Cereal Price Transmission in Several Large Asian Countries during the Global Food Crisis

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ABSTRACT

World cereal prices have been increasing substantially since 2003. Until 2008, the Asian countries examined in this paper (Bangladesh, China, India, Indonesia, the Philippines, Thailand and Viet Nam) had generally been able to contain domestic price increases by using trade policies and taking advantage of the depreciation of the US dollar. On average, domestic price increases in real terms were only about one-third of the world price increases in real US dollar terms. In the face of large world price increases in early 2008, the transmission to domestic markets was still incomplete, but prices increased substantially in some countries. In other countries, however, prices increased very little, if at all. Trade policies explain some of the different outcomes across countries, but speculative activity by farmers, traders, and consumers also appears to have played a role. While there has been incomplete transmission between world and domestic markets, transmission within national borders has been stronger in the sense that, for any given country, percentage increases in farm and consumer prices have been similar. The overall price increases during the past several years have probably been large enough to create a supply response, even in the face of higher fertilizer prices.

INTRODUCTION

International agricultural commodity prices (in US dollar terms) have been increasing since at least 2003 for cereals, other foods, and non-foods. There are many factors behind these increases, namely: increased biofuel demand; higher oil prices that have raised prices for agricultural inputs such as fuel and fertilizer; continued growth in demand for resources from China and India, which has led to reductions in net cereal and oilseed exports from these two giants in recent years; short-term supply shocks due to adverse weather conditions; low world prices in the early years of this decade, which may have reduced production incentives; and short-term trade policy changes such as reduced barriers to imports and increased restrictions on exports. Macroeconomic factors such as a weak US dollar and low real interest rates that affect both supply and demand have also played a role.

A key question, however, is the extent to which these changes in world market prices have been transmitted to domestic economies in recent years, especially for cereals. The extent of transmission is important for at least two reasons. First, it is domestic prices that affect

the welfare of poor consumers and farmers, not world prices. Second, the magnitude of the price transmission will help determine the extent to which adjustments by producers and consumers will stabilize world price movements. These adjustments (i.e., reduced consumption, increased production) will only take place if world prices are transmitted to domestic prices.

This paper will examine the extent to which increases in international cereal prices during the past few years have been transmitted to domestic prices for several large Asian countries. The focus will be on rice — the staple food in these countries — which accounts for a large share of the expenditures of the poor, and is also the most important agricultural crop in terms of area harvested. In addition, limited evidence on the price transmission for wheat and maize will be presented. The paper will also examine changes in both consumer and producer prices to see if these groups are being affected differently. Finally, some limited evidence on the transmission of world fertilizer prices will be analyzed, given that world urea prices have increased substantially and will affect farm profitability if they are transmitted to farmers.

DATA AND METHODOLOGY

This analysis uses monthly data on domestic prices at different levels of the marketing system (farm, wholesale, retail), as well as, data on exchange rates and the consumer price index. For most countries, the data reflect national averages for the most widely traded quality, although in some cases these figures apply to the capital city. In instances when data for both the nation and the capital city are available, the trends are quite similar (analysis not presented here). All data are for market prices, not government prices. Data come from standard government sources.

International price data are for standard reference varieties of the major cereals: 100B FOB Bangkok for rice; hard red winter #1, FOB in the Gulf of Mexico for wheat; and yellow #2 FOB in the Gulf of Mexico for maize. While the world rice market in particular is quite heterogeneous, price increases during the past few years have been almost identical for 100B, 15% brokens and parboiled 5% brokens (all FOB Bangkok). Real exchange rates vis-à-vis the US dollar are calculated by first dividing the nominal exchange rate by the domestic consumer price index (CPI), and then multiplying by the US CPI.

The core of the analysis is to perform a very basic calculation of cumulative changes in international and domestic prices in real (inflation-adjusted) terms between various points in time. A base year of 2003 is used because international oil, cereal, and fertilizer prices were relatively stable during the course of that year.

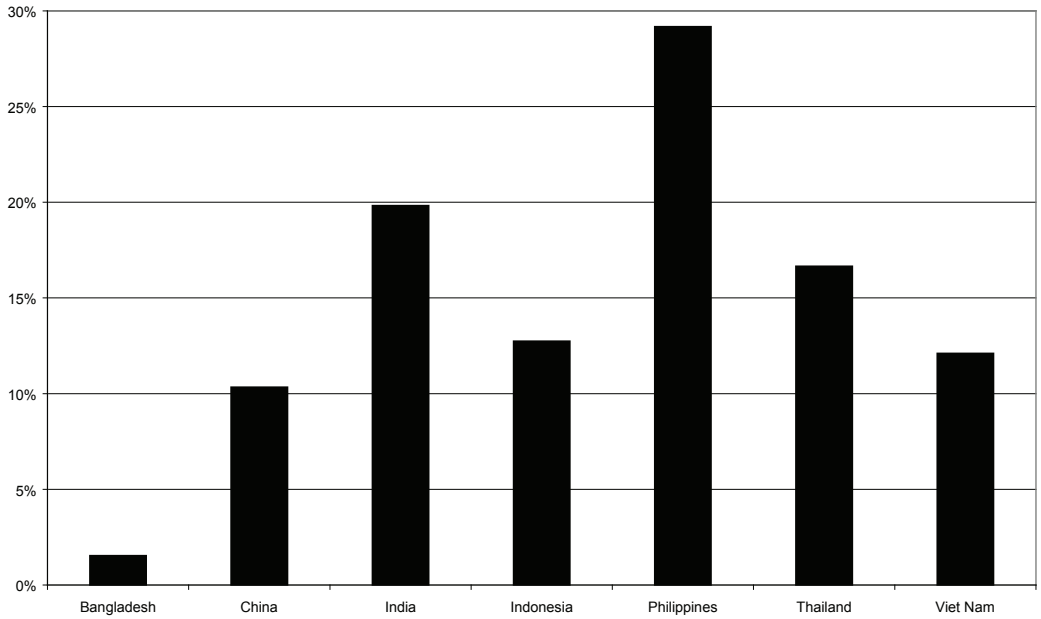
RESULTS

The Impact of Exchange Rates on Price Transmission

Even before the dramatic surge in prices in 2008, world market prices had increased substantially in real US dollar terms in recent years. Comparing Q4 2007 with Q4 2003, world market prices increased by 56 percent for rice, 91 percent for wheat, 40 percent for maize and 107 percent for urea (a source of nitrogen and the main fertilizer used by Asian farmers). During that time, however, the US dollar depreciated substantially against many currencies;[1] Figure 1 shows the percentage appreciation of the real exchange rate for the seven countries included in this analysis during this period (Q4 2003 to Q4 2007).

Real exchange rate (RER) appreciation vis-à-vis the US dollar, to the extent that it occurs,

[1] In fact, this depreciation is one cause of the recent uptrend in commodity prices.



Source: IMF (2008).

Figure 1. Real exchange rate appreciation of domestic currencies versus the US dollar, Q4 2003 to Q4 2007

will neutralize some of the impact of increased prices in US dollar terms. Because the magnitude of RER appreciation varies from country to country, changes in world market prices in *real domestic currency (DC) terms* will also vary from country to country, even for the same commodity. A comparison of the first and second columns of Table 1 shows that, for a substantial group of Asian countries, world market rice prices did not effectively increase by as much as was commonly believed (the "headline" number in column 1). For some countries, however, such as Bangladesh, world price increases were substantial because the real exchange rate was approximately constant.[2]

Transmission to Domestic Economies

While the difference between columns (1) and (2) in Table 1 shows that exchange rate appreciation in several Asian countries muted the effects of rising US dollar world rice prices, the fact remains that world prices increased throughout Asia during this time, even in real domestic currency terms (since all price changes in column 2 of Table 1 are positive). This section will assess the extent to which changes in world prices in domestic currency terms were passed through to consumers and farmers.

[2] In some countries, the exchange rate may be partially determined by world commodity price movements when the commodity in question is a major share of that country's international trade, as will be the case for oil in some African countries. The value of international cereal trade in the Asian countries analyzed here is relatively small, however, compared to the size of their foreign exchange markets and compared to total exports and imports (this is true even at the current high level of prices). Thus, exchange rate changes in these countries are taken as exogenous for the purpose of discussing commodity price transmission.

Table 1. Cumulative percentage changes in real rice prices, Q4 2003 to Q4 2007.

Country	(1) World price (US$)	(2) World price (DC)	(3) Domestic price (DC)	(4) Pass through (%) = (3)/(1)
Bangladesh	56	55	24	43
China	56	40	20	36
India	56	25	5	9
Indonesia	56	36	23	41
Philippines	56	10	3	6
Thailand	56	30	30	53
Viet Nam	39	25	3	11

Notes: Data for Viet Nam compare 2003 and 2006 (annual).

Pass through to consumers: rice. The impact on consumers will be assessed by using changes in either wholesale or retail rice prices. It is reasonable to use wholesale prices to measure the impact on consumers because, for the countries examined here, the wholesale market refers to rice that has been dried, milled, and transported to a large market. Thus, these wholesale prices refer to rice that has almost reached the retail level, but is quite far removed from the farm level.

Column (3) of Table 1 shows the cumulative increase in domestic wholesale or retail prices from the fourth quarter of 2003 to the fourth quarter of 2007 in real domestic currency terms. A comparison of columns (2) and (3), after controlling for exchange rate movements, shows that different countries have reduced the price transmission by different proportions. (1) group of countries, defined as those for which column (3) is less than half of column (2), can be considered as "stabilizers." These countries use various commodity-based policies (i.e., excluding exchange rate policies) to insulate the domestic economy from price increases in the international markets. For example, India and the Philippines use government storage, procurement, and distribution as well as restrictions on international trade (Rashid et al. 2005). Bangladesh is less interventionist, but uses ad hoc changes in rice tariffs to stabilize domestic prices. Viet Nam uses variable export restrictions of various sorts. For all of these countries, the volatility of domestic prices during the past few years has been less than that of world prices (analysis not shown), thus justifying the use of the term "stabilizer." As one example of the results of this type of stabilization, Figure 2 shows the evolution of monthly domestic prices in India between 2003 and 2007. It is obvious from visual inspection that domestic prices are more stable than international prices.

A second group, defined as those for which column (3) is at least 85 percent of column (2), can be considered as "free traders" in the sense that essentially all of the price movements in the international markets, after taking account of exchange rates, were transmitted to domestic markets during this period of time. To this group belongs Thailand and China, as far as rice is concerned. Thailand has some government intervention in terms of procurement and storage, but domestic wholesale and retail prices nevertheless follow world prices very closely (see Figure 3).[3] China does not allow the private sector

[3] This has not always been the case. In the 1960s and 1970s, when Thailand was often the world's leading exporter, variable export taxes created a wedge between domestic prices and the world prices quoted in Bangkok. The purpose of these export taxes was to stabilize domestic prices (Siamwalla 1975).

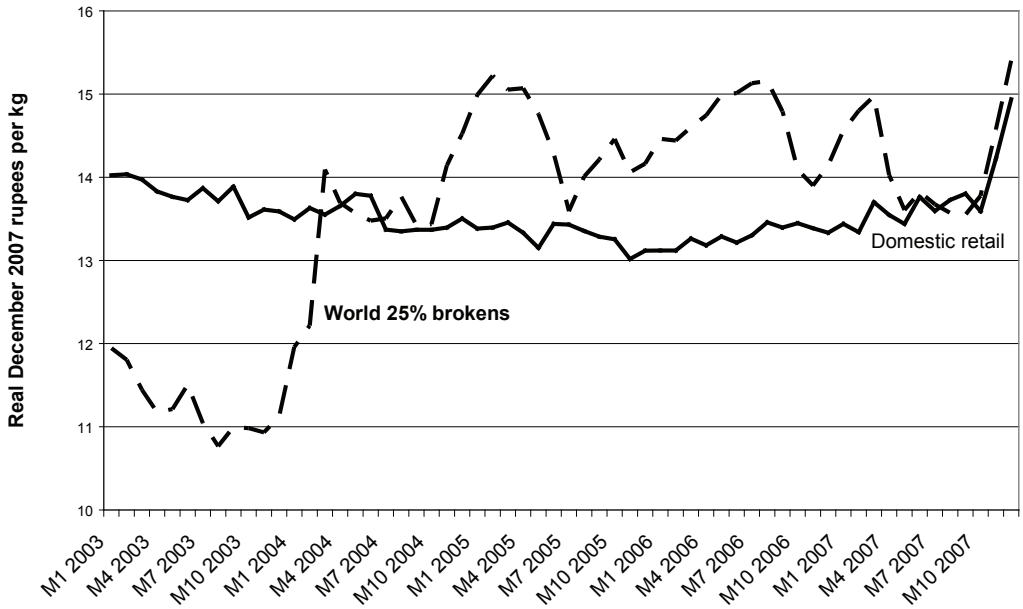


Figure 2. India's domestic retail and world rice prices, inflation adjusted, 2003 to 2007

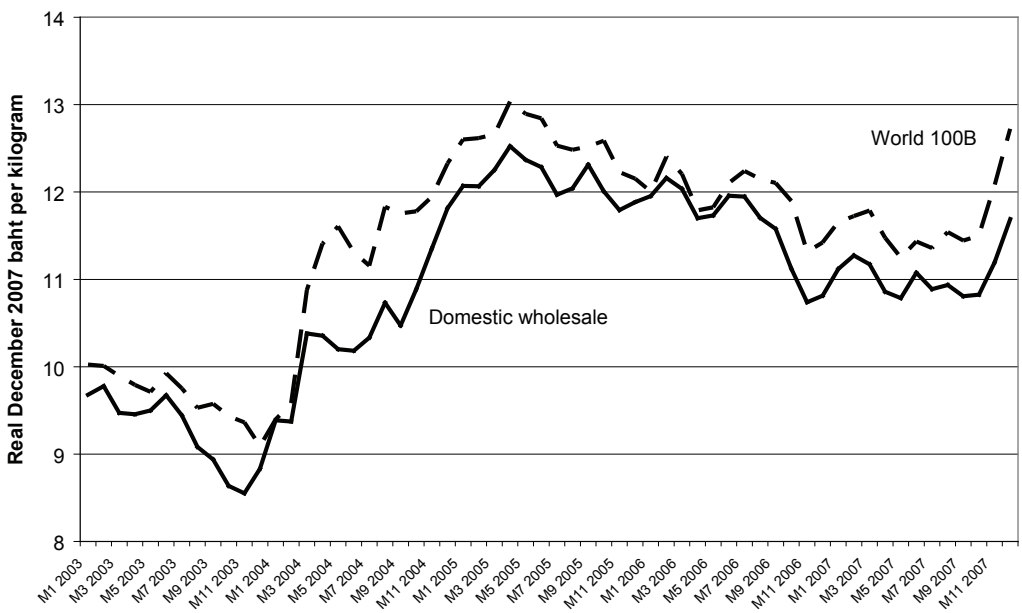


Figure 3. Thailand's domestic wholesale and world rice prices, inflation adjusted, 2003 to 2007

to trade at all, much less without restriction, so it is not a "free trader" in the sense that economists use the term. But at least, through the end of 2007, it was allowing changes in international prices to be reflected more or less fully in domestic prices (but see the analysis below for trends in 2008).

Indonesia does not fall neatly into either of these two groups. Historically, Indonesia has stabilized domestic rice prices (Timmer 1996), but domestic prices have been more volatile than international prices during the current decade. Domestic prices have skyrocketed at times in the past few years during which rice imports were restricted in an attempt to boost farm incomes, even when world prices were relatively stable.[4] Thus, Indonesian domestic rice prices have been insulated from the world market, but Indonesia should not be classified as a "stabilizer."

A key conclusion that emerges from Table 1 is that, for all countries in the sample, except China, the percentage change in column (3) is less than 60 percent of that in column (1); see column (4). The simple average of column (4) across these seven countries shows that, on average, the increase in real domestic prices has been about one-third of the increase in real US dollar world market prices. Thus, there was substantial damping of changes in international rice price increases, at least through the end of 2007.

Domestic rice price movements in early 2008. World market rice prices rose from 2003 to the end of 2007, but this increase was relatively steady and gradual. Thus, in October 2007, prices were $335/ton for Thai 100B, just 5 percent higher in real terms than in October 2006. Prices began to increase more rapidly in November and December, but it was not until 2008 that prices surged, reaching a peak of more than $1000 per ton in April and May (more than triple the level in October). To what extent were these large price increases transmitted to domestic economies?

Table 2 shows that, again, less than half of these most recent price increases on world markets was transmitted to domestic economies, with the exception of Thailand. The simple average pass-through was slightly lower, at about 25 percent, compared to an average of 32 percent from Q4 2003 to Q4 2007. Given the much larger price increase in the world market, however, domestic prices increased substantially in several countries. In Bangladesh, Philippines, Thailand,

Table 2. Cumulative percentage changes in real rice prices, "early" 2007 to "early" 2008.

Country	(1) World price (US$)	(2) World price (DC)	(3) Domestic price (DC)	(4) Pass through (%) = (3)/(1)
Bangladesh	203	171	54	26
China	144	115	5	3
India	203	178	15	7
Indonesia	144	125	2	1
Philippines	144	104	46	32
Thailand	203	169	131	65
Viet Nam	202	158	85	42

Note: All calculations compare one month in the first half of 2008 with the same month in 2007 to control for seasonality, although the months are different across countries. The chosen month for a given country is that month between April and June for which data are available and column (3) is largest (to capture different peak months in different countries). For Bangladesh, India, and Thailand, this month is April. For Viet Nam it is May, and for China, Indonesia, and the Philippines, it is June.

[4] Warr (2005) shows that these import restrictions have increased poverty.

and Viet Nam, real prices increased more than 50 percent in the span of one year, whereas prices did not increase more than 30 percent in any country in the four years between Q4 2003 and Q4 2007. Such large increases have serious repercussions for household food security (FAO 2008a), and often for domestic politics as well.

Another point to note is that there were substantial differences across countries during the past year with respect to the extent of price transmission, just as there were from 2003 to 2007. Even if price transmission is less than perfect in most countries, the obvious question is why prices increased so much in some countries, but much less in others. Policies will have an impact, but outcomes may also be influenced by initial baseline price levels, the size of crop harvests, and the ability to enforce policies that depend on closing borders.

Policies were likely to be the most important of these determinants in early 2008. First, world prices soared above domestic prices in all of the countries analyzed here, so even if prices were initially high in some countries, there should still have been upward pressure on domestic prices from the world market. Second, crop harvests were good in all of these countries in early 2008. Third, these countries are able to enforce price differentials when desired: even Indonesia, whose archipelagic nature makes border control difficult, was able to keep domestic prices 20–50 percent above world prices for 2006 and 2007.

Thus, a further look at policies seems warranted. Clearly, policies are complex and differ from one country to another. But Thailand and Bangladesh have one key policy in common that the other countries do not have: private sector traders are essentially free to make decisions regarding the quantity of exports or imports. This is not to say that either country follows a free trade policy: in recent years, Thailand had been active in procuring rice from farmers at prices substantially above those that would prevail in a truly free market. Bangladesh, a rice importer, had also varied the level of the tariff in response to world market conditions. Nevertheless, given these constraints, traders are essentially free to export or import as much as they please. This cannot be said for the other five large countries discussed here.

What is the consequence of allowing private traders to choose the level of imports or exports? In essence, this allows domestic prices to adjust fully to world prices, after taking account of tariffs and transport costs. If domestic prices are lower than world prices, net exports will increase (and vice-versa) until equilibrium is re-established via private sector arbitrage. Thus, domestic prices in Thailand have increased by as much as world prices.[5] In Bangladesh, the increase in domestic prices has been substantial, but still less than the increase in world prices; the explanation here is that the net exports for Bangladesh are bound at zero due to market imperfections.

Because Bangladesh is more or less a consistent importer, there are no established mechanisms for assessing the quality of Bangladeshi rice for export; further, it will take time for Bangladeshi private traders to develop a reputation among international traders which will allow substantial quantities of exports from that country. In addition, Bangladesh had banned exports from early May 2008. Thus, even when the world price rose above the domestic price in the short run, exports were not likely to occur (which is what would happen in a frictionless small open economy). Instead, the domestic price was determined by domestic supply and demand instead of world markets. In this particular case, Bangladesh suffered some domestic production

[5] The percentage increase in column (3) is less than that in column (2) for Thailand despite its open trading policy because in much of early 2008 the world rice market was so thinly traded that it was not easy to measure the world price. Thus, data on world prices for this period should only be taken as approximate.

shortfalls due to flooding and typhoon damage in late 2007 that contributed to increases in domestic prices, but an excellent crop in April contributed to a subsequent easing of domestic prices.

But among the five countries where the government determines the quantity of international trade, why did prices increase substantially in two of them (the Philippines and Viet Nam) but not in the other three (China, India, and Indonesia)? The most likely explanation here would seem to be that the two countries where domestic prices increased were the same two countries that were directly involved in the trades that sent world prices soaring in March and April.

To understand why this should make a difference, it is first important to realize that neither the Philippines nor Viet Nam were short of supplies during this time. While government rice stocks were a bit on the low side in the Philippines, private sector stocks accounted for most of total stocks, and these stocks were ample. Domestic production in 2008 was forecast to be substantially above that in 2007, and there were no adverse climatic shocks at the time (the most recent estimates show a 6% increase in domestic production for the first half of 2008 compared to the previous record, reached in the first half of 2007). Finally, there were large import contracts being negotiated (and the National Food Authority always sold its imports at below market prices). Thus, domestic supplies were adequate in quantity terms. As regards Viet Nam, it is the world's second largest exporter with an exportable surplus that is typically about 20 percent of domestic production, and the export bans it had in place should have ensured ample domestic supplies.

Since supplies were ample in both countries, and since neither one allows the private sector to fully arbitrage prices between domestic and international markets,[6] it seems that the most likely explanation for the surge in domestic prices was speculation and panic on the part of domestic farmers, traders, and consumers in these countries. The trades in the international market between the Philippines and Viet Nam in early 2008 were well known to the general public in the Philippines, and in Viet Nam were known at least to those involved in the rice trade. Indeed, even traders who dealt primarily in non-rice commodities shifted to rice, speculating on further price increases (Slayton 2009). While international rice traders in China, India, and Indonesia were certainly well aware of the transactions between the Philippines and Viet Nam, the general population in those three countries most likely would be less aware of the trades, and would thus have less reason to panic or speculate. Large government stocks in both China and India probably also served to discourage speculation, and Indonesia benefited from a good harvest. While there was speculative activity in Indonesia (Slayton 2008), apparently it was not widespread enough to cause a surge in prices.

Pass through to consumers: wheat and maize. Table 3 corresponds to Table 1, but it pertains to wheat and maize instead of rice. Column (3) of Table 3 is not completely filled in because international prices refer to wheat grain, while some domestic price series refer to wheat flour. This presents a problem when international wheat grain prices rise drastically, as they did in late 2007 (they increased by 86% from May to December in real US dollar terms). It is unlikely that wheat milling costs increased that rapidly in that short of a time span. Under these conditions, a wheat price increase on world markets that is completely passed through in *absolute* terms to

[6] While the private sector does participate in international rice trade in both countries, it is the government that decides the quantities of imports or exports; private traders are not free to make this decision.

Table 3. Cumulative percentage changes in real wheat and maize prices, Q4 2003 to Q4 2007.

Country	Commodity	(1) World price (US$)	(2) World price (DC)	(3) Domestic price (DC)
Bangladesh	Wheat	91	89	101
China	Wheat/Flour	55	40	17
India	Wheat/Flour	91	53	17
Indonesia	Wheat/Flour	91	66	19
Philippines	Maize	40	-1	5

Note: For China, India and Indonesia, columns (1) and (2) pertain to wheat, while column (3) pertains to wheat flour. For China, data cover 2003 to 2007 (annual).

domestic markets will raise domestic flour prices by the same *absolute* amount as international grain prices increased. But, since wheat flour prices are higher than wheat grain prices (due to the milling costs), the *percentage* increase in wheat flour prices will be smaller than the *percentage* increase in wheat grain prices simply because the flour price is higher. As a result, it does not make sense in these circumstances to compare percentage increases in prices for wheat and wheat flour;[7] instead, absolute price changes are compared (and there is no column (4) in Table 3). For both India and Indonesia, the absolute change in domestic wheat flour prices is about half the absolute change in international wheat grain prices (comparing Q4 2003 with Q4 2007 in real domestic currency terms).

To summarize the data for wheat, Bangladesh did not stabilize domestic wheat prices. India stabilized domestic wheat prices, but wheat prices increased more than rice prices. In the case of Indonesia, domestic rice and wheat prices have increased by approximately the same amount. With respect to maize in the Philippines, it is difficult to draw conclusions about commodity price stabilization policies, since the appreciation of the peso was strong enough to keep world maize prices in real local currency terms essentially stable during that period.

In general, then, Asian countries seem to stabilize domestic wheat prices less than for rice, but wheat price stabilization is still substantial in some countries. The lesser importance accorded to wheat price stabilization occurs because wheat is much less important than rice in terms of crop area and it is also much less important in terms of consumption for the poor. The conclusion that Asian countries stabilize rice prices more than wheat prices is similar to the results found by Sharma (2002) in an earlier study that examined price increases on domestic markets during the last major world price boom in 1995-96.

Pass through to farmers: farm prices and consumer prices. Table 4 shows the percentage change in real farm prices compared to the percentage change in real consumer (retail or wholesale) prices for several commodity/country combinations for which data were easily available. For these countries, the percentage changes in consumer and producer prices are remarkably similar in all cases, suggesting that markets are well integrated and that price changes at one level of the marketing system are passed through to other levels. It should be noted that

[7] This problem is not serious for rice in the analysis above because international, wholesale, and retail rice prices are all for milled grain, not for the paddy produced at farm level.

Table 4. Percentage change in real domestic producer and consumer prices, various time periods.

Country	Commodity	Time period	Producer	Consumer
Bangladesh	Rice	Q4 2003 to Q4 2006	8	2
Bangladesh	Wheat	Q4 2003 to Q4 2006	42	39
China	Rice	2003 to 2007 (annual)	28	30
China	Wheat/Flour	2003 to 2007 (annual)	20	17
Indonesia	Rice	Q1 2003 to Q1 2007	28	32
Philippines	Maize	Q1 2003 to Q1 2008	30	16
Philippines	Rice	Q1 2003 to Q1 2008	11	4
Thailand	Rice	2006 (annual) to May 2008	101	123

Notes: Different time periods for different countries are dictated by data availability. Most recent data are used for each country.

countries in East and Southeast Asia generally have better infrastructure than countries in sub-Saharan Africa, so the analysis could look quite different in other parts of the world.[8]

Pass through for fertilizer prices. Although data on domestic fertilizer prices are more limited, the extent of transmission of fertilizer prices from world to domestic markets seems to be more heterogeneous in these countries. The analysis here focuses on urea, which is the main source of nitrogen and is by far the most important fertilizer for most Asian farmers.

From Q4 2003 to Q4 2007, world urea prices increased by 107 percent in real US dollar terms, more than the increase in rice, wheat, and maize prices during the same period. Again, however, real exchange rate appreciation neutralized much of this increase for many Asian countries.

In Bangladesh, domestic policy has stabilized *nominal* urea prices, with the result that in real domestic currency terms urea prices declined by 25 percent during a period (from August/October 2003 to August/October 2007) when world market prices increased by 79 percent in real domestic currency terms. In the Philippines, however, urea retail prices increased by 33 percent in real domestic currency terms from Q4 2003 to Q4 2007, which, in absolute terms, is almost identical to the increase in world market prices during the same period.[9] Thus, Filipino farmers have been fully exposed to changes in the world market urea prices. In Viet Nam, domestic urea prices have also risen substantially, and in absolute terms the increase in domestic prices was about two-thirds that of the increase in international prices (in real domestic currency terms).

SUMMARY AND DISCUSSION

The foregoing analysis has yielded several points. First, the increase in world cereal prices through the middle of 2007 was accompanied by a real depreciation of the US dollar. For many countries (but not all), this depreciation neutralized a substantial proportion (although not all) of the increase in world prices. Since the middle of 2007, however, increases in cereal prices have far outpaced the depreciation of the US dollar.

[8] The issue of different price levels mentioned earlier for wheat and wheat flour is not a major problem here. Only one entry in Table 4 pertains to the wheat/flour combination (China). In the case of Bangladesh, the wholesale price data are for wheat grain, not wheat flour.

[9] Again, there is a problem of levels as with wheat, since retail urea prices are substantially higher than world urea prices FOB Ukraine.

Second, domestic commodity-specific policies in several of these Asian countries further stabilized domestic prices relative to the change in world prices, at least for a period of time. This was especially true for rice, the main staple food in the region, but it was also true for wheat. On average, through the end of 2007, the increase in real domestic rice prices was about one-third of the increase in real US dollar world market rice prices.

There was also incomplete transmission in early 2008 when world rice prices surged dramatically. But despite this incomplete transmission, domestic prices still increased substantially beyond what was desired by policymakers in several countries. This occurred for several reasons, including panic and speculation in Viet Nam and the Philippines, as well as the fact that import tariffs can only be lowered to zero (Bangladesh).[10]

Third, for the specific cases analyzed here, producer or farm-gate prices have changed by approximately the same percentage as consumer prices. Thus, in these Asian countries, domestic markets seem to be transmitting price changes between farmers and consumers rather efficiently.

Fourth, the experience with urea fertilizer prices is more heterogeneous: some countries are following free trade, while others have stabilized prices in nominal terms, which, in times of rising prices, is an even more extreme departure from free trade than is stabilization in real terms.

Finally, between 2003 and the middle of 2008, domestic rice prices have increased by a substantial amount in all of these seven large countries, with the cumulative increase in wholesale or retail prices being greater than 30 percent in real terms in five of the seven countries analyzed here (India and Indonesia being the two exceptions). Given the strong relationship between farm and consumer prices in these countries, it seems likely that farm prices have also increased by enough that some supply response would be expected.[11]

Working against a supply response, however, are increases in input prices, especially for fertilizer, fuel, and seeds (prices of the latter are likely to follow the same trend as output prices). Before the recent surge in prices, the value of these inputs accounted for perhaps one-sixth of the value of gross output in Asian rice farming (labor, land, and returns to management usually account for well over half of the gross value of production; Moya et al. 2004). The ratio of one-sixth means that the negative effect on farmer incentives of a 60 percent increase in fertilizer prices will be offset by a mere 10 percent increase in output prices. Thus, if fuel and fertilizer are the only inputs whose price has increased in real terms, it seems likely that incentives for farmers have improved on balance, even after accounting for the depressing effect of higher fertilizer prices. If wages and land rents have increased, however, this could substantially mute the incentives from higher output prices. Unfortunately, up-to-date data on prices for labor and land are not easily available.

While it is not certain, it seems likely that incentives for Asian rice farmers have improved during the past few years. Nevertheless, the magnitude of the improved incentives was reduced by: (a) the less-than-perfect transmission of world prices to domestic markets; and (b) increases in input prices. Furthermore, the magnitude of supply response depends not only on the change in incentives, but also on the magnitude of the supply elasticity and the magnitude of price

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[10] Technically, it is possible to move from a zero import tariff to an import subsidy. Such policies are used in Africa and the Middle East on occasion, but have not been adopted by countries in South, Southeast, or East Asia.

[11] It is not possible to make this assertion directly using farm price data, because these data are not always available, and when they are, are often not up-to-date.

increases for other farm commodities. In the end, Asian rice production in 2008 increased by 3.7 percent above the previous record set in 2007 (FAO 2008b).

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