).

While the earlier policy history of developing countries has been described in previous surveys (e.g., Krueger 1984), less well-known is the actual extent to which many emerging economies have belatedly followed the example of South Korea and Taiwan in abandoning import-substitution and opening their economies. Some (e.g., Chile) started in the 1970s while others (e.g., India) did not do so in a sustained way until the 1990s. Some have adopted a very gradual pace of reform, with occasional reversals, while others have moved rapidly to open markets. And some have adopted the rhetoric of reform but in practice have done little to free up their economies. To get a clear sense of the overall impact of these reform attempts, as well as those of high-income countries, there is no substitute for empirical analysis that quantifies over time the types of indicators raised in the theory section above.

Estimates of distortions since the 1950s

After post-war reconstruction, Japan raised its agricultural protection, just as had been happening in Western Europe, but to even higher levels. Domestic prices exceeded international market prices for grains and livestock products by less than 40 per cent in both Japan and the European Community in the 1950s (Gulbrandsen and Lindbeck 1973). By the early 1980s the difference was more than 80 per cent for Japan but was still around 40 percent for the EC – and was still close to zero for the agricultural-exporting rich countries of Australasia and North America (Anderson Hayami and others 1986, Table 2.5). Virtually all of that assistance to Japanese and European farmers in that period was due to restrictions on imports of farm products.

Since, 1986 the OECD Secretariat has been computing annual producer and consumer support estimates (PSEs and CSEs) by member countries (OECD 2008a). For the OECD member countries as a group, the PSE rose between 1986-88 and 2005-07 in US dollar terms (from \$239 to \$263 billion) but has come down when expressed as a share of support-inclusive returns to farmers (from 37 to 26 percent, or from 59 to 35 percent when expressed as a percentage of undistorted prices). Because of some switching of support instruments, including to measures that are based on non-current production or on long-term resource retirement, the share of that assistance provided via market price support measures has fallen from three-quarters to one-half. This suggests OECD policies have become considerably less trade distorting at least in proportional terms, even though farmer support in high-income countries has continued to grow in dollar terms because of growth in the value of their farm output.

As for developing countries outside Northeast Asia, the main comprehensive set of pertinent estimates over time is for the period just prior to when reforms became widespread. They were generated as part of a major study of 18 developing countries for the 1960s to the mid-1980s by Krueger, Schiff and Valdés (1988, 1991). That study by the World Bank, whose estimates are summarized in Schiff and Valdés (1992), shows that the depression of incentives facing farmers has been due only partly to various forms of agricultural price and trade policies, including subsidies to food imports. Much more important in many cases have been those developing countries' non-agricultural policies that hurt their farmers indirectly. The two key ones have been manufacturing protectionism (which attract resources from agriculture to the industrial sector) and overvalued exchange rates (which attract resources to sectors producing nontradables, such as services). That study revealed that disincentives for farmers were greater the poorer the country, and for producers of exportables as compared

with import-competing farm producers, suggesting a strong anti-trade bias for the sector as a whole.

Since there were no comprehensive multi-country, multi-region studies of the Krueger/Schiff/Valdés type for developing countries that monitored progress over the reform period,⁶ a new study was launched by the World Bank in 2006 aimed at filling this lacuna. The new study covers not only 41 developing countries but also 14 European transition economies as well as 20 high-income countries. The results from that study⁷ do indeed reveal that there has been a substantial reduction in distortions to agricultural incentives in developing countries over the past two to three decades. They also reveal that progress has not been uniform across countries and regions, and that – contrary to some earlier claims (e.g., from Jensen, Robinson and Tarp 2002) – the reform process is far from complete. In particular, many countries still have a strong anti-trade bias in the structure of assistance within their agricultural sector; and some countries have ‘overshot’ in the sense that they have moved from having an average rate of assistance to farmers that was negative to one that is positive, rather than stopping at the welfare-maximizing rate of zero. Moreover, the variance in rates of assistance across commodities within each country, and in aggregate rates across countries, remains substantial; and the beggar-thy-neighbor practice of insulating domestic markets from international food price fluctuations continues, thereby exacerbating that volatility.

⁶ Exception include a pair of follow-on studies by Valdés (1996, 2000) for a sample of Latin American and European transition economies, and a recent study of four Asian countries by Orden et al. (2007).

⁷ A global overview of the results is provided in Anderson (2009), and the detailed country case studies are reported in four regional volumes covering Africa, Asia, Latin American and Europe’s transition economies (see www.worldbank.org/agdistortions). The global database that brings together the fifty years of distortion estimates is provided by Anderson and Valenzuela (2008).

A global summary of those new results is provided in Figure 1. It reveals that the nominal rate of assistance (NRA) to farmers in high-income countries rose steadily over the post-World War II period through to the end of the 1980s, apart from a small dip when international food prices spiked around 1973-74. After peaking at more than 50 percent in the mid-1980s, that average NRA for high-income countries has fallen a little, although the extent of the dip shown assumes that the farm programs claimed to be 'decoupled' from production do indeed have no influence on production decisions. For developing countries, too, the average NRA for agriculture has been rising, but from a level of around -25 percent during the period from the mid-1950s to the early 1980s to a level of nearly 10 percent in the first half of the present decade.

When those rates of assistance are expressed in terms of the gross subsidy equivalent (GSE), it turns out that the rise in high-income assistance more or less offset the rise in negative assistance to developing country farmers prior to the 1980s, but then the rise in developing country NRAs has more than offset the fall in NRAs for high-income country farmers since the 1980s. As a result, the estimated GSE of government assistance to farmers globally has risen very substantially in constant (2000) US dollar terms, from close to zero up to the mid-1970s to more than \$200 billion per year at the farm-gate since the mid-1990s. When expressed on a per farmer basis, it varies enormously as between high-income and developing countries. In 1980-84 the GSE in high-income countries was already around \$8,000 and by 2000-04 it had risen to \$10,000 on average (and \$25,000 in Norway, Switzerland and Japan), or \$13,500 when 'decoupled' payments are included. By contrast, the GSE in developing economies was -\$140 per farmer in the first half of the 1980s, which is a non-trivial tax when one recalls that at that time the majority of these people's households were surviving on less than \$1 a day per capita. By 2000-04 they received on average around \$50 per farmer (Anderson 2009, Ch. 1). While this represents a major

improvement, it is only 0.5 percent of the support received by the average farmer in high-income countries.

The improvement in farmers' incentives in developing countries is understated by the above NRAag 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 in Figure 1(a), was clearly much greater than the increase in the average NRA for tradable agricultural sectors for the period to the mid-1980s, consistent with the finding of Krueger, Schiff and Valdés (1988, 1991). For the period since the mid-1980s, changes in both sectors' NRAs have contributed almost equally to the improvement in farmer incentives. The Relative Rate of Assistance, captured in equation (8) above, provides a useful indicator of relative price change: the RRA for developing countries as a group went from -46 percent in the second half of the 1970s to 1 percent in the first half of the present decade. 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 in just a generation. This is mostly because of the changes in Asia, but even for Latin America that relative price hike is one-half, while for Africa that indicator improves by only one-eighth. As for high-income countries, assistance to manufacturing was on average much smaller 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 1(b)).⁸

While the RRA captures the extent of anti- or pro-agricultural bias in policies across sectors, the trade bias index (TBI) defined in equation (7) above is able to capture the extent

⁸ Australia and New Zealand were clear exceptions, where manufacturing protection had been very high and its decline was several decades later than in other high-income countries (Anderson, Lloyd and MacLaren 2007).

to which the exporting and import-competing sub-sectors of agriculture have very different NRAs. Figure 2 shows agriculture's TBI on the horizontal axis and the RRA on the vertical axis. An economy with no anti- or pro-agricultural bias ($RRA = 0$) and no anti- or pro-trade bias within the farm sector ($TBI = 0$) would be located at the intersection of the two axes in Figure 2. Africa, Asia and Latin America (shown there as LAC) were all well to the southwest of that neutral point as of 1980-84, but by 2000-04 all had moved to become much closer to the vertical axis (meaning they had reduced their anti-trade bias in agriculture), and all but Africa had become closer to the horizontal axis. Asia is now above rather than below that axis, which means those developing countries are assisting farmers relative to producers of other tradable products. While that can lead to just as much waste of resources as the earlier anti-agricultural policy bias, it is only in Korea and Taiwan that the 2000-04 RRA is well above zero (being just 1 percent for China and 4 percent for Southeast Asia).

To provide single indicators of distortions imposed by each country's border and domestic policies on its economic welfare and its trade volume, Lloyd, Croser and Anderson (2008) define a Welfare Reduction Index (WRI) and a Trade Reduction Index (TRI) and estimate them for the 75 countries in the above-mentioned World Bank study, taking into account that the NRA differs from the CTE for some products (while ignoring indirect effects of sectoral and trade policy measures directed at non-agricultural sectors). The WRI measure reflects the true welfare cost of agricultural price-distorting policies better than the NRA because it captures the disproportionately higher welfare costs of peak levels of assistance or taxation. They thus go somewhat closer to what a computable general equilibrium (CGE) can provide in the way of estimates of the trade and welfare (and other) effects of the price distortions captured by the product NRA and CTE estimates; and they have the advantage over CGE models of being able to provide an annual time series. Global five-year averages of those two indexes are provided in Figure 3, along with the global average NRA.

The WRI results in Figure 3 indicate a fairly constant tendency for agricultural policies to reduce welfare 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 ways) away from zero in the first half of the period under study and then converged toward zero in the most recent quarter-century. That meant their weighted average NRA traces out a fairly flat trend whereas the WRI traces out a hill-shaped path and thus provides a less misleading indicator of resource misallocation in world agricultural markets.

Turning to the TRI, it indicates that the trade restrictiveness of agricultural policy for developing countries as a group was roughly constant until the early 1990s and thereafter it declined, especially for Asia and Latin America, while for high-income countries the TRI decline began a few years later. The TRI for developing countries is driven by the exportables sub-sector which was being taxed until recently and the import-competing sub-sector which was and is increasingly being protected (albeit by less than in high-income countries). For high-income countries, policies have supported both exporting and import-competing agricultural products and, even though they favor the latter much more heavily, the assistance to exporters has offset somewhat the anti-trade bias from the protection of import-competing producers. The net result, shown in Figure 3, is that the global TRI rises from around 20 percent in the 1960s to around 30 percent in the latter 1980s before falling to a little above 10 percent by the latter 1990s.

Economy-Wide Effects of Past Reforms and Remaining Policies

It is clear from the above that there has been a great deal of reform over the past quarter of a century in policy distortions to agricultural incentives throughout the world: the anti-agricultural and anti-trade biases of policies of many developing countries have been

reduced, export subsidies of high-income countries have been cut, and some re-instrumentation toward less inefficient and less trade-distorting forms of support, particularly in Western Europe, has begun.⁹ However, protection from agricultural import competition has continued to be on an upward trend in both rich and poor countries, notwithstanding the Uruguay Round Agreement on Agriculture that aimed to bind and reduce farm tariffs. What, then, have been the net economic effects of agricultural price and trade policy changes around the world since the early 1980s? And how do those effects on global markets, farm incomes and economic welfare compare with the effects of policy distortions 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 seeks to assess how far the world has come, and how far it still has to go, in removing the disarray in world agriculture. It quantifies the impacts both of past reforms and current policies by comparing the effects of the recent World Bank project's distortion estimates for the period 1980-84 with those of 2004.

Several key findings from that economy-wide modeling study are worth emphasizing. First, the policy reforms from the 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 (in 2004 US dollars). This suggests that in a global welfare sense the world had moved three-fifths of the way towards global free trade in goods over that quarter century.

Second, developing economies benefited proportionately more than high-income economies (1.0 percent compared with 0.7 percent of national income) from those past policy reforms, and would gain nearly twice as much as high-income countries if all countries were to complete that reform process (an average increase of 0.9 percent compared with

⁹ A thorough discussion of farm policy re-instrumentation is available in Rausser (1995),

0.5 percent for high-income countries). Of those prospective welfare gains from global liberalization, 60 percent would come from agriculture and food policy reform. This is a striking result given that the shares of agriculture and food in global GDP and global merchandise trade are only 3 and 6 percent, respectively. The contribution of farm and food policy reform to the prospective welfare gain for just developing countries is even greater, at 83 percent.

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

Fourth, the developing countries' share of the world's primary agricultural exports rose from 43 to 55 percent, and its farm output share from 58 to 62 percent, because of the reforms since the early 1980s, with rises in nearly all agricultural industries except rice and sugar. Removing remaining goods market distortions would boost their export and output shares even further, 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 protection database. (For example, Anderson, Martin and van der Mensbrugghe (2006) 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 for 2004 are included in the new database (most notably for Argentina) and their 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 farmers in developing countries (Chen and Ravallion 2008).

Finally, removal of agricultural price-supporting policies in high-income countries would undoubtedly lead to painful reductions in income and wealth for farmers there if they were not compensated – although it should be kept in mind that the majority of farm household income in high-income countries comes from off-farm sources (OECD 2008b). The gainers in the rest of their societies could readily afford to compensate them fiscally from the benefits of freeing trade, bearing in mind that farmers constitute less than 3 percent of the workforce in high-income countries.

Prospects for Further Reductions in Distortions

The RRAs summarized above could lead one to view developments from the early 1960s to the mid-1980s as an aberrant period of welfare-reducing policy divergence (negative and declining RRAs in low-income countries, positive and rising RRAs in most high-income countries) that has given way to welfare-improving and poverty-reducing reforms during which the two country groups' RRAs are converging. However, the convergence of RRAs to near zero hides the continuing difference between NRAs for exporting and import-competing sub-sectors of agriculture: the former trended towards zero which was almost certainly welfare-improving, but at the same time the latter was above zero from the 1950s and is trending upwards over time at the same rate as in high-income countries – notwithstanding the Uruguay Round Agreement on Agriculture which was aimed at tariffing and reducing import protection.

Why have some countries reformed their price-distorting agricultural and trade policies more than others in recent decades? Some have reformed unilaterally, apparently having become convinced that it is in their own national interest to do so. China is the most dramatic and significant example of the past three decades among developing countries, and Australia and New Zealand among the high-income countries (Huang et al. 2009, Anderson, Lloyd and MacLaren 2007). Others may have done so partly to secure bigger and better loans from international financial institutions and then, having taken that first step, they have continued the process, even if somewhat intermittently. India is one example, but there are numerous examples also in Africa and Latin America. Few have gone backwards in terms of increasing their anti-agricultural bias, but Zimbabwe and perhaps Argentina qualify during the present decade – and numerous others joined them in 2008, at least temporarily, in

response to the sudden upward spike in international food prices. And some have reduced their agricultural subsidies and import barriers at least partly in response to the GATT's multilateral Uruguay Round Agreement on Agriculture, the European Union (EU) being the most important example (helped by its desire also for otherwise-costly preferential trade agreements, including its expansions eastwards in 2004 and 2007).

The EU reforms suggest agricultural protection growth can be slowed and even reversed if accompanied by re-instrumentation away from price supports to decoupled measures or more direct forms of farm income support (Rausser 1995, Josling 2009). The starker examples of Australia and New Zealand show that one-off buyouts can bring faster and even complete reform.¹⁰ But in the developing countries where rates of agricultural protection are generally below high-income rates, there are fewer signs of a slowdown of the upward trend in agricultural protection from import competition over the past half-century. Indeed, there are numerous signs that developing country governments want to keep open their options to raise agricultural NRAs in the future, particularly via import restrictions. One is the high tariff bindings that 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 is the unwillingness of many developing countries to agree to major cuts in bound agricultural tariffs in the WTO's on-going Doha round of multilateral trade negotiations, and their demands for exemptions for "Special Products" and a "Special Safeguard Mechanism" into the multilateral trading system's agricultural negotiations.

¹⁰ Anderson, Lloyd and MacLaren (2007). For a detailed analysis of the buyout option versus the slower and less complete cashout option (moving to direct payments), as well as the uncompensated gradual squeeze-out or sudden cutout options, see Orden and Diaz-Bonilla (2006).

Developing countries that continue to free up domestic markets and practice good macroeconomic governance will keep growing, and typically the growth will be more rapid in manufacturing and service activities than in agriculture, especially in the more densely populated countries where agricultural comparative advantage is likely to decline. Whether such economies become more dependent on imports of farm products depends, however, on what happens to their relative Rates of Assistance (RRA). The first wave of Asian industrializers (Japan, and then Korea and Taiwan) chose to slow the growth of food import dependence by raising their NRA for agriculture even as they were bringing down their NRA for non-farm tradables, such that their RRA became increasingly above the neutral zero level. A key question is: will later industrializers follow suit, given the past close association of RRAs with rising per capita income and falling agricultural comparative advantage?

One new force is disciplines on farm subsidies and protection policies of WTO member countries following the Uruguay Round. Earlier industrializers were not bound under GATT to keep down their agricultural protection. Had there been strict disciplines on farm trade measures at the time Japan and Korea joined GATT in 1955 and 1967, respectively, their NRAs may have been halted at less than 20 percent (Anderson 2009, Figure 1.12). At the time of China's accession to WTO in December 2001, its NRA was less than 5 percent according to Huang et al. (2009), 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 2009). 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).

Hopefully developing countries will choose not to make use of the legal wiggle room they have allowed themselves in their WTO bindings to follow Japan, Korea and Taiwan into high agricultural protection. A much more efficient and equitable strategy would be to instead treat agriculture in the same way they have been treating non-farm tradable sectors. That would involve opening the sector to international competition, and relying on more-efficient domestic policy measures for raising government revenue (e.g., income and consumption or value-added taxes) and for assisting farm families (e.g., public investment in rural education and health, rural infrastructure, and agricultural research and development – see, e.g., Fan 2008).

As for high-income countries, they have all lowered the price supports for their farmers since the 1980s. In some countries that has been partly replaced by assistance that is at least somewhat decoupled from production. If that trend continues at the pace of the past quarter century, and if there is no growth of agricultural protection in developing countries, then before the middle of this century most of the disarray in world food markets will have been removed. However, if the WTO's Doha Development Agenda is not brought to a successful conclusion, and governments thereby find it more difficult to ward off agricultural protection lobbies, it is all the more likely that developing countries will follow the same agricultural protection path this century as that which was taken by high-income countries last century.

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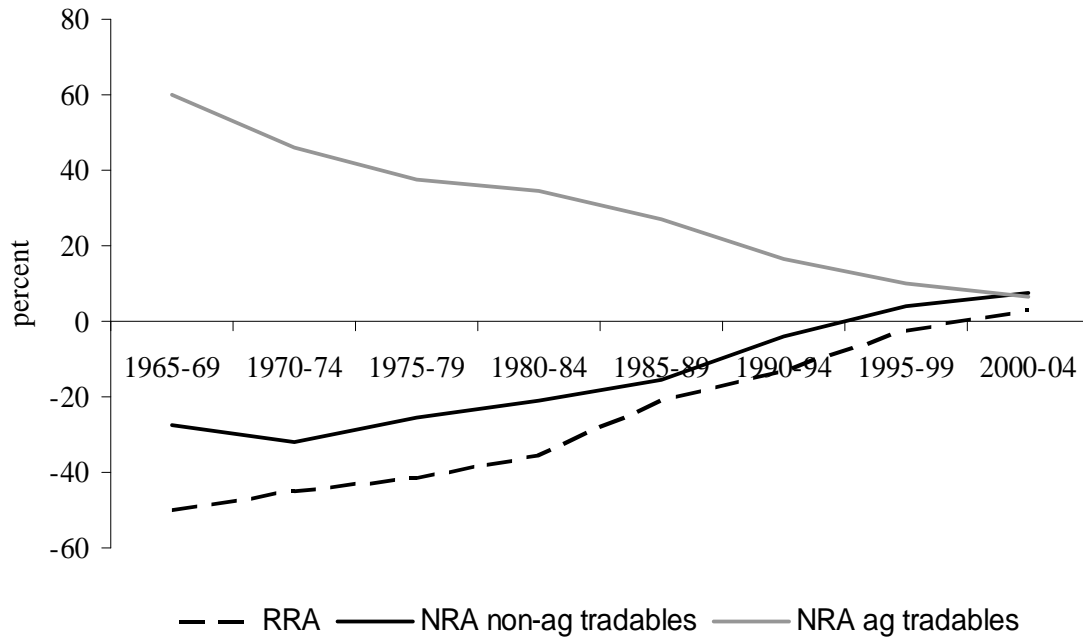
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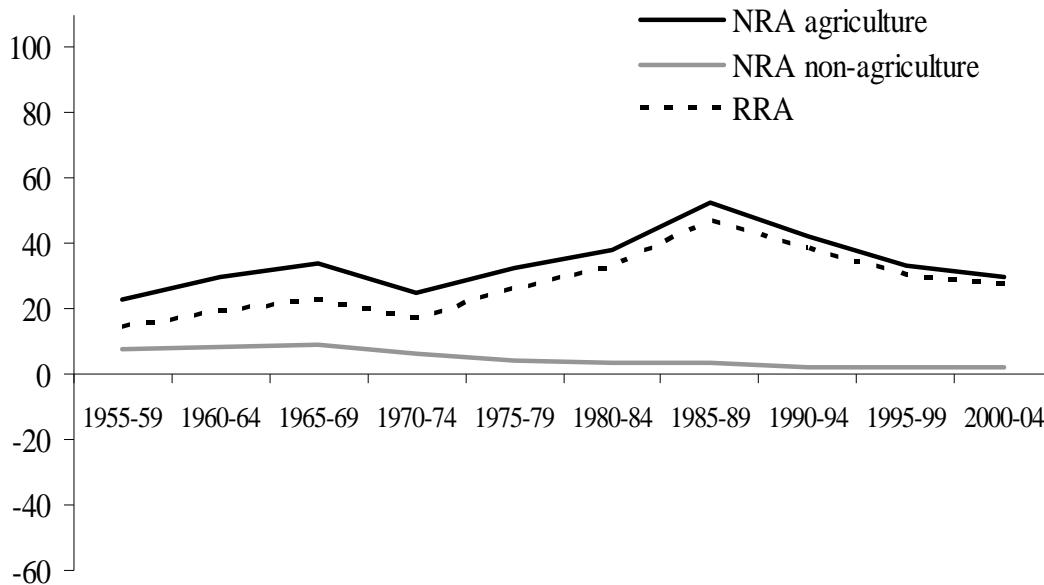
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Figure 1: Nominal rates of assistance to agricultural and non-agricultural sectors and relative rate of assistance,^a developing and high-income countries, 1955 to 2004
 (percent, production-weighted averages across countries)

(a) Developing countries



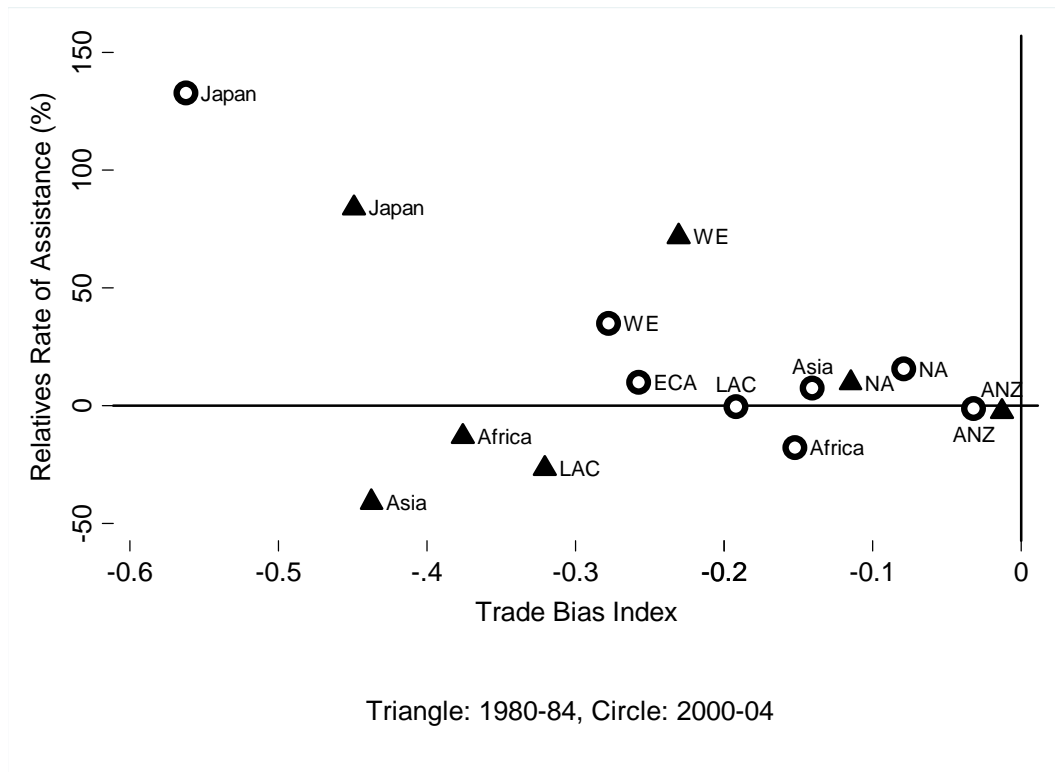
(b) High-income countries



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

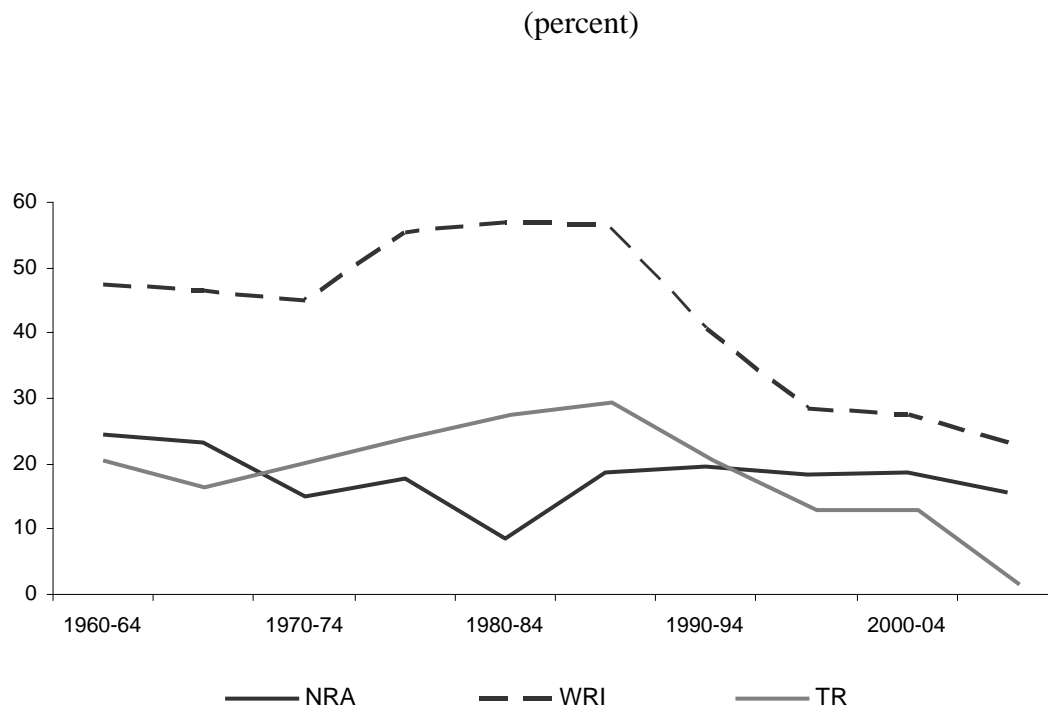
Source: Anderson (2009, Ch. 1), based on estimates in Anderson and Valenzuela (2008).

Figure 2: Relationship between RRA and the trade bias index for agriculture, various regions, 1980-84 and 2000-04



Source: Anderson (2009, Ch. 1), using the formulae in equations (7) and (8) above, and NRA and RRA estimates in Anderson and Valenzuela (2008).

Figure 3: Nominal rate of assistance (NRA), welfare reduction index (WRI) and trade reduction index (TRI) for the world's tradable farm products, 1960 to 2007^a



^a Based on estimates of these indicators for a sample of 75 countries (see Anderson and Valenzuela 2008) that in 2000-04 accounted for 92 percent of global agricultural GDP. The final observation is for 2005-07 and does not include estimates for developing countries.

Source: Lloyd, Croser and Anderson (2009).