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How Do Governments Respond to Food Price Spikes?

Lessons from the Past

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Abstract

Food prices in international markets spiked upward in 2008, doubling or more in a matter of months. Evidence is still being compiled on policy responses over the following two years, but lessons can be learned from the price spike in 1973, the magnitude and speed of which were similar to those experienced around the 2008 spike. In developing countries, policy responses to the earlier spike lowered the (negative) nominal assistance coefficient for agriculture by one-third between 1972 and 1974 before it was returned to the same level by 1976. That was twice the extent of the fall and recovery of the (positive) nominal assistance coefficient for high-income countries. However, the trade and welfare effects of those changes were much less for developing than high-income countries, suggesting the dispersion of distortion rates among farm industries decreased in developing countries. The adjustments were virtually all due to suspension and then reinstatement of import restrictions, with changes in export taxation by developing countries playing an additional (but minor) role during 1972–74. This beggar-thy-neighbor dimension of each government's food policies is worrying because it reduces the role that trade between nations can play in bringing stability to the world's food markets. More effort appears to be needed before a multilateral agreement to desist can be reached.

This paper—a product of the Agriculture and Rural Development Team, Development Research Group—is part of a larger effort in the department to understand better the ways in which governments respond to economic shocks. Policy Research Working Papers are also posted on the Web at http://econ.worldbank.org. The author may be contacted at kym.anderson@adelaide.edu.au or viaWmartin1@worldbank.org.

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How do governments respond to food price spikes? Lessons from the past

Kym Anderson and Signe Nelgen

1. Introduction

Food prices in international markets spiked upward in 2008, doubling or, in the case of rice, trebling in a matter of months. The magnitudes of the price rises, and the speed of their subsequent fall back to trend, were similar to those experienced in 1974. Figure 1 shows real international prices for the five years around the earlier and most-recent spikes for three key grains and for groundnut oil (which also is an important food staple in numerous low-income countries). On both occasions, the rising price generated panic buying by individual households, especially of rice in Asia, which exacerbated the international price spike. Both episodes also lead to urban food riots in numerous low-income countries.

[Insert Figure 1 about here]

Many scholars have studied the responses of market participants leading up to and during periods of upward and downward commodity price spikes, seeking among other things to explain the spikes (see, e.g., Deaton and Laroque 1992, 1996). This paper is not about actions of private agents, but rather of governments. It is understandable that in such periods governments feel the need to be seen to be doing something to lessen the impact on those adversely affected in their country. How and to what extent do their policy actions alter domestic producer and consumer prices of the commodities concerned, relative to the changes in international prices?

Evidence is still being compiled on policy responses in 2008-10, but how have governments responded in the past, and in particular how did policies react to that mid-1970s price spike? The next section of the paper briefly reviews the domestic market insulation impacts of agricultural policies used in the past by governments attempting to stabilize their domestic food markets. Those impacts include protecting producers in times of downward international price spikes (as in 1986) as well as protecting consumers in periods of upward price spikes – in each case at the expense of the other domestic group who otherwise would have benefitted from the price movement. The main section then examines in detail the policy responses as reflected in various annual indicators of distortions to producer and

consumer incentives during the years 1972 to 1976. The final section of the paper draws together some policy lessons from this evidence of past government responses to food price spikes. In particular, it draws attention to the fact that when many countries seek to reduce gyrations in their domestic food markets by altering trade restrictions at their national border, such actions are collectively self-defeating: they reduce the role that global trade can play in dampening fluctuations in international prices, and they prolong the adjustment process.

2. Past domestic market stabilization efforts

Governments of almost all countries deliberately seek to reduce fluctuations in domestic food prices and in the quantities available for local consumption. There is a huge analytical literature on the economics of such price stabilization efforts. Its connection with trade policy was highlighted by Johnson (1975) immediately following the upward spike in world food prices in 1973-74. His analysis of grain prices suggested that if free trade in grain had been in place in 1975, prices would have been so much less variable – because trade could mitigate local supply variability – that only negligible quantities of carryover/storage would have been profitable. A subsequent study of global food trade provided complementary results: using a stochastic model of world markets for grains, livestock products and sugar, Tyers and Anderson (1992, Table 6.14) found that instability of international food prices in the 1980s was three times greater than it would have been under free trade in those products.

Such government intervention is in response to lobbying efforts from and society's concern for groups destined to otherwise lose from exogenous shocks (Thompson et al. 2004, Freund and Ozden 2008) – although it needs to be kept in mind that stabilizing prices is not the same as stabilizing real incomes of the target households. An additional justification sometimes given for such intervention in poor countries is that credit markets are underdeveloped, or inefficient because of local monopoly lenders, so low-income consumers and producers have difficulty smoothing their consumption over time as prices fluctuate.

However, it is difficult for governments to stabilize even prices, let alone incomes for target households. Indeed, more than 60 years ago Hayek (1945) warned that such intervention is likely to lead to government failure that could reduce welfare more than the cost of the market failure it seeks to overcome, given the high cost of the information needed to do it well. The extensiveness of that required information is made clear in the seminal theoretical study by Newbery and Stiglitz (1981), the econometric work by Deaton and

Laroque (1992) and by the studies of storage in particular by Williams and Wright (1991) and Deaton and Laroque (1996).

One way countries try to achieve their stabilization objectives is by varying the restrictions on their international trade in food according to seasonal conditions domestically and changes in prices internationally. Effectively this involves exporting domestic instability and not importing instability from abroad. A simulation exercise by Tyers (1991) suggests that between three-fifths and three-quarters of the global cost of OECD agricultural protection is due to the insulating component of high-income countries' policies. That practice has continued unabated despite the signing of numerous multilateral and preferential trade-liberalizing agreements over the past two decades.

Another indication of how much governments are intervening for stabilization purposes is provided by annual estimates of national nominal rates of assistance (NRAs). A NRA captures the extent to which the domestic producer price differs from the most comparable international price at a country's border. NRAs have been measured for all major farm products in more than 70 countries from the mid-1950s to 2007 in a recently completed study summarized in Anderson (2009). That study provides an ideal annual database for analysing government responses to food price spikes, which is fully detailed in Anderson and Valenzuela (2008).

As a prelude to looking at those distortion estimates, it is illustrative to compare the movements in their two components, namely domestic and border prices. Pursell, Gulati and Gupta (2009), for example, report pertinent prices for rice in India which reveal that the Indian government has been able to maintain an almost-constant real domestic rice price for decades despite huge fluctuations in the international price of rice. Similar if less-complete attempts have been made by most governments of South and Southeast Asia and in parts of Sub-Saharan Africa where rice is also a key food staple (Figure 2). When averaged across all developing countries, Figure 3 reveals that that insulating behavior of governments hugely reduced the rise in domestic prices relative to the spike in international prices for rice (and also for wheat). As a result, especially since Asia produces and consumes four-fifths of the world's rice (compared with about one-third of the world's wheat and maize), this market-insulating behavior of Asian and to a lesser extent African policy makers means that very little rice production has been traded internationally: less than 7 percent in 2000-04 (and less than 5 percent pre-1990), compared with 14 and 24 percent for maize and wheat. This insulating behavior of governments also means international prices are much more volatile for rice than for those other grains, as is evident for the two periods shown in Figure 1.

[Insert Figures 2 and 3 about here]

To get a sense of how much this practice varies across products, whether it is mirrored by the opposite adjustment in times of downward international price spikes such as in the mid-1980s, and whether it has changed much since policy reforms began around the mid-1980s, Table 1 reports the average across countries of the percentage point deviation each year of national NRAs for 12 key farm products around their trend value for the sub-periods before and following each of those two spike periods (1972-76 and 1984-88). For the majority of those products that indicator is higher for the period since the late 1980s than in the earlier two non-spike periods. Those annual percentage point deviations since 1988 have been several times the average percentage NRA for the world as a whole (shown in parentheses in the first column of Table 1). During the upward price spike years 1972-76, the NRAs tend to be below the estimates for the periods either side of the spike, whereas in the mid-1980s when prices spiked downwards they tend to be above the NRAs in the more normal periods either side of that spike.

[Insert Table 1 about here]

That NRAs tend to be above trend in years of low international prices and conversely in years when international prices are high is also clear from Table 2, which shows the extent of the negative correlation between the NRAs for various products and their international price. That coefficient globally and in high-income countries is negative for all but beef, and even in the various developing country regions it is negative in all but one-quarter of the cases. For almost all of those 12 products the (negative) regional correlation is highest for the South Asian region. Among the developing countries it is again rice, sugar and milk that have the highest correlation coefficients.

[Insert Table 2 about here]

The proportional deviation of the international price of a farm product from its long-run trend value each year turns out to be highly significant when added to equations aiming at explaining NRA differences in the Anderson and Valenzuela (2008) database for those 12 products over the full time series from 1955 to 2007. The other prospective explanatory variables are per capita income, an index of agricultural comparative advantage (farm land per capita) and a dummy for distinguishing export industries. Anderson et al. (2010) show that the price deviation variable is highly significant for the three grains, sugar, cotton and coffee, but is not significantly different from zero for non-staple livestock products and soybean.

Yet another way of capturing this insulation phenomenon statistically is to estimate the elasticity of transmission of the international product price to the domestic market. Following Tyers and Anderson (1992, pp. 65-75), a geometric lag formulation is used by Anderson et al. (2010) to estimate elasticities for each product for all focus countries for the period 1985 to 2007. The average of estimates for the short run elasticity range from a low of 0.3 for sugar and milk to 0.5 for rice, wheat and pigmeat, 0.6 for cotton, cocoa, maize and poultry, and 0.7 for beef, soybean and coffee. The unweighted average across all of those 12 key products is 0.54, suggesting that within the first year little more than half the movement in international prices is transmitted domestically. Even the long run elasticity appears well short of unity after full adjustment: the average of the elasticities for those 12 products across the focus countries is just 0.69.

3. Changes in the extent of distortions during the food price spike of the mid-1970s

We turn now to the responses to the most extreme food price spike prior to 2008, focusing on the five years around 1974. The effects of government actions are reflected in the movement of domestic relative to international prices and thus in estimated NRAs. These are reported by country in Anderson and Nelgen (2010, Appendix Table B) for the three key grains, for the important food staple of groundnut oil, and for all farm products for which estimates are available in Anderson and Valenzuela (2008). In the case of rice, for example, the NRA for developing countries as a group was 7 percent in 1972, but it fell to -27 percent in 1973 and -55 percent in 1974 before recovering slowly to -24 percent in 1975 and -8 percent in 1976.

3.1 Nominal assistance coefficients

To compare the extent of the fall and rise of food prices in developing countries with that in high-income countries (where assistance rates are much higher), it is easier if the NRA is converted to an NAC (nominal assistance coefficient, defined as 1+ NRA/100). The rice NAC for developing countries fell from 1.07 in 1972 to 0.45 in 1974, which is similar proportionally to the fall for high-income countries, whose NAC also more than halved over that short period, from 2.65 to 1.24 (Table 3). That means rice was still protected in high-income countries even in 1974 (NAC>1), whereas in developing countries its domestic price averaged less than half the international price in that year.

[Insert Table 3 about here]

The NAC falls for wheat were not as severe as for rice, but were still substantial: from 1.24 in 1972 to 0.71 in 1973 for developing countries, and from 1.05 to 0.88 for high-income countries over the same 12-month period. For maize the NACs fell even less than for wheat, bottoming out a year later at 30 percent lower for developing countries and one-eighth lower for high-income countries. And the fall was smaller again for groundnut oil.

Considering all covered farm products, the NAC for developing countries fell by exactly one-third in the first two years before rising by almost the same amount in the subsequent two years. This was a little more than twice the extent of the fall and recovery for high-income countries, and is due mainly to Asia's developing countries (see bottom segment of Table 3). What is remarkable is that these U-shaped paths over that 5-year period for this large sample of 75 countries are the mirror image of the inverted U-shaped paths of the international prices shown in Figure 1. This is so even if the depths of the former are not quite as big as the heights of the latter in proportional terms – confirming that there is at least some transmission of the international price changes to domestic markets.

Table 4 reports for comparison the regional NRAs and regional consumer tax equivalents (CTEs) of agricultural policies. These two indicators are almost identical for high-income countries, reflecting the fact that most of the farm price distortions are coming from border measures in those countries. For developing countries, however, the CTEs are one-tenth lower initially than the NRAs (or rather their coefficient counterparts are), and they are negative on average, meaning consumers were paying less than they would under free markets. However, note that the CTEs for developing countries decline less than do their NRAs by 1974, before rising back to slightly above their pre-shock level by 1976.

[Insert Table 4 about here]

3.2 Welfare and trade reduction indexes

The cost of government policy distortions to incentives in terms of inefficiency of resource use and consumer spending tends to be greater the greater the variation of NRAs and CTEs across industries/products within the agricultural sector. It is helpful to have a single indicator of the overall welfare effect of each country's regime of agricultural price distortions in place at any time, so as to be able to trace its path over time and make cross-country comparisons. To that end, the family of indexes first developed by Anderson and Neary (2005) under the catch-all name of trade restrictiveness indexes has been drawn upon to generate indicators of distortions imposed by each country's agricultural policies on its economic welfare, and also

on its agricultural trade. Lloyd, Croser and Anderson (2010) define and estimate a Welfare Reduction Index (WRI) and a Trade Reduction Index (TRI) for the same 75 countries as included in this paper, taking into account the fact that for some covered products the NRA and CTE differ. As their names suggest, each of these two new indexes captures in a single partial equilibrium indicator the direct welfare- or trade-reducing effects of distortions to consumer and producer prices of covered farm products from all agricultural and food price and trade policy measures in place. Specifically, the WRI (or TRI) is that ad valorem trade tax rate which, if applied uniformly to all farm commodities in a country that year would generate the same reduction in economic welfare (or trade) as the actual cross-commodity structure of agricultural NRAs and CTEs for that country, other things equal.

The WRI measure reflects the partial equilibrium welfare cost of agricultural price-distorting policies better than the NRA because it recognizes that the welfare cost of a government-imposed price distortion is related to the square of the price wedge. It thus captures the disproportionately higher welfare costs of peak levels of assistance or taxation within the farm sector, and is larger than the mean NRA/CTE and is positive regardless of whether the government's agricultural policy is favoring or hurting farmers. In this way the WRI and TRI go somewhat closer to what a computable general equilibrium can provide in the way of estimates of the welfare and trade (and other) effects of the price distortions captured by the product NRA and CTE estimates – and they have the advantage over a computable general equilibrium model of providing an annual time series.

Summaries of those two indexes are provided for the major regions in the lower half of Table 4. In 1972 the WRI was almost 50 percent for developing countries and almost 60 percent for high-income countries. Over the subsequent two years, that index went down by nearly one-third in high-income countries but hardly changed for developing countries – even though the NAC for developing countries fell by one-third. Almost the same is true for the TRI: no change for developing countries, but a big drop (a halving) for high-income countries. This suggests for developing countries that the dispersion of NRAs among farm industries increased in individual developing countries, for example because NRAs for export industries became more negative to a greater extent than NRAs for import-competing farm industries became less positive. For high-income countries, if most of the assistance for farmers is provided by import restrictions such as variable levies to stabilize domestic prices, one would expect those levies to be reduced as international prices rise.

3.3 Contribution of different policy instruments to the aggregate indicators

To test the possibility in the previous sentence, it is necessary to attribute each industry's NRA and CTE to a particular set of policy instruments. This is done in Table 5(a) for developing countries and Table 5(b) for high-income countries. The latter shows that in the mid-1970s import restrictions were indeed the dominant form of assistance to farmers in high-income countries, with domestic and export subsidies accounting for less than one-sixth of the total NRA. Between 1972 and 1974 it was both import restrictions and export subsidies that contributed to the fall in the NRA for high-income countries, as they did to its subsequent rise.

[Insert Table 5 about here]

For developing countries, by contrast, domestic price-depressing policies – especially export taxes – were the dominant policy instrument in 1972, although import restrictions and domestic producer subsidies played non-trivial roles as well. By 1974, though, import restrictions and domestic subsidies had been mostly suspended while the absolute contribution to the total NRA from export taxes and import subsidies hardly changed on average. As a result, the NRA for developing countries fell from 3 percent to -29 percent over those two years, before rising back to an average of almost zero again by 1976.

The contribution to the CTEs by different instruments was fairly similar to that for NRAs and so is not shown, but they are almost as important as the NRAs in terms of their contribution to the WRI and TRI. To attribute those index values to different policy instruments requires doing it separately for the producer and consumer sides of the market: each instrument share is computed by first converting the index percentage to constant 2000 $US billions by multiplying it by the average value of production or consumption for that instrument group at the country level, and then dividing the dollar amount for each instrument by the country average value of production or consumption. The weighted average of the production and consumption components could give an overall attribution, but for the sake of transparency they are shown separately in Tables 6 and 7.

[Insert Tables 6 and 7 about here]

For high-income countries, their WRI fall of one-third and the halving of their TRI by 1974 are virtually all due to import measure changes, and the contribution from the consumption side is only a little greater than that from the production side. By 1976, however, both the WRI and TRI had risen by more than they had fallen in the previous two

years, and both production and consumption of farm products in high-income countries were more distorted immediately after than before the price spike.

For developing countries, the situation summarized in Tables 6 and 7 is more complex. First, because the export tax instrument dominated in 1972 for developing countries, the contribution to both indexes from the production side is greater than from the consumption side. Second, even though their average WRI and TRI did not increase by 1974, each of the two component parts did and especially on the production side. And third, those increases are all due to increases in export restrictions and some import subsidies and are despite substantial falls in the contributions from import restrictions.

4. Lessons from the past

Clearly a lot happened to global agricultural market distortions during the brief spike in international prices of farm products in the mid-1970s. By way of summary, the key points that emerged from the above analysis are the following:

- The magnitudes of the international price rises in 1973-74, and the speed of their subsequent fall, were very similar to those experienced in 2006-10;
- National NRAs and CTEs tend to be above trend in years of low international prices and conversely in years when international prices are high, reflecting the fact that trade restrictions adjust to reduce the fluctuations in domestic prices that would otherwise occur;
- The agricultural sector's NAC for developing countries fell by exactly one-third between 1972 and 1974 before rising by almost the same amount in the subsequent two years, which was slightly more than twice the extent of the NAC fall and recovery for high-income countries;
- By contrast, the WRI (TRI) for covered agricultural products went down by almost one-third (nearly halved) in high-income countries but hardly changed for developing countries between 1972 and 1974, even though the NAC for developing countries fell by one-third, suggesting that the dispersion of NRAs among farm industries decreased in individual developing countries;

- Between 1972 and 1974 it was both import restrictions and export subsidies that contributed to the fall in the NRA for high-income countries, as they did to its subsequent rise;
- For developing countries, where export taxes were the dominant policy instrument in 1972 (although import restrictions and domestic producer subsidies played non-trivial roles as well), their import restrictions and domestic subsidies were mostly suspended by 1974 while the absolute contribution to the total NRA from export taxes and import subsidies hardly changed over those two years;
- For high-income countries, their WRI fall of one-third and the halving of their TRI by 1974 are virtually all due to import measure changes, but by 1976 both the WRI and TRI had risen by more than they had fallen in the previous two years, indicating that agriculture in high-income countries was more distorted immediately after than before that mid-1970s price spike.

These findings for the mid-1970s, together with the broader findings in Section 2 of a tendency for governments to use border measures to reduce the variability of domestic food prices in general, are not dissimilar to what appeared to be the case in the most recent food price spike – although the data are not yet available to confirm that anecdotal impression.

That beggar-thy-neighbor dimension of each government's food policies ought to be of concern. It is worrying because it reduces the role that trade between nations can play in bringing stability to the world's food markets: the more countries insulate 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 each nation's NRAs are desired. By increasing the volatility of world markets as they seek to reduce domestic volatility, such actions by national governments are collectively self-defeating. Clearly there is scope for multilateral agreement to desist. The World Trade Organization (WTO) is the most obvious place to seek restraints on varying trade restrictions (exports as well as imports), but the initial responses to proposals along these lines in the WTO's current Doha round of trade negotiations has been at best cool to date. It remains to be seen whether, over time, responses become warmer or even cooler with the expected increase in volatility of international food markets as climate change adds to the frequency of extreme weather events around the world.

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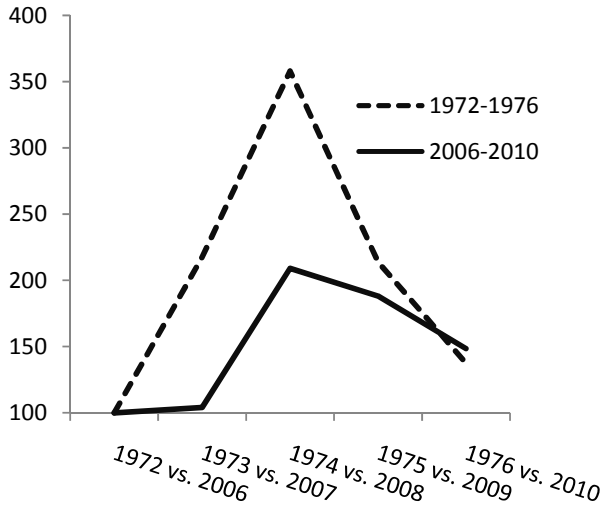
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Figure 1: Indexes of real international prices of rice, wheat, maize and groundnut oil, 1972-76 (1972 = 100) and 2006-10 (2006 = 100)

(a) Rice



(b) Wheat

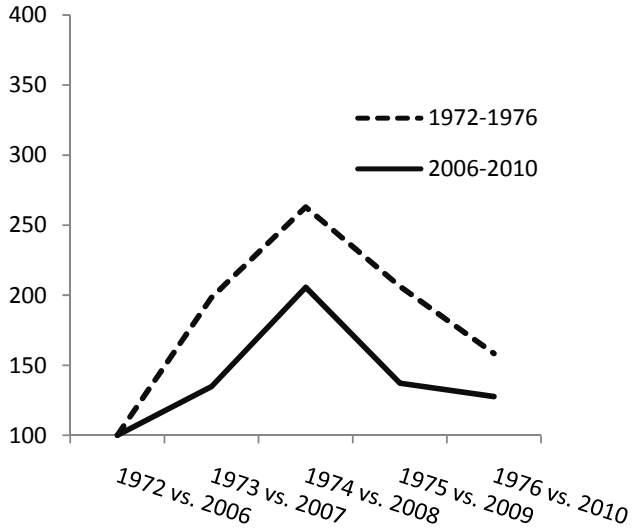
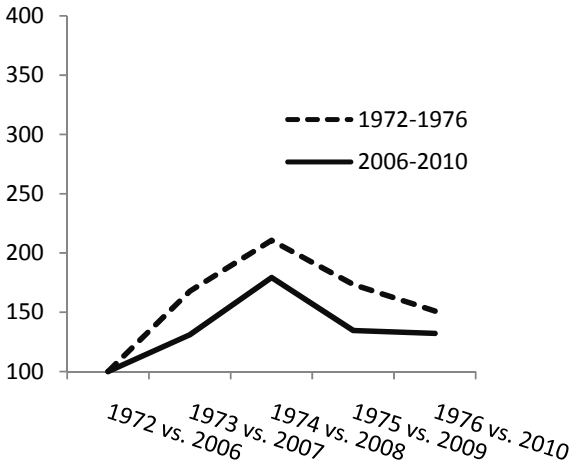
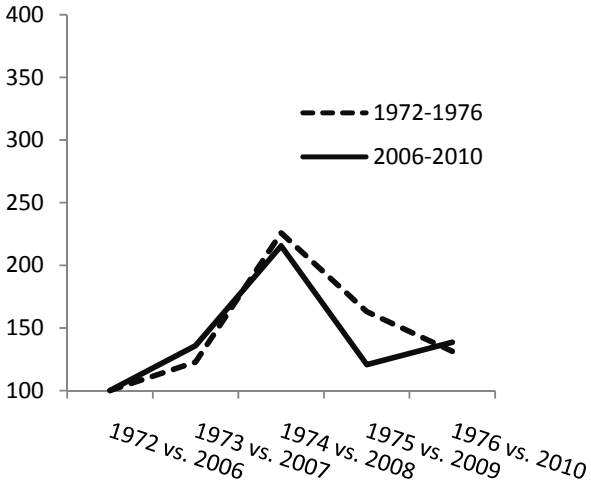


Figure 1 (continued): Indexes of real international prices of rice, wheat, maize and groundnut oil, 1972-76 (1972 = 100) and 2006-10 (2006 = 100)

(c) Maize



(d) Groundnut oil

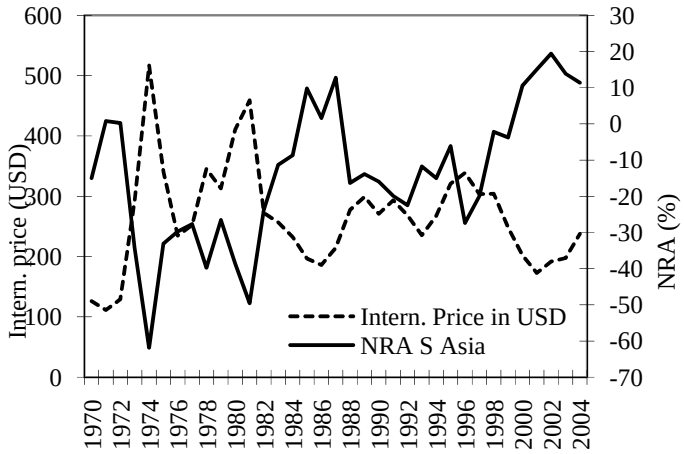


Source: Authors' derivation drawn from World Bank *Pink Sheets* of nominal prices deflated by the Unites States GDP implicit price deflator (see Anderson and Nelgen 2010, Appendix Table A).

Figure 2: Rice NRAs and international rice price, South and Southeast Asia, 1970 to 2005

(left axis is int'l price in current US dollars, right axis is weighted average NRA in percent)

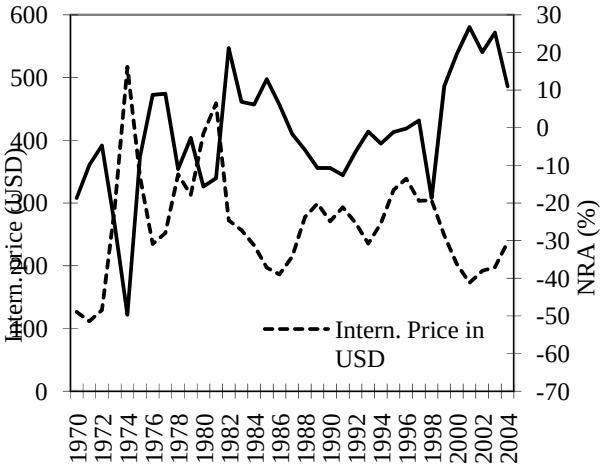
(a) South Asia



Correlation coefficient is -0.79

Note: Countries included are Bangladesh (except for 1970-73), India, Pakistan, Sri Lanka.

(b) Southeast Asia



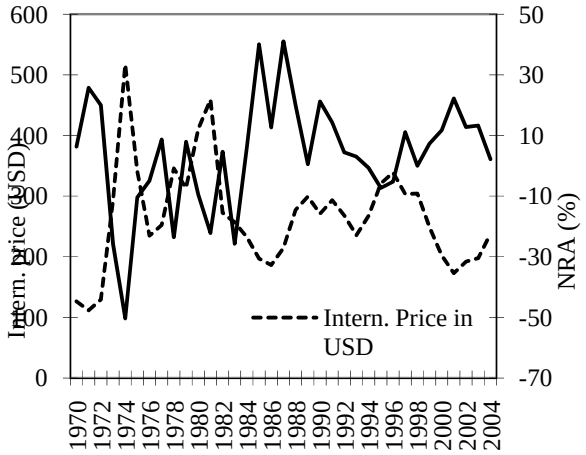
Correlation coefficient is -0.56

Note: Countries included are Indonesia (except for 1970-74), Malaysia, Philippines, Thailand and Vietnam (except for 1970-85).

Figure 2 (continued): Rice NRAs and international rice price, South and Southeast Asia, 1970 to 2005

(left axis is int'l price in current US dollars, right axis is weighted average NRA in percent)

(c) Sub Saharan Africa

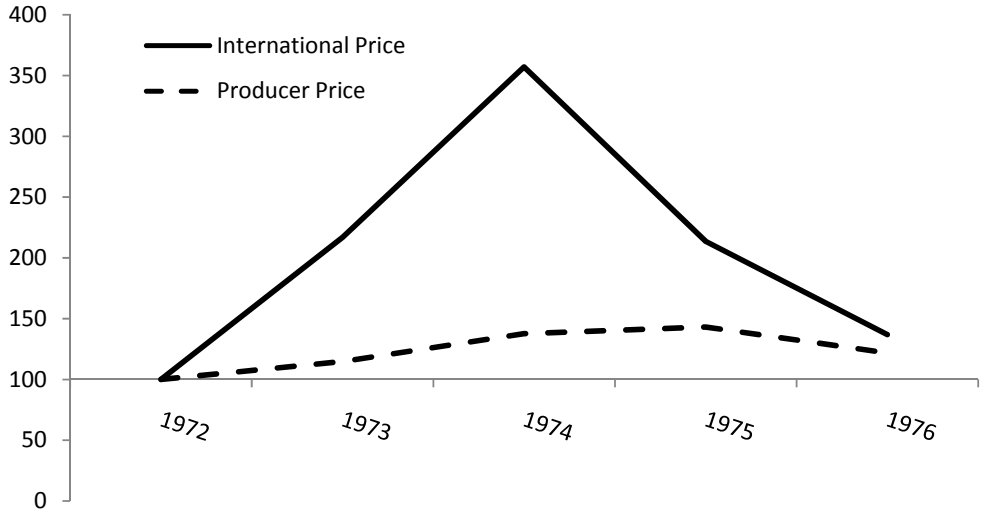


Correlation coefficient is -0.72
Note: Countries included are Cote d'Ivoire, Ghana (except for 1983), Madagascar, Mozambique (except for 1970-75, 1997-98, 2002-04), Nigeria, Senegal, Tanzania (except for 1970-75), Uganda, Zambia.

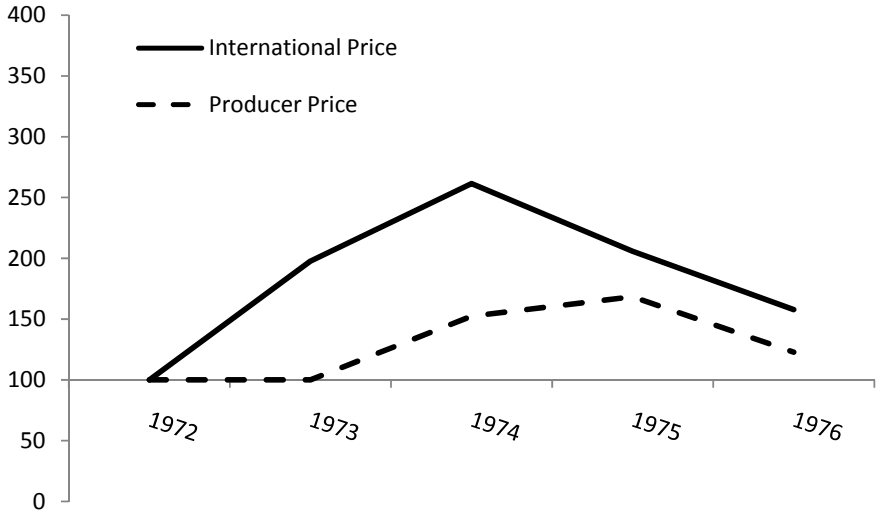
Source: Authors' compilation based on data in Anderson and Valenzuela (2008).

Figure 3: Indexes of real international prices and real producer prices of rice and wheat, developing countries' unweighted average, 1972-76 (1972 = 100).

(a) Rice



(b) Wheat



Note: Countries included are: Argentina, Bangladesh, Brazil, Chile, Colombia, Cote d'Ivoire, Dominican Republic, Ecuador, Ghana, India, Indonesia, Kenya, Korea, Madagascar, Malaysia, Mozambique, Nigeria, Pakistan, Philippines, Senegal, Sri Lanka, Sudan, Taiwan, Tanzania, Thailand, Uganda, Zambia, and Zimbabwe.

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

Table 1: Deviation of national NRA around its trend value,[a] 12 key covered farm products,[b] developing and high-income countries, 1965-72, 1972-76, 1976-84, 1984-88 and 1988-2004

(NRA percentage points)

	Developing countries					High-income countries				
	1965-1972	***1972-1976***	1976-1984	***1984-1988***	1988-2004	1965-1972	***1972-1976***	1976-1984	***1984-1988***	1988-2004
Grains, oils, sugar										
Rice (28%)	24	***32***	36	***62***	64	54	***48***	89	***222***	227
Wheat (18%)	30	***29***	37	***45***	46	44	***18***	67	***119***	84
Maize (7%)	38	***34***	37	***53***	28	42	***28***	43	***76***	53
Soybean (3%)	36	***30***	56	***75***	124	10	***11***	111	***142***	41
Sugar (42%)	70	***38***	46	***95***	57	216	***45***	133	***230***	160
Tropical cash crops										
Cotton (-5%)	30	***39***	42	***38***	32	63	***42***	11	***21***	29
Coconut (-21%)	23	***17***	22	***15***	22	na	***na***	na	***na***	na
Coffee (-12%)	31	***37***	50	***44***	25	na	***na***	na	***na***	na
Livestock products										
Milk (88%)	68	***61***	87	***101***	61	187	***188***	281	***327***	156
Beef (43%)	32	***38***	59	***63***	51	54	***57***	103	***167***	117
Pigmeat (3%)	96	***84***	73	***49***	61	75	***61***	75	***98***	74
Poultry (21%)	111	***90***	112	***63***	76	44	***46***	135	***221***	192

[a] Deviation is computed as the absolute value of (residual – trend NRA) where trend NRA in each of the two sub-periods is obtained by regressing NRA on time. The global NRA average for each product for 1985-2004 is shown after the product name in column 1.

[b] Unweighted average of national deviations.

Source: Anderson et al. (2010).

Table 2: Coefficient of correlation between regional NRA and international price, 12 key covered farm products,[a] various regions, 1965 to 2007

	Africa	South Asia	South East Asia and China	Latin America	High-income countries	All focus countries[b]
Grains, oils, sugar						
Rice	-0.19	-0.58	-0.51	-0.52	-0.10	-0.16 (0.99)
Wheat	0.01	-0.81	0.09	-0.12	-0.28	-0.41 (0.85)
Maize	-0.20	-0.70	-0.55	-0.04	-0.29	-0.57 (0.71)
Soybean	-0.15	-0.42	0.16	-0.27	-0.07	-0.18 (0.30)
Sugar	-0.57	-0.74	-0.57	-0.40	-0.69	-0.70 (0.99)
Tropical cash crops						
Cotton	0.28	-0.33	-0.16	-0.29	-0.74	-0.57 (0.96)
Coconut	na	-0.16	-0.14	na	na	-0.12 (0.99)
Coffee	-0.35	na	0.02	-0.30	na	-0.28 (0.99)
Livestock products						
Milk	0.19	-0.57	-0.70	0.33	-0.10	-0.31 (0.98)
Beef	0.20	na	0.05	0.55	0.29	0.32 (0.97)
Pigmeat	na	na	-0.53	-0.47	-0.60	-0.76 (0.98)
Poultry	0.59	na	-0.52	-0.78	-0.22	-0.34 (0.87)

[a] Computed using the weighted average regional NRAs and a common international reference price for each product, from World Bank (2008).

[b] Numbers in parantheses are the coefficient of correlation between the unweighted average regional NRAs and CTEs for individual covered products. For all covered products the coefficient is 0.93.

Source: Source: Anderson et al. (2010).

Table 3: Nominal assistance coefficients[a] for rice, wheat, maize, groundnuts and all farm products, key country groups, 1972 to 1976

(percent)

	1972	1973	1974	1975	1976
Rice					
Asia (excl. Japan)	1.07	0.72	0.43	0.76	0.92
Africa	0.98	0.61	0.36	0.60	0.82
Latin America	1.00	1.04	0.84	0.90	0.98
All developing countries	1.07	0.73	0.45	0.76	0.92
High-income countries	2.65	1.84	1.24	1.72	2.33
Wheat					
Asia (excl. Japan)	1.31	0.72	0.83	0.97	0.94
Africa	1.19	0.85	0.67	0.87	1.00
Latin America	0.89	0.59	0.57	0.93	1.02
All developing countries	1.24	0.71	0.75	0.95	0.96
High-income countries	1.05	0.88	0.88	0.97	0.93
Maize					
Asia (excl. Japan)	1.52	1.17	1.04	0.82	1.03
Africa	1.03	0.90	0.69	0.83	0.92
Latin America	1.06	0.89	0.81	0.85	0.84
All developing countries	1.18	0.98	0.83	0.83	0.92
High-income countries	1.13	1.06	1.00	1.03	1.04
Groundnut oil					
Asia (excl. Japan)	1.08	1.00	1.00	0.69	0.86
Africa	0.51	0.46	0.48	0.53	0.57
Latin America	na	na	na	na	na
All developing countries	0.92	0.88	0.78	0.63	0.75
High-income countries	na	na	na	na	na
All farm products					
Asia (excl. Japan)	1.18	0.90	0.69	0.87	1.04
Africa	0.83	0.75	0.70	0.80	0.79
Latin America	0.73	0.69	0.58	0.65	0.85
All developing countries	1.01	0.83	0.67	0.82	0.96
High-income countries	1.32	1.19	1.14	1.25	1.36

[a] Nominal assistance coefficient = 1 + NRA/100

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

Table 4: NRAs, CTEs, WRIs and TRIs, all covered farm products, by region, 1972 to 1976

	1972	1973	1974	1975	1976
NRA (%)					
Asia (excl. Japan)	18	-10	-31	-13	4
Africa	-17	-25	-30	-20	-21
Latin America	-27	-31	-42	-35	-15
All developing countries	1	-17	-33	-18	-4
High-income countries	32	19	14	25	36
CTE (%)					
Asia (excl. Japan)	-5	-32	-28	-8	1
Africa	-9	-18	-25	-13	-6
Latin America	-19	-26	-35	-28	-9
All developing countries	-9	-28	-29	-12	-2
High-income countries	32	18	14	26	36
WRI (%)					
Asia (excl. Japan)	47	48	46	50	41
Africa	55	52	53	48	49
Latin America	38	41	52	49	27
All developing countries	47	47	48	49	40
High-income countries	59	43	41	51	72
TRI (%)					
Asia (excl. Japan)	29	25	24	36	25
Africa	19	18	23	25	31
Latin America	21	25	33	33	16
All developing countries	25	24	25	34	24
High-income countries	27	18	13	24	36

Source: Authors' compilation based on data in Anderson and Valenzuela (2008) and Anderson and Croser (2009).

Table 5: Contributions to total agricultural NRA[b] from different policy instruments,[a] by region, 1972-76 (percent)

(a) Developing countries

	1972	1973	1974	1975	1976
Border measures					
Import tax equivalent	22	2	2	8	6
Export subsidies	4	0	0	1	1
Export tax equivalent	-26	-18	-24	-22	-9
Import subsidy equivalent	-6	-5	-5	-2	-1
ALL BORDER MEASURES	**-22**	**-21**	**-28**	**-16**	**-4**
Domestic measures					
Production subsidies	26	7	1	1	1
Production taxes	-1	0	-3	-3	0
farm input net subsidies	0	0	0	1	1
Non-product-specific (NPS) assistance except to inputs	0	0	0	0	0
ALL DOMESTIC PRODUCTION MEASURES	**25**	**7**	**-1**	**-1**	**2**
TOTAL NRA (including NPS and decoupled payments)	**3**	**-14**	**-29**	**-17**	**-2**
Producer subsidy equivalent, in real 2000 US$ billion	**7**	**-43**	**-141**	**-72**	**-9**

(b) High-income countries

	1972	1973	1974	1975	1976
Border measures					
Import tax equivalent	25	18	15	21	30
Export subsidies	4	2	1	2	2
Export tax equivalent	0	-1	0	0	0
Import subsidy equivalent	-1	-3	-3	-1	-1
ALL BORDER MEASURES	**27**	**17**	**13**	**22**	**31**
Domestic measures					
Production subsidies	1	1	0	1	1
Production taxes	0	0	0	0	0
farm input net subsidies	0	0	0	0	0
Non-product-specific (NPS) assistance except to inputs	1	0	1	1	1
ALL DOMESTIC PRODUCTION MEASURES	**2**	**1**	**1**	**1**	**1**
TOTAL NRA (including NPS and decoupled payments)	**29**	**18**	**13**	**24**	**32**
Producer subsidy equivalent, in real 2000 US$ billion	**125**	**114**	**89**	**137**	**173**

[a] In the absence of data, it is assumed the share of input tax/subsidy, domestic production tax/subsidy and border tax/subsidy payments for non-covered farm products are the same as those for covered farm products.
[b] All entries have been generated by dividing the producer subsidy equivalent of all (including NPS and 'decoupled') measures by the total agricultural sector's gross production valued at undistorted prices.
[c] All entries have been generated by dividing the consumer tax equivalent of all measures by the total consumption value (at the farmgate level, valued at undistorted prices).

Source: Authors' compilation based on data in Anderson and Valenzuela (2008) and Anderson and Croser (2009).

Table 6: Contributions to Welfare Reduction Index for covered products by different policy instruments, by region, 1972 to 1976
(percent)

(a) Production side of economy

	High-income countries					Developing countries				
	1972	**1973**	**1974**	**1975**	**1976**	**1972**	**1973**	**1974**	**1975**	**1976**
All measures	46	34	31	41	60	42	47	55	53	38
Border measures	46	32	31	41	58	38	44	44	43	35
Export tax	0	1	1	0	0	16	31	34	28	18
Export subsidy	6	3	1	3	3	3	1	0	1	1
Import tax	39	25	24	37	53	15	4	3	11	13
Import subsidy	1	3	5	1	2	4	8	7	3	2
Domestic taxes & subsidies	0	2	0	0	2	4	3	11	10	3
Production tax on output	0	0	0	0	0	2	1	10	8	1
Production subsidy on output	0	2	0	0	2	0	0	0	0	0
Farm input net subsidies	0	0	0	0	0	2	1	1	1	1

(b) Consumption side of economy

	High-income countries					Developing countries				
	1972	**1973**	**1974**	**1975**	**1976**	**1972**	**1973**	**1974**	**1975**	**1976**
All measures	**51**	**37**	**34**	**47**	**67**	**39**	**52**	**45**	**45**	**35**
Border measures	**51**	**37**	**34**	**47**	**67**	**39**	**51**	**44**	**43**	**35**
Export tax	0	1	0	0	0	11	37	30	24	15
Export subsidy	5	2	1	2	3	3	1	0	1	1
Import tax	44	30	27	43	63	21	4	3	14	16
Import subsidy	2	4	6	1	2	5	9	10	4	3
Domestic taxes & subsidies	**0**	**0**	**0**	**0**	**0**	**1**	**1**	**1**	**1**	**0**
Consumption tax	0	0	0	0	0	1	1	1	1	0
Consumption subsidy	0	0	0	0	0	0	0	0	0	0

Source: Authors' compilation based on data in Anderson and Valenzuela (2008) and Anderson and Croser (2009).

Table 7: Contributions to Trade Reduction Index for covered products by different policy instruments, by region, 1972 to 1976
(percent)

(a) Production side of economy

	High-income countries					Developing countries				
	1972	**1973**	**1974**	**1975**	**1976**	**1972**	**1973**	**1974**	**1975**	**1976**
All measures	**24**	**16**	**12**	**22**	**32**	**22**	**20**	**28**	**37**	**25**
Border measures	**24**	**16**	**12**	**22**	**32**	**22**	**24**	**27**	**33**	**25**
Export tax	0	1	0	0	0	15	29	32	26	17
Export subsidy	-4	-2	-1	-2	-2	-2	-1	0	-1	-1
Import tax	29	20	17	24	35	13	3	2	10	11
Import subsidy	-1	-3	-4	-1	-2	-3	-8	-7	-3	-2
Domestic taxes & subsidies	**0**	**0**	**0**	**0**	**0**	**0**	**-4**	**1**	**4**	**0**
Production tax on output	0	0	0	0	0	0	1	1	4	0
Production subsidy on output	0	0	0	0	0	0	-5	0	0	-1
Farm input net subsidies	0	0	0	0	0	0	0	0	1	1

(b) Consumption side of economy

	High-income countries					Developing countries				
	1972	**1973**	**1974**	**1975**	**1976**	**1972**	**1973**	**1974**	**1975**	**1976**
All measures	**28**	**19**	**13**	**25**	**38**	**20**	**30**	**21**	**30**	**23**
Border measures	**28**	**19**	**13**	**25**	**38**	**21**	**30**	**21**	**30**	**23**
Export tax	0	1	0	0	0	10	36	28	22	14
Export subsidy	-3	-2	-1	-2	-1	-2	-1	0	-1	-1
Import tax	33	23	18	28	41	17	3	3	13	13
Import subsidy	-1	-4	-5	-1	-2	-4	-9	-9	-4	-3
Domestic taxes & subsidies	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Consumption tax	0	0	0	0	0	0	0	0	0	0
Consumption subsidy	0	0	0	0	0	0	0	0	0	0

Source: Authors' compilation based on data in Anderson and Valenzuela (2008) and Anderson and Croser (2009).