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Trade Barrier Volatility and Agricultural Price Stabilization

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Abstract

National barriers to trade are often varied to insulate domestic markets from international price variability. This paper explores the extent of that behavior by governments using estimates of agricultural price distortions in 75 countries. Newly estimated price transmission elasticities are quite low, albeit slightly higher since than before 1985. In the case of extreme upward price spikes, trade policy responses by food importers are as substantial as those of exporting countries. The domestic price-stabilizing effect of intervention by each group is thereby weakened by the other group's response, suggesting more-effective domestic policy options need to be considered instead of varying trade barriers.

Keywords: Commodity price stabilization, Price transmission, Domestic market insulation, Distorted incentives, Agricultural trade policies

JEL codes: F14, Q17, Q18

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Trade Barrier Volatility and Agricultural Price Stabilization

Restrictions on food exports are back in the news. They received much publicity when prices in international food markets rose from 2005 and spiked in mid-2008. The rapid rise during 2007-08 was fueled in part by the news that some developing countries – so as to slow the rise in domestic prices –were suspending their grain exports. Agricultural prices came down somewhat in the final few months of 2008, but the US dollar price of wheat rose by more than half again in the northern summer of 2010, triggered by Russia's announcement to suspend wheat exports in the wake of its drought and wildfires (Figure 1). Ukraine, Belarus, Uzbekistan and Kazakhstan restricted or banned their wheat exports in the latter half of 2010 too, while India has retained effectively an export ban on both wheat and rice since 2008.

[Insert Figure 1 about here]

Sudden export restrictions evidently can contribute to spikes in international food prices. They thus can add to the cost of exogenous supply or demand shocks to food buyers in the rest of the world. Typically they are also not in the economic interests of the countries imposing them, as there are almost always more-efficient ways to achieve the stated objectives of the restriction. The same is true of export subsidies, whose sudden increase in the mid-1980s (the so-called EU-North American export subsidy war) was a major contributor to the downward price spike then. Moreover, price spikes also prompt food-deficit countries to alter their import restrictions, which further exacerbates the international price spike. This beggar-thy-neighbor behavior of governments is a concern for all trading

nations because it reduces the stability and predictability of trade opportunities. Left unchecked, it may do so even more in the future if climate change adds to the volatility of weather patterns and hence crop yields around the world.

Ironically, trade policy responses by exporters and importers collectively can render national government interventions ineffective in stabilizing domestic prices, while adding to international market instability. Furthermore, in the case of upward spikes they increase the transfer of welfare from food-deficit to food-surplus countries associated with an exogenous shock to world food markets. They may also add to rather than reduce poverty, even though many governments claim their interventions are aimed at preventing a rise in poverty.

This paper first briefly explains how these ironies can come about. The paper then compares recent policy responses with how governments responded to the upward price spike around 1973-74, and also to the downward spike in international food prices in the mid-1980s. It does so using new estimates of agricultural price distortions in 75 countries. Responses by food importers are shown to be as substantial as those by food exporters, ensuring that each group reduced the effectiveness of the other's domestic price-stabilizing intervention effort. The paper concludes by exploring more-effective policy options.

Potential impacts of trade policy responses to international food market shocks

Fluctuations are to be expected in commodity markets subject to periodic supply or demand shocks, especially if adverse supply shocks occur when stocks are at low levels (Deaton and Laroque 1992). They are even more likely in the presence also of sporadic changes in government storage activity. Many governments seek to shield their domestic market somewhat from those fluctuations, and especially from severe spikes in international prices, by altering the restrictiveness of their trade policies.

An export tax or its equivalent lowers the domestic price below the border price of a tradable product such as grain (as does an import subsidy), whereas an import tax or its equivalent raises its domestic price above the border price (as does an export subsidy). Hence it is not surprising that governments, in seeking to protect domestic consumers from an upward spike in international food prices, consider a change in trade measures as an appropriate response, since that can lower the consumer tax equivalent of any such measure.

However, an import tax (or export subsidy) is the equivalent of a consumer tax and a producer subsidy, hence lowering it also reduces the extent to which the measure assists producers of the product in question. Likewise, since an export tax (or import subsidy) is the equivalent of a consumer subsidy and a producer tax, raising it not only helps consumers but also harms farmers. If farming is discouraged, the demand for labor on farms falls, and with it the wages of unskilled workers in non-farm as well as farm jobs. Thus while poor households may benefit on the expenditure side from a measure that reduces the extent to which the price of food would otherwise rise, they could be harmed on the earnings side if they are sellers of food or suppliers of unskilled labor. Such trade policy responses therefore could add to rather than reduce poverty.[1] In the case of small countries unable to influence their terms of trade, such trade measures also are likely to reduce national economic welfare, because they distort production in addition to lowering the consumer price of food.[2] They are also wasteful if it is only poor consumers who need to be helped, since a trade measure affects all food consumers in the country. Conversely, in the case of opposite changes to trade measures aimed at protecting farmers from a spike downwards in international prices, it is consumers who are inadvertently harmed by such policy responses, and all producers rather than just the poorest are helped – and in proportion to their output, thereby adding to farm income inequality.

Trade measures are not only *inefficient* at protecting a needy group from being harmed by a shock to international food markets, they are also *ineffective* if many countries

respond similarly. The ineffectiveness comes about because trade policies of both food-exporting and food-importing countries tend to alter in an effort to prevent the transmission of the international price shock. If only food-exporting countries respond to an upward price spike, the international terms of trade would turn even further in their favour because of the additional reduction in available supplies on the international markets (and conversely if only food-importing countries alter their trade restrictions when the world price of food collapses); and the extent of that extra terms of trade benefit is greater, the larger the proportion of global trade so affected by the exporting countries' policy response. Such action would thus add both to the extent of the international price spike and to the transfer of welfare from food-deficit to food-surplus countries (or from food-surplus to food-deficit countries when the price spike is downward and only food-deficit countries respond).

However, Martin and Anderson (2010) show that when both sets of countries seek to insulate their domestic markets from an external shock, their impacts on the international price spike are reinforcing but their impacts on the volume they trade internationally – and hence on their domestic prices – are offsetting. In the extreme case in which food-deficit countries expand their imports to exactly the same extent as food-surplus countries reduce exports, the domestic price in both sets of countries would be no different than if neither country altered their trade measures following the exogenous shock. That is, the initial international price change from the shock would be fully transmitted to both sets of countries, despite their efforts to fully insulate their domestic markets in that extreme case. Moreover, the more countries participate and thus the more the international price spike is accentuated, the more compelled will other countries feel to join the bandwagon and push that price even higher.

The above insights from standard trade theory raise several empirical questions: How much do countries try to dampen international-to-domestic food price transmission in

general, and has this tendency lessened since many countries began reducing their trade barriers in the 1980s? Are trade restrictions noticeably different in periods of international price spikes than in non-spike periods? Do various governments respond differently in periods of upward versus downward spikes in international food prices? In particular, do developing countries alter their trade interventions more than high-income countries, and are food-deficit countries more inclined to vary their trade interventions than food-surplus countries? The next section describes a new database capable of addressing these questions, and the following section provides a summary of empirical evidence provided by that database.

Database on government distortions to domestic prices of farm products

A new World Bank database provides, in a single source, a set of indicators of the extent to which export restrictions and other price-distorting trade and domestic policies have altered annual average domestic producer and consumer prices of farm products away from their international price levels over the past half century (Anderson and Valenzuela 2008, with summary estimates in Anderson 2009 and Ch. 2 of Anderson 2010). The sample includes 75 countries that together account for all but one-tenth of global agriculture, and the 75 most important products so as to cover around 70 percent of the gross value of agricultural output in each focus country.

While those estimates only go up to 2007 (and only to 2004 for most developing countries), and so do not include the most-recent price-spike period, price data are now available for sufficient countries to enable at least a preliminary update of the estimates in Anderson and Valenzuela (2008) for rice and wheat. These new estimates are based, for high-income countries (including those that recently acceded to form the EU-27), on producer

support estimates reported in OECD (2010). For developing countries, the updated estimates make use of FAO and World Bank data sources for producer and border prices, respectively.[3]

The key indicator used for present purposes is the national nominal rate of assistance to agricultural producers (NRA). This is the extent to which the domestic producer price exceeds the border price, and hence is negative if farmers receive less than the price at the country's border for a similar product. That is the appropriate indicator in times of international price downturns when governments seek to provide more assistance to farmers; but it turns out to be very highly correlated with the appropriate indicator in times of upward international food price spikes when governments seek to provide more protection to consumers, which is the consumer tax equivalent (CTE).[4] The high correlation reflects the fact that most interventions in national food markets occur at the border, rather than in the form of domestic food consumer or producer subsidies or taxes.

How much do governments insulate their domestic agricultural markets?

Needless to say, governments do not limit their interventions in markets for farm products to periods of extreme prices. In the past developing countries have tended to set NRAs below zero, especially if they are food-surplus, while high-income countries have tended to assist their farmers (NRAs above zero), especially if they are food-deficit. That is, NRAs tend to be higher the higher a country's income per capita and the weaker the country's agricultural comparative advantage. This is evident from the first 3 columns of Table 1, which reports regressions of product NRAs in the panel dataset for six key crop products. Those highly significant regression coefficients suggest NRAs tend to rise over time as a country's per capita income rises, and more so the more that growth is accompanied by a decline in agricultural comparative advantage.

[Insert Table 1 about here]

Agricultural policy regimes tend also to have an anti-trade bias. In high-income countries, that has manifest itself in import restrictions. There have been no substantive export restrictions on high-income countries' farm products since the 1950s and, even where export subsidies have been used, they have provided much less assistance to exporters than that enjoyed by import-competing farmers of high-income countries. For the developing country group, the anti-trade bias manifests itself mostly as taxes and other restrictions on agricultural exports, although their impact has declined since the 1980s and there has instead been some growth in agricultural import protection by developing countries. This anti-trade bias is reflected in the negative coefficient on the dummy variable for exportables in column 5 of Table 1 (as well as in the anti-trade bias and trade reduction indexes reported in Anderson 2009).

More pertinent to the present paper is the fact that around the long-run trends in NRAs for each country there is much fluctuation from year to year in individual product NRAs. NRAs are negatively correlated with deviations from trend in the international price of the product in question (column 4 of Table 1). Perhaps the most notable case is rice in Asia (Figure 2), where the negative coefficient of correlation between the NRA and international price is well above 0.5; but, during 1965-2007, it is also above 0.5 globally for cotton, maize, pork and sugar, and is 0.41 for wheat (Anderson 2010, Table 2.7).

[Insert Figure 2 about here]

This domestic price-insulating behavior by governments is of concern because it means there is less international trade in farm products than would be the case otherwise. Such 'thinning' of international markets for these weather-dependent products in turn makes prices and quantities traded 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. A further simulation exercise by Tyers (1991) suggests that between three-fifths and three-quarters of the global cost of agricultural protection in high-income countries in the early 1980s was due to the insulating component of their policies.

To examine how much that behavior has continued since the early 1980s, we estimate the elasticity of transmission of the international product price to the domestic market for key farm products. Following Nerlove (1972) and Tyers and Anderson (1992, pp. 65-75), we use a geometric distributed lag formulation to estimate elasticities for each key product for all focus countries for the period 1985 to 2007. Specifically, we assume that associated with the border price P_t there is a 'target' domestic price p_t^*, towards which policy ensures that the actual domestic price, p_t, moves only sluggishly. Changes in this target price might respond incompletely, even in the long run, to corresponding changes in the border price. If all prices are expressed in logarithms, the target domestic price then has the following relationship with the border price:

$$p_t^* = p_0 + \phi_{LR}(P_t - P_0) \qquad (1)$$

where ϕ_{LR} is the long-run price transmission elasticity and the values of p_0 and P_0 are the domestic and border prices in the base period. In the short-run, the inflation-deflated domestic price adjusts only partially to any change in the target domestic price:

$$p_t - p_{t-1} = \delta(p_t^* - p_{t-1}) \qquad (2)$$

where the parameter δ gives the fraction of the ultimate adjustment that takes place in one year. By substituting (1) into (2) to eliminate the unobservable target price, the following reduced form, which is suitable for fitting to data, is obtained:

$$p_t = \delta(p_0 - \phi_{LR}P_0) + (1-\delta)p_{t-1} + \delta\phi_{LR}P_t \quad = \quad a + b\, p_{t-1} + c\, P_t \qquad (3)$$

where, again, if the prices are expressed in logarithms, the short-run (one year) elasticity of price transmission is simply δ times the long-run elasticity. Thus the short-run elasticity estimate is the regression coefficient c and the long-run elasticity estimate is c/(1-b). If the policy objective was to hold the level of protection constant on average over time but to stabilize the domestic price around the trend border price, ϕ_{SR} would be less than one and ϕ_{LR} would be one. But in general even ϕ_{LR} could be less than one, for example if the government sought to raise the trend level of agricultural protection as per capita income grew (as suggested by the first two columns of Table 1).

Table 2 summarizes the estimates for the short-run. The global averages in the 1985-2004 period range from a low of 0.3 for sugar to around 0.5 for rice, wheat and pork, not quite 0.6 for maize, cotton, cocoa and poultry, and around 0.7 for soybean, coffee and beef (final column of Table 2). The unweighted average across all of those key products is 0.57, suggesting that within one year, little more than half the movement in international prices of those farm products has been transmitted domestically on average over the past quarter century. Even the long-run elasticity appears well short of unity after full adjustment: the average of the elasticities for those eleven products across the 75 sample countries is just 0.71. Low though these global elasticities are, they were even lower in the 1965-84 period (by about one-seventh). While that suggests a reduced reliance on this measure for domestic price stabilization for the world as a whole, there appears to be an increased reliance for some crops in high-income countries (middle pair of columns in Table 2).

[Insert Table 2 about here]

Also, the tendency for each country to alter its individual product NRAs from year to year around their long-run trend appears to have diminished slightly since trade-related policy reforms began in the mid-1980s. In Table 3 the focus is on the NRA's annual average deviation from trend, again in the two decades before and after 1985. The average deviation

from trend NRA is lower in the latter two decades than in the earlier two decades in a small majority of cases, for both developing and high-income countries. Notice, though, that the deviations are still non-trivial: except for rice in high-income countries, the average deviation is well above the mean NRA for each product (which is reported in the right-hand half of Table 3).

[Insert Table 3 about here]

How different are NRAs in periods of international price spikes?

We move now to a closer examination of periods of extreme spikes in international food prices. The only such periods prior to 2008 in the World Bank's distortions database are those around 1974 (an upward price spike) and in 1986 (a downward price spike). In Table 4 we focus on the annual average nominal assistance coefficient[5] (NAC = 1 + NRA/100) in the spike year plus the two years each side of it, relative to the longer period either side of each spike period. The expectation is that the NAC would be lower in the upward spike periods than in the average of the two adjoining longer non-spike periods, and conversely for the downward spike period around 1986. That is indeed what is evident in Table 4, where the spike periods are shown in bold italics and the percentage change in their average NACs from the prior non-spike period are shown in the lower half of the table.

[Insert Table 4 about here]

Looking more closely at rice and wheat, for which new NAC estimates are available for the period since 2004 when their international prices were gradually rising before spiking in mid-2008, they too are lower than in the preceding 1988-2004 non-spike period. The proportional extent to which the rice and wheat NACs were lowered is greater in the recent period than in the 1970s' spike period. That difference may be even greater once estimates

are available for the two years following the 2008 spike instead of having to use, as a substitute, estimates for 2004 and 2005 when international rice and wheat prices were lower (see Figure 1).

Also provided in Table 4 is a breakdown of rice and wheat countries into import-competing and exporting country sub-sets. The same down-up-down pattern is present for each of those two country sub-sets as for the total set. The changes in the NACs in each spike period from its prior non-spike period are not obviously higher or lower for exporting as compared with importing countries, suggesting both types of countries are actively engaged in altering their interventions at their national border when international food prices spike.

Historically, governments in developing countries have tended to discriminate against farmers and in favor of food consumers whereas in high-income countries they have tended to do the opposite (Anderson 2009). That suggests in developing countries consumers are more likely to be protected from an upward price spike than producers would be from a downward spike in international prices, and conversely in high-income countries. Assuming the CTE is the same as the NRA (that is, only border distortions matter), that in turn might lead one to expect the percentage change in the NAC to be less for developing countries and more for high-income countries in the 1980s downturn period than in the upward spike periods. That indeed is what is shown for all but one of the eleven cases reported in the bottom part of Table 4 for high-income countries, and is clear for the cases of rice and wheat illustrated in Figure 3(a). However, it is true for barely half of the developing country cases shown in Table 3(b) – although when the developing country group was subdivided into low- and middle-income countries, the expected result for rice and wheat held true for three-quarters of the cases.

[Insert Figure 3 about here]

Such comparisons of period averages are blunt, however, because the averages hide a lot of year-to-year variation. A more-precise picture of the annual changes in the first half of the price spike periods can be seen in Table 5. It shows that the decline in NACs was more gradual in the recent price surge period than in the 1970s when all the change for wheat was in 1973 and for rice (whose harvest dates are less concentrated around the end of the year than are those for wheat) was in 1973 and 1974. Because of that faster change in the 1970s, the magnitude of the annual NAC changes was greater then than in the recent period to 2008.

[Insert Table 5 about here]

The rice NACs over the 1972-74 period fell by more than two-fifths for both high-income and developing countries. The NAC falls for wheat were not as severe as for rice, but were still substantial at more than one-quarter for high-income countries and nearly one-third for developing countries. The extent of annual decline in the NACs in the most recent price spike is slightly less than in the 1970s except for high-income wheat, and not quite as rapid: between 2005 and 2008 the NAC for rice fell 29 percent for high-income countries and 36 percent for developing countries, and for wheat it fell around 37 percent for both high-income and developing countries (Table 5). That slightly smaller and slower decline also is consistent with the fact that there were smaller and slower proportionate rises in the international prices of those cereals in 2005-08 than in the early 1970s.

Turning to all covered farm products (bottom segment of Table 5), the NAC for developing countries fell by 16 percent in the first two years before rising by half that amount in the subsequent two years of the 1970s' spike period. The fall for high-income countries was almost the same (14 percent) but it more than recovered in the subsequent two years. As for the mid-1980s price slump period, the NAC rise for all farm products was larger for high-income countries and smaller for developing countries in1984-86 than the fall in 1972-74, consistent with the findings discussed above from Table 4(b) and Figure 3(a).

Table 6 allows an easy comparison between the mid-1980s, and the two upward price spike periods, of annual price changes in NACs. It also suggests there is little difference not only in the magnitude but also in the timing of the responses of food-importing and food-exporting countries. That is the case not only for rice and wheat (illustrated in figure 3(b)) but also for all products included in the World Bank's database, shown at the bottom of Table 6.

[Insert Table 6 about here]

In Table 7 the NRAs have been decomposed into the various border and domestic measures for developing and high-income countries, for all products covered by the World Bank's database, following the methodology in Croser and Anderson (2010). The annual estimates are shown for the upward spike period of 1972-76 and the downward spike period of 1984-88. Export restrictions were the dominant instrument for developing countries in both those periods, becoming more and then less important in the upward spike period of 1972-76 (when import tariffs were lowered and then raised), and conversely in the downward spike period of 1984-88. In high-income countries there are virtually no taxes or other restrictions on exports, but the component of their NRAs due to export subsidies, as one would expect, have followed the same path as dominant import tariffs over those spike periods: U-shaped during the upward spike, inverted U-shaped in the downward spike. Finally, the bolded rows of Table 7 (showing the NRAs from border measures and the aggregate NRAs which include also domestic producer taxes and subsidies) reveal that border measures account for the vast majority of the distortions to producer prices in both sets of countries.

[Insert Table 7 about here]

Summary and policy implications

The above empirical findings can be summarized as follows:

- Product NRAs are significantly negatively correlated with fluctuations around trend in the product's international price;
- On average, little more than half the movement in international food prices is transmitted to domestic markets within the first year;
- That insulation tendency appears to be slightly less in the two decades following the trade-related policy reforms that began in the mid-1980s than it was in the previous two decades, except for some crops in high-income countries;
- NACs were substantially lower in the two upward price spike periods than in adjacent non-spike periods, and higher for the downward price spike period around 1986, with both export and import measures contributing to that finding;
- The extent and speed of the annual NAC changes during an upward price spike was greater in the early 1970s than in the recent period to 2008, consistent with the fact that international food prices rose proportionately less per year in the latter period;
- The extent and speed of NAC changes in each spike period are similar for food-exporting and food-importing countries, suggesting both types of countries actively insulate their domestic market from international food prices spikes; and
- The percentage change in the NAC was less for developing countries and more for high-income countries in the mid-1980s' downward price-spike period than in the two upward spike periods, suggesting that in developing countries consumers are more likely to be protected from an upward price spike than producers would be from a downward price spike, and conversely in high-income countries.

True, the above findings are based in part on distortion estimates for the most-recent food price spike that are preliminary and cover just border measures for the two main food staples. However, the behavior of policy makers indicated by those estimates is so similar to

that indicated by past responses to price spikes that tentative policy implications can be drawn with reasonable confidence, pending the availability of a more-comprehensive update of distortion estimates.

Trade policy interventions are varied in response to international food price spikes to achieve various stated or hidden objectives of governments. The most commonly stated one in developing countries in the case of upward price spikes is to ensure domestic food security for consumers, that is, to have adequate supplies at affordable prices for all domestic households. Related stated objectives are to reduce inflationary or balance of payments pressures from an upward price spike, but those concerns could be better handled via monetary or exchange rate policies, respectively. As for downward price spikes, the commonly stated objective of altering a country's trade barriers is to protect poor farmers from income losses.

An unstated motive may be to extract a higher price from the international market while there are shortages, by improving the terms of trade further through restricting exports. This assumes a country faces a sufficiently inelastic demand for its exportable surplus (and that of any allies with whom it can cartelize, as Russia managed to do for wheat in the latter half of 2010) such that the reduced quantity exported is more than compensated for by the further rise in the price of those exports. However, most countries have little or no such market power even in the short run. Even if they did have some power, and sought to use it during a period of rising prices, they would alienate long-time customers who may permanently turn to other suppliers or raise support to their own producers – which ultimately may be more costly than the short term gains it might bring them (recall the US embargo on soybean exports in1973 and the strength that gave to the arguments of agricultural protectionists in Japan). In any case, even the short-term potential benefit is foregone if an export ban, rather than partial restriction, is used. Nor can this motive apply to food-

importing countries that lower their import tariff or introduce an import subsidy in response to a rise in the international price. On the contrary, their reaction turns the terms of trade against themselves. For that reason it might be expected that food-exporting countries are more likely to respond to upward price spikes than food-importing countries – were it not for the fact that most countries on their own have little or no scope to be net beneficiaries from such action. For equal and opposite reasons, food-importing countries might be expected to respond to downward price spikes, by raising their tariffs, more than food-exporting countries who would be inclined to lower their export taxes/raise their export subsidies – but again the small-country caveat applies, which may be why these tendencies do not appear in the estimates summarized above.

Corden (1997, pp. 72-76) suggests the pattern of intermittent border interventions, aimed at lowering the hurt to those adversely affected by an external shock even though it harms those helped by the shock and the overall economy, implies a conservative social welfare function. A more formal model of loss-averting reactions of governments, based on utility theory, has been developed by Freund and Özden (2008), building on the pioneering lobbying model of Grossman and Helpman (1994).[6] Helpful though this may be in explaining why governments intervene, more work is needed to explain why governments attempt to provide loss-averting assistance by varying their trade restrictions rather than via more-direct and thus more efficient domestic policy instruments such as targeted income supplements to only the most vulnerable households and only while the price spike lasts.[7]

Traditional national government trade policy reactions to food price spikes are undesirable also because, collectively, they are not very effective in stabilizing domestic prices, and not least because they add to international price instability: they reduce the role that trade between nations can play in bringing stability to the world's food markets. The larger the number of countries insulating their domestic markets, the more other countries

perceive a need to do likewise, exacerbating the effect on world prices such that even greater changes in trade barriers are desired by each nation – both exporters and importers. They also transfer welfare between food-surplus and food-deficit countries, and may even add to rather than reduce poverty.

Clearly there is scope for governments to multilaterally agree to stop intermittently intervening in these ways. The World Trade Organization (WTO) is the most obvious place to seek restraints on variable trade restrictions. Indeed one of the original motivations for the Contracting Parties to sign the GATT (WTO's predecessor) was to bring stability and predictability to world trade. To date the membership has adopted rules to encourage the use of trade taxes in place of quantitative restrictions on trade (Article IX of the GATT), and has managed to obtain binding commitments on import tariffs and on production and export subsidies as part of the Uruguay Round Agreement on Agriculture. However, those bindings have been set well above applied rates by most countries, leaving great scope for varying them without dishonoring those legal commitments.

In the current Doha round of WTO negotiations there are proposals to phase out agricultural export subsidies as well as to bring down import tariff bindings, both of which would contribute to global economic welfare and more-stable international prices for farm products. At the same time, however, developing countries have added to the WTO's Doha agenda a proposal for a Special Safeguards Mechanism (SSM) that would allow those countries to raise their import barriers above their bindings for a significant proportion of agricultural products in the event of a sudden international price rise or an import surge. This is exactly the opposite of what is needed by way of a global public good to reduce the frequency and amplitude of food price spikes (Hertel, Martin and Leister 2010).

Moreover, proposals to broaden the Doha agenda to also introduce disciplines on export restraints have struggled to date to gain traction.[8] This reflects the facts that

traditionally the demandeurs in WTO negotiations have been dominated by interests seeking market access, and that upward price spikes are infrequent. Yet the above analysis reveals the need for symmetry of treatment of export and import disciplines.

Could greater supply assurances from food-surplus countries, in the form of stronger disciplines on export restrictions, provide a Doha breakthrough? Potentially it could reduce the need for an SSM, which has been one of the more contentious issues in the Doha talks and the one that triggered their suspension in mid-2008. But more than that, it could reduce the concerns food-deficit countries have over relying on food imports in general, thereby increasing the chances of lowering not only the variance of but also the mean NRAs of those countries.

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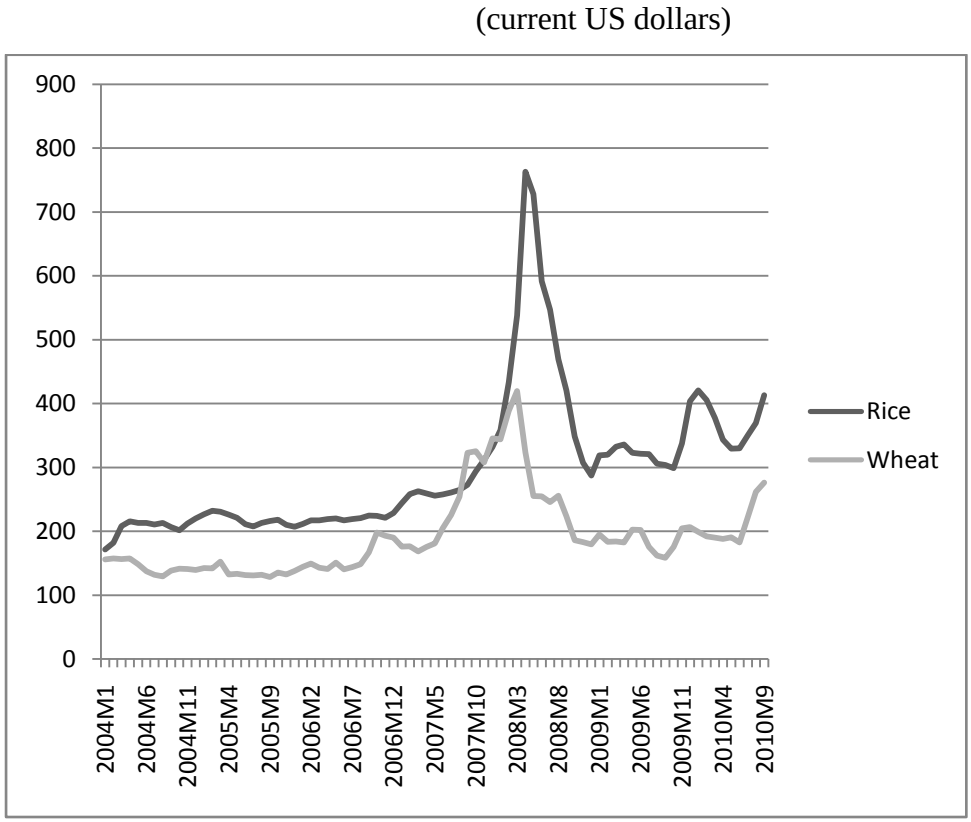
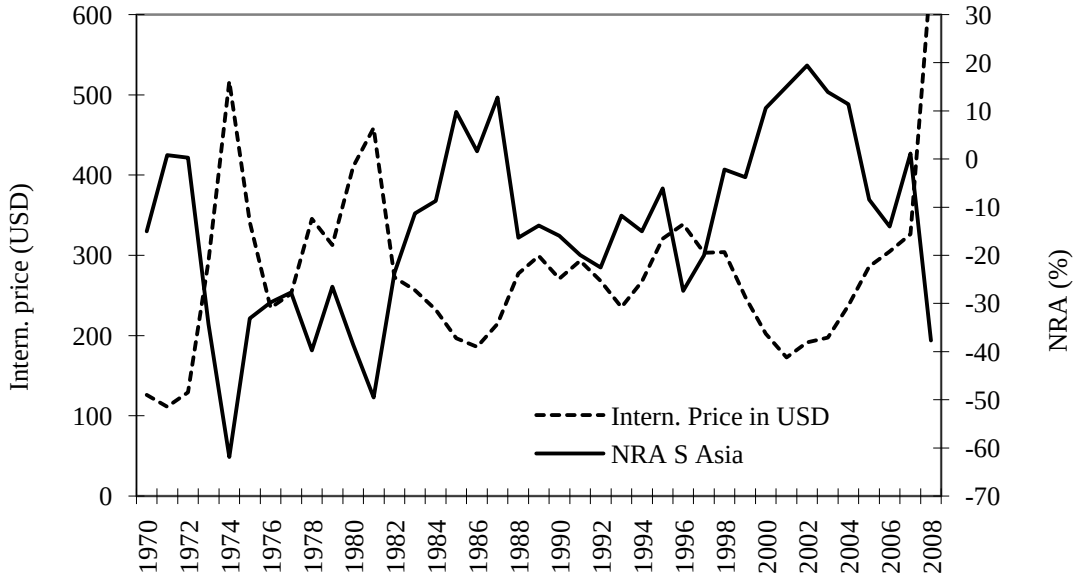
Figure 1: International prices for rice and wheat, 2004 to September 2010



Source: World Bank, *Pink Sheets*, http:// econ.worldbank.org, accessed 25 October 2010

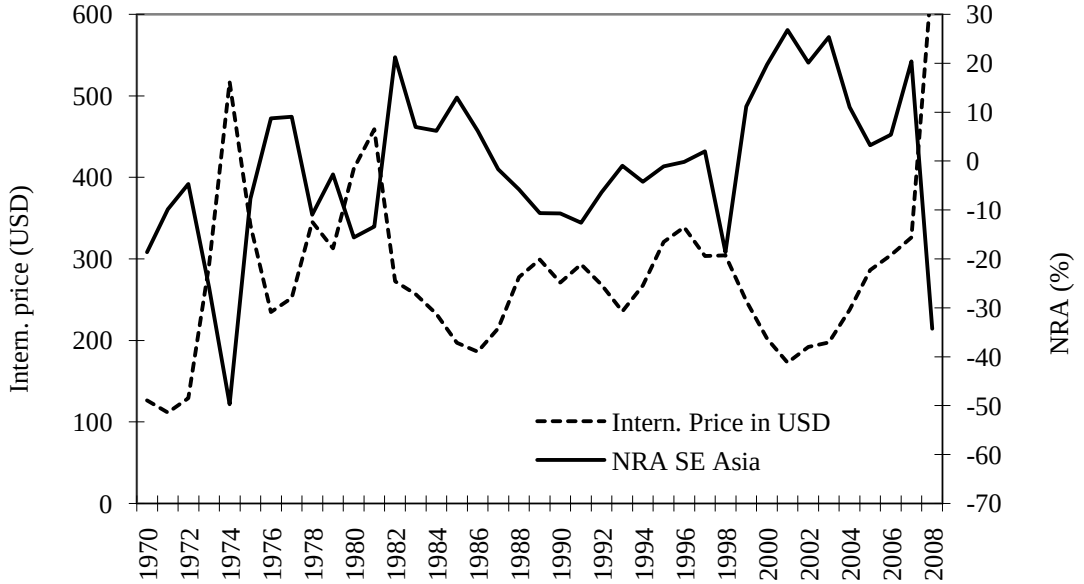
Figure 2: Rice NRAs and international rice price, South and Southeast Asia, 1970 to 2008
(left axis is int'l price in current US dollars, right axis is weighted average NRA in percent)

(a) South Asia



Note: Correlation coefficient is -0.70. Countries included are Bangladesh (except for 1970-73), India, Pakistan and Sri Lanka.

(b) Southeast Asia

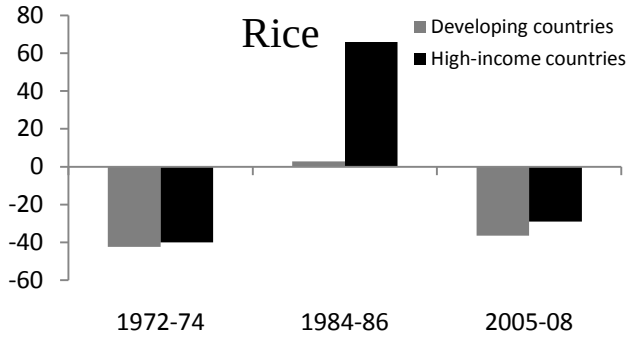


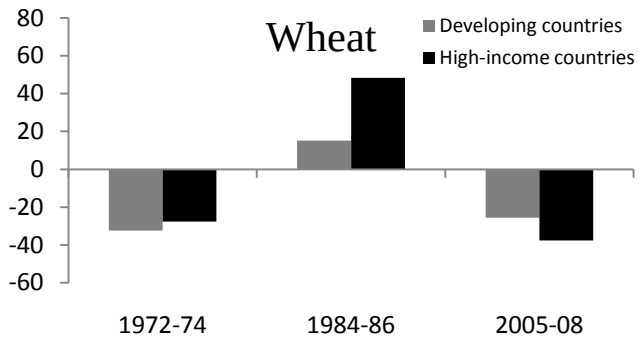
Note: Correlation coefficient is -0.57. Countries included are Indonesia (except for 1970-74), Malaysia, Philippines, Thailand and Vietnam (except for 1970-85 and 2005-08).
Source: Authors' compilation based on their update of data in Anderson and Valenzuela (2008).

Figure 3: Changes in nominal assistance coefficients for rice and wheat,[a] high-income and developing countries, and world exporters and world importers, 1972-74, 1984-86, and 2005-08

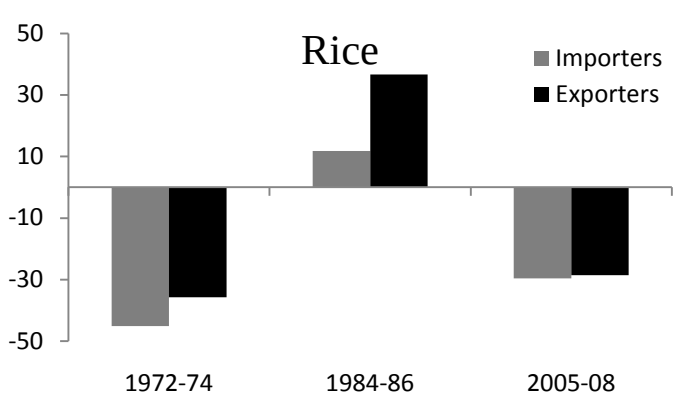
(percentage changes)

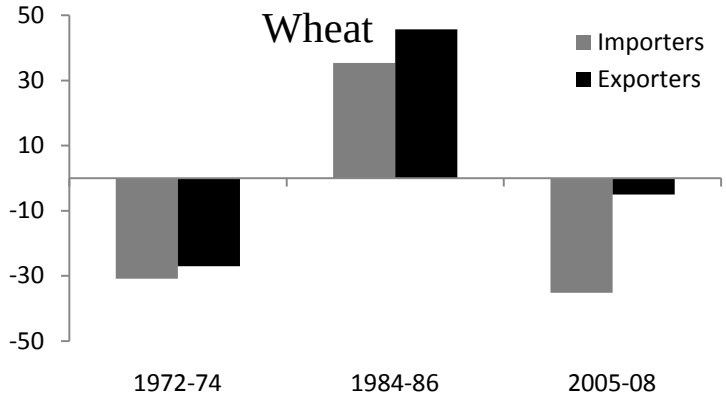
(a) High-income and developing countries





(b) World exporters and world importers





Source: Authors' compilation from Table 5.

Table 1: Regressions aimed at understanding variations in product NRAs across 75 countries, 1955 to 2007

(no country fixed effects)

	Log of real GDP per capita	Log of real GDP per capita, squared	Log of arable land per capita	% deviation of int'l price from its trend	Dummy if exportable	Constant	No. of obs.	Adjusted R^2
Rice	-2.022***	0.157***	-0.390***	-0.320***	-0.732***	5.988***	1281	0.514
	(0.152)	(0.00988)	(0.0219)	(0.0532)	(0.0447)	(0.562)		
Wheat	-0.921***	0.0707***	-0.158***	-0.317***	-0.424***	2.823***	1661	0.347
	(0.116)	(0.00728)	(0.0159)	(0.0529)	(0.0368)	(0.454)		
Maize	-0.432***	0.0334***	-0.167***	-0.236***	-0.195***	1.307***	1525	0.208
	(0.0937)	(0.00602)	(0.0145)	(0.0504)	(0.0292)	(0.354)		
Soybean	0.957***	-0.0424**	-0.548***	-0.0372	-0.128	-5.229***	703	0.310
	(0.345)	(0.0212)	(0.0368)	(0.155)	(0.0893)	(1.366)		
Sugar	-1.021***	0.0843***	-0.244***	-0.582***	-0.414***	3.180***	1648	0.413
	(0.178)	(0.0113)	(0.0255)	(0.0338)	(0.0554)	(0.670)		
Cotton	-0.370***	0.0320***	0.00829	-0.274***	-0.270***	1.057***	883	0.275
	(0.0897)	(0.00607)	(0.0159)	(0.0363)	(0.0429)	(0.315)		

*** indicates statistically significant at the 1% level

Source: Authors' revision of Table 2.14 in Anderson (2010).

Table 2: Global average short-run price transmission elasticities, key agricultural products,[a] developing and high-income countries, 1965-84 and 1985-2004

	Developing countries		High-income countries		All countries	
	1965-84	1985-2004	1965-84	1985-2004	1965-84	1985-2004
Product						
Rice	0.17	0.55	0.33	0.16	0.18	0.52
Wheat	0.23	0.47	0.58	0.48	0.42	0.47
Maize	0.39	0.49	0.85	0.67	0.62	0.58
Soybean	0.43	0.69	1.00	0.76	0.83	0.72
Sugar	0.19	0.31	0.29	0.33	0.22	0.31
Cotton	0.28	0.36	0.66	0.22	0.42	0.59
Cocoa	0.36	0.58	na	na	0.36	0.58
Coffee	0.77	0.71	na	na	0.77	0.71
Beef	0.60	0.53	0.65	0.77	0.64	0.69
Pork	0.03	0.28	0.70	0.76	0.29	0.49
Poultry	0.46	0.51	0.75	0.66	0.67	0.59
Unweighted average[b]	**0.36**	**0.50**	**0.65**	**0.54**	**0.49**	**0.57**

[a] The elasticity shown for each product is a weighted average of national elasticity estimates (based on the regression coefficient of P_t in equation (3) in the text), using as weights the value of 1980-84 or 2000-04 national output of that product at undistorted prices.

[b]The final row provides an unweighted average of the 11 elasticities in each column.

Source: Authors' estimates based on NRAs from Anderson and Valenzuela (2008).

Table 3: Deviation of national NRA around its trend value,[a] key farm products,[b] developing and high-income countries, 1965–84 and 1985–2004

	Deviation of national NRAs around trend[a]				Weighted average of NRAs (%)			
	Developing countries		High-income countries		Developing countries		High-income countries	
	1965–84	1985–04	1965–84	1985–04	1965–84	1985–04	1965–84	1985–04
Rice	32	64	66	229	-20.1	1.9	136.8	419.3
Wheat	33	47	80	91	5.5	10.0	16.1	29.3
Maize	36	33	53	58	-3.4	0.6	7.5	13.9
Soybean	46	117	75	61	2.7	-1.2	0.1	6.6
Sugar	53	66	179	173	17.2	15.5	106.5	141.2
Cotton	38	33	42	28	-16.0	-12.5	33.1	32.2
Coconut	22	20	na	na	-11.5	-20.8	na	na
Coffee	41	27	na	na	-37.3	-12.2	na	na
Beef	45	52	128	127	-12.4	2.7	22.3	47.0
Pork	81	60	92	77	23.6	-7.5	35.6	14.7
Poultry	109	74	164	197	26.3	12.3	24.0	25.8

[a] Deviation, measured in NRA percentage points, is computed as the absolute value of (residual – trend NRA) where national trend NRA in each of the two sub-periods is obtained by ordinary least squares linear regression of the national NRA on time. Estimates shown are an unweighted average of national NRA deviations each year, averaged over the number of years in each period.

Source: Authors' compilation based on NRAs from Anderson and Valenzuela (2008).

Table 4: Average annual NACs[a] and percentage changes in them, key crops, developing and high-income countries, 1965 to 2008
(1 + NRA/100)

(a) Average annual NACs (1 + NRA/100)

	Developing countries						High-income countries					
	1965-1972	***1972-1976***	1976-1984	***1984-1988***	1988-2004	***2004-2008***	1965-1972	***1972-1976***	1976-1984	***1984-1988***	1988-2004	***2004-2008***
Rice	0.97	***0.91***	1.02	***1.27***	1.30	***1.20***	1.23	***1.07***	1.37	***2.53***	2.31	***1.87***
Importers	1.06	***0.99***	1.09	***1.35***	1.35	***1.23***	1.85	***1.70***	2.28	***5.78***	6.99	***3.47***
Exporters	0.76	***0.65***	0.78	***1.02***	1.16	***0.91***	0.99	***0.81***	1.01	***1.89***	1.53	***1.02***
Wheat	1.10	***0.90***	1.10	***1.18***	1.19	***1.00***	1.39	***0.92***	1.41	***2.00***	1.58	***1.41***
Importers	1.01	***0.94***	1.24	***1.36***	0.91	***0.71***	1.20	***0.97***	1.08	***1.46***	1.27	***1.02***
Exporters	1.12	***0.89***	1.09	***1.18***	1.22	***1.05***	1.45	***0.91***	1.50	***2.18***	2.05	***1.87***
Maize	1.09	***0.99***	1.03	***1.13***	1.07	na	1.38	***1.21***	1.37	***1.62***	1.42	na
Soybean	1.20	***0.99***	1.19	***1.27***	1.42	na	0.97	***1.00***	1.45	***1.90***	1.22	na
Sugar	1.39	***0.78***	1.10	***1.49***	1.37	na	2.95	***1.17***	2.19	***3.29***	2.58	na

(b) Percentage change in NAC from previous non-spike period

	1972-1976	**1984-1988**	**2004-2008**	**1972-1976**	**1984-1988**	**2004-2008**
Rice importers	-7	24	-9	-8	154	-50
Rice exporters	-14	31	-22	-18	87	-33
Wheat importers	-7	10	-22	-19	35	-20
Wheat exporters	-21	8	-14	-37	45	-9
Maize	-9	10	na	-12	18	na
Soybean	-18	7	na	3	31	na
Sugar	-44	35	na	-60	50	na

[a] Unweighted average of national NACs each year, averaged over the number of years in each period.

Source: Authors' calculations based on updated NRA estimates from Anderson and Valenzuela (2008).

Table 5: Annual NACs for rice, wheat and all farm products, by country group, 1972 to 2008

(1 + NRA/100)

(a) Rice

	1972	1973	1974	1975	1976	1984	1985	1986	1987	1988	2005	2006	2007	2008
World exporters	0.87	0.62	0.56	0.73	0.88	1.11	1.31	1.52	1.69	1.58	1.05	0.97	1.05	0.75
World importers	1.37	1.03	0.75	1.07	1.17	1.45	1.61	1.62	1.64	1.49	1.51	1.47	1.52	1.07
High-income countries	1.29	0.95	0.77	1.07	1.26	1.70	2.09	2.82	3.17	2.85	2.27	1.89	1.70	1.61
Developing countries	1.11	0.83	0.64	0.91	1.03	1.24	1.37	1.28	1.29	1.15	1.27	1.24	1.34	0.81
Asia	1.15	0.84	0.58	0.89	1.02	1.26	1.42	1.35	1.46	1.25	1.30	1.22	1.28	0.74
Africa	1.10	0.84	0.66	0.99	1.06	1.21	1.17	1.16	1.29	1.12	1.06	1.15	1.36	0.79
Latin America	1.05	0.81	0.75	0.82	0.96	1.27	1.65	1.34	0.90	0.96	1.44	1.35	1.44	0.94

(b) Wheat

	1972	1973	1974	1975	1976	1984	1985	1986	1987	1988	2005	2006	2007	2008
World exporters	1.14	0.88	0.83	0.97	0.98	1.17	1.19	1.71	1.70	1.41	0.90	0.95	0.90	0.86
World importers	1.09	0.73	0.76	0.96	0.94	1.29	1.46	1.74	2.04	1.79	1.50	1.43	1.14	0.97
High-income countries	1.11	0.82	0.80	0.93	0.94	1.47	1.71	2.17	2.51	2.13	1.86	1.70	1.19	1.16
Developing countries	1.10	0.72	0.74	1.01	0.95	1.06	1.09	1.22	1.33	1.20	1.07	1.00	0.98	0.80
Asia	1.35	0.80	0.89	1.21	1.01	1.20	1.20	1.28	1.42	1.46	1.08	1.00	0.92	0.59
Africa	0.99	0.73	0.64	0.87	0.84	0.92	0.91	1.20	1.38	1.11	1.13	0.99	1.10	0.92
Latin America	1.02	0.63	0.72	0.96	1.07	1.14	1.27	1.20	1.16	1.09	1.01	1.02	0.93	0.84

(c) All covered farm products

	1972	1973	1974	1975	1976	1984	1985	1986	1987	1988
World exporters	0.94	0.83	0.80	0.87	0.80	0.86	0.99	1.16	1.15	1.04
World importers	1.49	1.30	1.22	1.40	1.58	1.73	1.89	2.05	2.22	1.88
High-income countries	1.46	1.34	1.26	1.40	1.62	1.81	1.96	2.25	2.44	2.04
Developing countries	1.02	0.88	0.86	0.95	0.93	0.99	1.09	1.10	1.11	1.05
Asia	1.30	1.04	0.98	1.09	1.16	1.29	1.45	1.46	1.42	1.36
Africa	0.90	0.80	0.78	0.83	0.80	0.80	0.85	0.90	0.97	0.91
Latin America	1.01	0.92	0.92	1.08	1.06	1.10	1.28	1.16	1.03	0.99

[a] Unweighted average of national NACs.

Source: Authors' calculations based on updated NRA estimates from Anderson and Valenzuela (2008).

Table 6: Annual changes in NACs, by country group, 1972-74, 1984-86, and 2005-08

(percent)

(a) Rice

	1972/73	1973/74	1984/85	1985/86	2005/06	2006/07	2007/08
World exporters	-29	-10	18	16	-7	8	-29
World importers	-24	-27	11	1	-3	3	-30
High-income countries	-26	-19	23	35	-17	-10	-5
Developing countries	-25	-23	10	-7	-3	8	-40

(b) Wheat

	1972/73	1973/74	1984/85	1985/86	2005/06	2006/07	2007/08
World exporters	-22	-6	2	43	5	-5	-5
World importers	-33	4	14	19	-5	-21	-14
High-income countries	-26	-2	17	27	-8	-30	-3
Developing countries	-34	3	3	12	-6	-3	-19

(c) All farm products

	1972/73	1973/74	1984/85	1985/86
World exporters	-12	-3	15	17
World importers	-13	-6	9	8
High-income countries	-8	-6	8	15
Developing countries	-13	-3	10	1

[a] Unweighted averages of national NACs changes.

Source: Authors' calculations based on updated NRA estimates from Anderson and Valenzuela (2008).

Table 7: Contributions to total agricultural NRA[a] from different policy instruments, developing and high-income countries, 1972-76 and 1984-88

(percent)

(a) Developing countries

	1972	1973	1974	1975	1976	1984	1985	1986	1987	1988
Border measures										
Import tax equivalent	22	2	2	8	6	7	7	8	9	8
Export subsidies	4	0	0	1	1	1	1	1	1	1
Export tax equivalent	-26	-18	-24	-22	-9	-20	-10	-14	-19	-22
Import subsidy equivalent	-6	-5	-5	-2	-1	-1	-1	-1	-1	-2
ALL BORDER MEASURES	**-22**	**-21**	**-28**	**-16**	**-4**	**-14**	**-3**	**-6**	**-11**	**-15**
TOTAL NRA(incl. domestic measures)	**3**	**-14**	**-29**	**-17**	**-2**	**-15**	**-2**	**-5**	**-9**	**-13**

(b) High-income countries

	1972	1973	1974	1975	1976	1984	1985	1986	1987	1988
Border measures										
Import tax equivalent	25	18	15	21	30	33	34	50	49	42
Export subsidies	4	2	1	2	2	2	4	7	7	5
Export tax equivalent	0	-1	0	0	0	0	-1	0	0	0
Import subsidy equivalent	-1	-3	-3	-1	-1	0	0	0	0	0
ALL BORDER MEASURES	**27**	**17**	**13**	**22**	**31**	**35**	**37**	**57**	**56**	**46**
TOTAL NRA(incl. domestic measures)	**29**	**18**	**13**	**24**	**32**	**46**	**52**	**70**	**69**	**59**

[a] All entries have been generated by dividing the producer subsidy equivalent of all (including domestic price, non-product-specific and 'decoupled') measures by the total agricultural sector's gross production valued at undistorted prices.

Source: Authors' calculations based on NRA estimates from Anderson and Valenzuela (2008).

Endnotes

[1] Recent empirical studies provide numerous cases of where trade restrictions have added to or would add to poverty. See, for example, Hertel and Winters (2006), Anderson, Cockburn and Martin (2010) and Aksoy and Hoekman (2010).

[2] Variable trade restrictions can also affect long-term investments and hence economic growth rates. Drawing on a broad range of developing country case studies, Bevan Collier and Gunning (1990) and Collier, Gunning and Associates (1999) suggest that faster economic growth would result from allowing producers access to high prices in those rare occasions when they spike, rather than taxing it away. According to the evidence in their case studies, this is because governments are more prone than farm households to squander the windfall either in poor investments or in extra consumption.

[3] The new developing country estimates are less reliable than the high-income country ones, and the earlier estimates for developing countries in Anderson and Valenzuela (2008), for several reasons. One is that, to do the update promptly, producer prices reported to FAO had to be used for developing countries rather than more-nuanced prices available only in national statistical agencies. To minimize the errors this might introduce, the FAO producer prices in US current dollars were converted into an index set at 100 for 2004, and the 2004 prices in Anderson and Valenzuela (2008) were updated using the changes in that index for each country through to 2008. Likewise, to overcome delays in obtaining export and import volumes and values, from which border prices could be derived, the authors simply used the Thailand 5% broken rice and Canadian wheat prices (from World Bank 2010) to create indexes set at 100 for 2004 for those international reference prices, and the 2004 border prices in Anderson and Valenzuela (2008) were updated using the changes in each of those indexes through to 2008. The coefficients of correlation between those international reference

prices and the border prices used for each of the developing countries in Anderson and Valenzuela (2008) over the period 1970-2004 are 0.58 for wheat and 0.69 for rice.

[4] The coefficient of correlation between the NRA and CTE for the 75 countries and products over the five decades covered by Anderson and Valenzuela (2008) is 0.93.

[5] The NAC is more appropriate than the NRA for getting a sense of the proportional change over time in the degree of distortion, especially when some NRAs are negative (which just means the NAC is below rather than above one). The national NACs are averaged across countries without using weights, so that each polity is treated as an equally interesting case. The estimates therefore differ from those reported for country groups in Anderson (2009 and 2010), where production weights are used to calculate NRA averages (and consumption weights for CTE averages).

[6] See also Thompson et al. (2004), Tovar (2009) and Martin and Anderson (2010). An additional justification sometimes given for such price-stabilizing intervention in poor countries is that credit markets are underdeveloped, or inefficient because of local monopoly lenders, so low-income consumers and producers have difficulty smoothing their consumption over time as prices fluctuate. In that case the frist-best policy response would be to improve the credit market.

[7] Even if the policy objective was explicitly to reduce food import dependence, Nettle, Britten-Jones and Anderson (1987) show that trade policy alone is second best to an import tariff plus a tariff-funded production subsidy. But since this is just one of many situations in which an economic change disadvantages some households, there is a strong case for developing better social safety net policies that can offset the adverse impacts of a wide range of different shocks on poor people – net sellers as well as net buyers of food – without imposing the costly by-product distortions that necessarily accompany n^{th}-best trade policy instruments.

[8] A proposal by Japan in 2000, for example, involved disciplines similar to those on the import side, with export restrictions to be replaced by taxes and export taxes to be bound. A year later Jordan proposed even stronger rules: a ban on export restrictions and (as proposed for export subsidies) the binding of all export taxes at zero.