Causes of high food prices

Introduction

Are food grain prices high? The answer depends on the commodity, the period of comparison, and whether the prices are in nominal or real terms. Even from the perspective of just two decades, deflated prices are not exceptionally high for corn (maize) and wheat—only rice seems to be going off the top end of the scale (Figure 2.3.1).

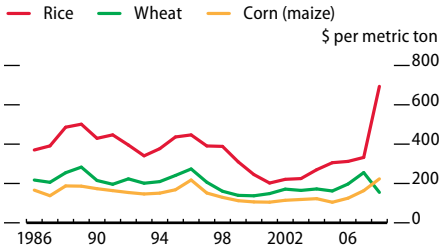
A longer-run view, from 1950 to the present, is even more surprising. Price trends over more than half a century reveal that even the highest price levels experienced in 2007 and 2008 are substantially below the peaks in the previous world food crisis in 1973–74. Indeed, real prices in mid-2008 for corn, wheat, and rice remain well below what was considered "normal" until the full impact of the green revolution was felt after 1980 (Figure 2.3.2).

But most policy makers, consumers, and producers have shorter memories than implied by Figure 2.3.2. Recent price movements have been very sharp and disruptive, with an especially heavy impact on poor consumers and low-income food-importing countries. Rapid increases in food prices are adding to inflationary pressures in most of developing Asia, bringing into prospect monetary tightening and slower economic growth. After several decades of stability in world grain markets, and even steady price declines, the world looks very different in mid-2008 (Figure 2.3.3). Scarcity is back, hunger is growing, and rapid economic growth is threatened (ADB 2008). These are difficult times.

These high food prices have attracted a great deal of attention in policy, media, and academic circles. The runup in corn prices since mid-2007 has fueled a sharp debate over the ethanol subsidy program in the United States (US). High vegetable oil prices have raised similar questions over biodiesel mandates in Europe. High wheat and rice prices may significantly undermine the gains in poverty reduction in the past two decades. The world community has mobilized new resources to feed the poor, including a doubling of the budget for the World Food Program, from $3 billion a year to over $6 billion for 2008.

A combination of decent weather in most growing regions, vigorous response from farmers, and announcement of a small but timely release

2.3.1 Short-run movements in real prices of world grains

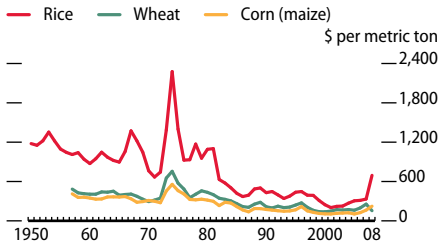


Notes: 2008 represents data for the first 5 months. The world prices of corn (maize), rice, and wheat are based on US No. 2 yellow, free on board Gulf of Mexico; Thailand white milled 5% broken, free on board Bangkok; and No. 1 hard red winter, ordinary protein, free on board Gulf of Mexico, respectively. Prices were deflated by the US consumer price index, with 2007 prices as base.

Source: International Monetary Fund, available: http://www.imf.org/external/np/res/commod/index.asp, downloaded 15 August 2008.

Click here for figure data

2.3.2 Long-run movements in real prices of world grains



Notes: 2008 represents data for the first 5 months. The world prices of corn (maize), rice, and wheat are based on US No. 2 yellow, free on board Gulf of Mexico; Thailand white milled 5% broken, free on board Bangkok; and No. 1 hard red winter, ordinary protein, free on board Gulf of Mexico, respectively. Prices were deflated by the US consumer price index, with 2007 prices as base.

Source: International Monetary Fund, available: http://www.imf.org/external/np/res/commod/index.asp, downloaded 15 August 2008.

Click here for figure data

This chapter was written by C. Peter Timmer, Visiting Professor, Stanford University, and Non-Resident Fellow, Center for Global Development. William James of the Economics and Research Department, ADB, Manila, coordinated the writing of this chapter.

in May of imported rice stocks by Japan seem to have stopped the price panics seen early in 2008.[1] Market psychology has clearly turned negative (and Viet Nam has aggressively cut export prices for rice in an effort to regain market share from Thailand). But price levels remain well above long-run trends and significant micro- and macroeconomic adjustments are in the works. To understand these adjustments, and to assess their impact, it is necessary to understand the causes of high food prices and their likely duration. That is the purpose of this chapter.

The new price environment has now existed long enough to move beyond journalistic coverage (some of it quite insightful) and to have generated a preliminary flow of analysis and policy perspectives. These range from thoughtful essays that reflect on previous world food crises and the distinguishing features of this one (Naylor and Falcon 2008), to urgent appeals to ramp up food aid funding and support for agricultural research (von Braun 2008). The most useful and balanced assessment appeared in the Farm Foundation Issue Report (FFIR) in July 2008. Authored by three distinguished agricultural economists based at Purdue University, the issue report, "What's driving food prices," concludes that falling grain stocks since 2000 have gradually changed world commodity markets from surplus to deficit and have provided the supply–demand fundamentals for sharply higher prices (Abbot, Hurt, and Tyner 2008).

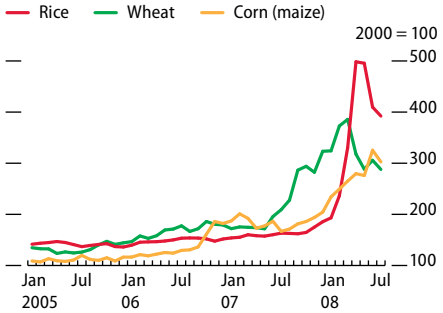
These changing fundamentals can be seen in an especially compelling way when one compares rates of population growth in Asia with rates of growth in rice yields (Figure 2.3.4). The green revolution produced a surge in rice production, and rice surpluses, but the rate of growth has been on a falling trend for the last two decades.

The trigger for the higher prices depends on individual commodities, but significant depreciation of the US dollar, high oil prices, and demand for biofuels have been the main drivers, although even these basic forces are interrelated. Because the FFIR covers the drivers of high food prices in detail, from both a macroeconomic and a commodity-specific perspective, it provides the basic foundation for the more specialized analysis here (Abbot, Hurt, and Tyner 2008). In particular, the FFIR stresses the distinction between short- and long-term responses of supply and demand to a new price environment, and the pervasive impact of changes in exchange rates on commodity prices. Both these factors are investigated in some detail in this chapter.

A major policy issue has been the extent to which "outside" financial speculation—by pension and hedge funds, or newly created commodity index funds available to small investors—has been driving up prices for key staple foods (and petroleum). India, for example, has banned futures trading in important food staples. Nearly all economists and market analysts agree that financial speculation cannot drive up prices in the long run—over a decade or longer. Only the fundamentals of supply and demand can do that.

But there is much more controversy over the role of new speculative activity on price formation in the short run, and especially the potential for such speculation to create "spikes" in prices, or bubbles, that disconnect the market price from underlying fundamentals (OECD 2008). It is very difficult to explain the creation of such spikes across a wide range of commodities without a significant role for financial speculation based on expectations of higher prices. Indeed, the sharp sell-off in

2.3.3 Grain price indexes

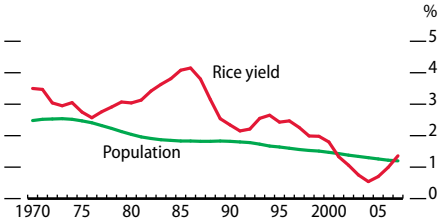


Note: The world prices of corn (maize), rice, and wheat are based on US No. 2 yellow, free on board Gulf of Mexico; Thailand white milled 5% broken, free on board Bangkok; and No. 1 hard red winter, ordinary protein, free on board Gulf of Mexico, respectively.

Source: International Monetary Fund, *International Financial Statistics* online, downloaded 1 September 2008.

Click here for figure data

2.3.4 Growth of rice yield and population



Note: Growth is calculated using successive rolling 5-year period data on rice yield and population in 24 rice-producing developing Asian economies. For example, growth for 1970 is the change between 1966–1970 and 1961–1965.

Sources: Food and Agriculture Organization of the United Nations Statistics (FAOSTAT), available: http://faostat.fao.org/site/291/default.aspx; *World Development Indicators* online; both downloaded 3 September 2008.

Click here for figure data

many commodity markets since mid-July 2008 has convinced many doubters that financial speculation played a significant role in the rapid price runups seen since mid-2007. This chapter also brings to bear new empirical analysis that sheds light on this role.

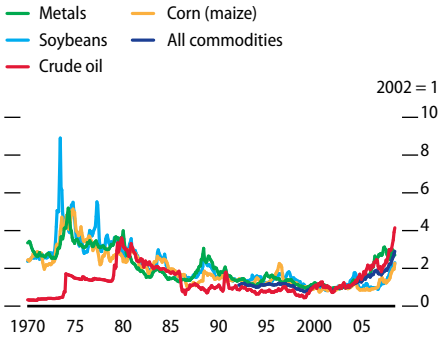
The key results are as follows. First, the distinction between short-run responses of supply and demand to price changes and longer-run responses is crucial. This is a result familiar to agricultural economists, who have used Nerlovian-type distributed lag models of farmer and consumer behavior for half a century (Nerlove 1958). A simple model developed here that captures this distinction suggests that much of the recent gradual increase in the prices of food commodities—from 2002 to 2007—is a direct result of sharply declining prices a decade ago. We are paying a high price, literally, for the destocking of grains since the mid-1990s, a process that pushed down prices.

Simultaneously, this destocking was a rational response to falling grain prices. The simultaneity between stock levels and price expectations—emphasized in the theory of the supply of storage (Brennan 1958; Williams and Wright 1991)—is another neglected aspect of most analyses of current high food prices. Considerable insight comes from remedying that neglect, simply by recognizing that in market economies stock changes do not happen "exogenously" from price formation.

Second, the pervasive impact of exchange rates on commodity prices is confirmed even in the very short run (a result compatible with the FFIR perspective but additional to it). It is important to remember, as the report stresses, that exchange rates are financial variables conditioned by their macroeconomic and trade context. Almost inherently, then, commodity prices will be linked to financial markets, even in the long run (Frankel 2006). Price formation in organized commodity markets depends on financial factors as well as "real" supply and demand factors.

Finally, the short-run price linkages among exchange rates, oil prices, and the prices of important food commodities are tested with Granger causality techniques. These linkages are almost certainly driven by the intermediation of financial markets, i.e., speculators engaged in commodity futures (and other derivatives) markets who have no physical connection to the commodity businesses themselves. These results provide tantalizing, but preliminary, evidence of the role of financial speculation in short-run price behavior, but the role is not nearly as uniform and pervasive as most critics seem to think. Speculative pressures come and go, for reasons not yet apparent from the data. Understanding these reasons—which are perhaps no more than "animal spirits"—is the next goal of the research reported here. Any progress in such understanding will move the discussion forward a great deal.

2.3.5 Long-run real commodity price movements since 1970



Notes: The commodity price index includes both fuel and nonfuel price indexes. The oil price index is the simple average of the spot prices of dated Brent, West Texas Intermediate, and Dubai. Corn (maize) and soybeans, respectively, refer to US No. 2 yellow, free on board Gulf of Mexico, and US No. 2 yellow, Chicago soybean futures contract (first contract forward). The metals price index comprises copper, aluminum, iron ore, tin, nickel, zinc, lead, and uranium prices. Prices were deflated using the US consumer price index, with 2000 prices as base.

Source: International Monetary Fund, *International Financial Statistics* online, downloaded 1 September 2008.

Click here for figure data

What has caused commodity prices to increase since 2000?

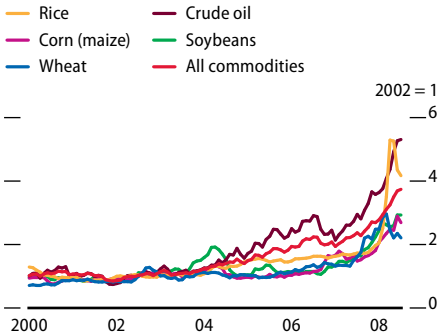
When compared with the long-run decline in most commodity prices visible in Figure 2.3.5, the runup in prices since 2000 appears to be a reversal of historical trends. The timing of the rise varies by commodity, so some commodity-specific stories will be needed to explain the

patterns. But there seem to be common elements to the rise as well. This section will attempt to assess the role both of the general drivers and of the commodity-specific dimensions of the commodity price boom.

The general patterns since 2000 are clear enough in Figure 2.3.6. From 2000 to 2004 all the tracked commodities moved more or less in tandem, and by relatively small amounts. Soybean prices spurted in 2004 after production problems in the US, but returned to normal levels in 2005. From then until early 2007 prices of wheat, corn, and soybeans remained flat, but rice prices had already started a steady rise from their historical low in 2001. Crude oil prices and metals—which together make up a large share of the International Monetary Fund (IMF) commodity price index—had also started a steady rise by 2004. Clearly, by the mid-2000s, commodity prices were beginning to show signs of life not seen for a decade. Something had changed.

The change is most apparent in crude oil and the metals-heavy IMF index. Food staples, except rice, remained stable until 2007. Such a pattern is best explained by the accelerating demands for industrial raw materials and energy as the economies of the People's Republic of China (PRC) and India consolidated their momentum of very rapid growth after the turn of the millennium. As the authors of FFIR point out, however, the PRC and India are not large factors in global grain markets, and their rapid economic growth did not spill over directly into higher prices for wheat, corn, and soybeans. The rising prices for rice need a special explanation, detailed below. By 2006, however, it was clear that rapid growth in the developing world, especially the PRC and India, could move global commodity markets. This realization set the stage for new expectations among commodity traders in particular and the broader investment community in general. By 2006, expectations of higher commodity prices were well established.

2.3.6 Short-run nominal commodity price movements since 2000



Notes: The commodity price index includes both fuel and nonfuel price indexes. The oil price index is the simple average of the spot prices of dated Brent, West Texas Intermediate, and Dubai. The bases for the price of corn (maize), rice, soybeans, and wheat, respectively, are as follows: US No. 2 yellow, free on board Gulf of Mexico; Thailand white milled 5% broken, free on board Bangkok; US No. 2 yellow, Chicago soybean futures contract (first contract forward); and No. 1 hard red winter, ordinary protein, free on board Gulf of Mexico.

Source: International Monetary Fund, *International Financial Statistics* online, downloaded on 29 August 2008.

Click here for figure data

Layers of causation

It is useful to think about the factors causing high food prices in terms of cumulative layers of causation (Timmer 2008a). Five basic drivers seem to be stimulating rapid growth in demand for food commodities:

- Rising living standards in the PRC, India, and other rapidly growing developing countries lead to increased demand for improved diets, especially greater consumption of vegetable oils and livestock products (and the feedstuffs to produce them). The PRC is a major importer of soybeans for both meal and oil and India is a significant importer of vegetable oils. However, wheat and rice consumption in the PRC and India are not rising significantly and both countries are largely self-sufficient in both commodities;
- The rapid depreciation of the dollar against the euro and some other important currencies drives up the price of commodities quoted in dollars for both supply and demand reasons (see below). The depreciation of the dollar also causes investors "long" in dollars (i.e., most US-based investors, but holders of dollars globally as well) to seek hedges against this loss of value, with commodities being one attractive option;
- Mandates for corn-based ethanol in the US (and biodiesel fuels from vegetable oils in Europe) cause ripple effects beyond the corn

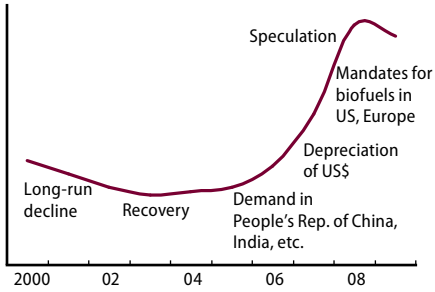
economy, which are stimulated by inter-commodity linkages (Naylor et al. 2007; Timmer, Falcon, and Pearson 1983). There is active debate about whether legislative mandates or high oil prices are driving investments in biofuel capacity (Abbot, Hurt, and Tyner 2008), but no doubt about the increasing quantities of corn and vegetable oil being used as biofuel feedstocks (Elliott 2008);

- Massive speculation from new financial players searching for better returns than in stocks or real estate has flooded into commodity markets. The economics and finance communities are unable to say with any confidence what the price impact of this speculation has been, but virtually all of it has been a bet on higher prices; and
- Underneath all these demand drivers is the high price of petroleum and other fossil fuels.

Figure 2.3.7 provides a graphical representation of how the first four factors listed above have contributed to the recent escalation in food prices. The figure also illustrates the tail end of the long-run declining trend in prices that prevailed over the last 200 years or so. A moderate recovery from the trough earlier in this decade was motivated by long-run demand and supply responses to the protracted period of falling prices (i.e., a huge expansion in demand and limited additions in supply in reaction to declining prices gradually bid prices back up again). Nevertheless, the sharp acceleration in food prices generally began in late 2006, but the appeal of food commodities to speculative investors seems to have begun only toward the middle of 2007 (Timmer 2008a).

Each of the four demand-driven causes is a little different for each basic commodity, but the "structural" forces—rapid demand growth in developing countries and depreciation of the dollar—are similar for all the commodities of interest here (again, with rising oil prices as a foundation). These factors have been in play for years and have been fairly predictable, driven as they are by macroeconomic fundamentals. The two "top" layers, however, have come on the scene much more recently and have the potential to change the price formation equation rapidly and unexpectedly. Table 2.3.1 summarizes this perspective for supply and demand drivers according to their "predictability," i.e., whether the drivers are low variance (and easy to predict) or high variance (and very difficult to predict).

2.3.7 Factors contributing to food price formation since 2000



Source: Based on Timmer (2008a).

The biofuel debate

Biofuels are enormously controversial, and this chapter is not the place to review the debate over their full economic and environmental impact—see Elliott (2008), Collins (2008), and Runge and Johnson (2008) for useful, if sobering, reviews. Very senior and experienced commodity analysts place the share of biofuels' contribution to the runup in grain prices since mid-2007 at between 60% (Collins, the former chief economist for the United States Department of Agriculture, analyzing only corn), and 75% (Mitchell [2008], the senior commodity economist at the World Bank, analyzing all grain markets). More academic analysts relying on large-scale models tend to place the share at between 25% and 35%—the latter figure from Rosegrant's (2008) use of the International Model for Policy Analysis of Agricultural Commodities and Trade

2.3.1 External drivers of food prices

	Supply	Demand
Low variance	Seed technology	Population growth
	Irrigation	Income growth
	Total harvested area	Dietary changes and tastes
	Climate change	Meat and livestock economy
	Knowledge and management skills	
High variance	Weather	Exchange rates
	Diseases	Speculation
	Crop-specific harvested area	Biofuels (but predictable from mandates; not predictable from oil prices)
	Fuel costs	Panic or hoarding
	Fertilizer costs	Government trade and inventory policies

Source: Author.

(IMPACT) developed by the International Food Policy Research Institute. FFIR agrees that biofuel demand for corn was a main driver of higher corn prices, but argues that most of this demand was driven by high oil prices, not Congressional mandates.

The problem is that none of the formal models fully capture the cross-commodity supply and demand linkages between corn—the primary grain used to make ethanol—and other commodities such as soybeans, wheat, and other feed grains. As a simple example, increased planting of corn led to reductions in soybean acreage in 2007 in the US. The reduced output of soybeans meant that soy oil production was also lower, which caused increased demand for palm oil in Asia, and a spike in prices. Although the PRC is not a significant importer of corn, it is a huge importer of soybeans to crush for both soymeal and soyoil. With reduced supplies of soybeans available—a ripple effect of the increased acreage devoted to corn—the PRC turned to Asian-produced palm oil to meet its growing demand for vegetable oils (Naylor et al. 2007). India, too, is a substantial importer of vegetable oils and of palm oil, in particular.

Corn is the quintessential "multi-end-use" commodity, and the economics of which end use is "driving" market prices depends on the supply and demand structure of all the alternative commodities, as well as on macroeconomic conditions and trade policies in importing and exporting countries. Modeling this is difficult. In the precise language of Chen, Rogoff, and Rossi (2008), the multiple end uses lead to "parameter instability" in the relationship between supply, demand, and price.

It is entirely possible that in one month demand for corn to make ethanol is driving up the price of corn, soybeans, and palm oil, whereas in another month price formation across these commodities can be completely delinked, depending simply on each commodity's own supply and demand situation (or on other forces). Thus not only would the parameters of a "multi-end-use commodity price model" vary from period to period, so too would the entire structure of the model. Perhaps it is not surprising that different analysts and different models produce very different estimates of what is causing high food prices. Parameter instability is the fundamental reason that careful analysts, such as Abbot, Hurt, and Tyner (2008), argue that it is impossible to place quantitative

weights on the causes of higher food prices, or at least weights that would have continuing validity over time and across commodities.

It is possible actually to "see" this parameter instability and changing structure if price data are available with sufficiently high frequency. As one example of such data, Figure 2.3.8 plots daily prices of palm oil for 31 December 1999 to 2 July 2008. The sudden take-off around mid-2006, when corn prices also started to take off, suggests a new set of drivers in the formation of palm oil prices.

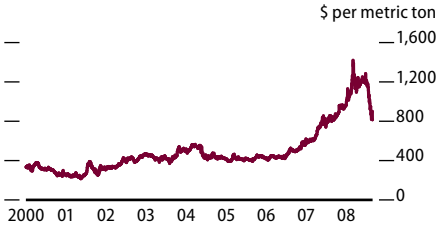
Not all the action has been on the demand side. Supplies of some food commodities have generally been marked by shocks from adverse weather conditions and crop disease. Wheat is a clear example. A shock on wheat supplies would usually trigger some price increase, but would be quickly addressed by stock drawdowns and increased production that would damp the upward price movements. However, the bad harvest in 2007 happened at a time of extremely low wheat stocks (Figure 2.3.9). As a result, the price response was exaggerated. In the same vein, the rebound in Australia's wheat harvest in 2008 brought about a marked drop in wheat prices after April (Figure 2.3.3 above).

Declining stock-to-use ratios for corn since the late 1990s are the main rationale offered by analysts who see corn-based ethanol demand as the main driver of higher prices for staple food grains (Figure 2.3.10). Because corn has multiple end uses that are economically efficient at normal prices, a shift in demand from one of the end uses (e.g., biofuels) can create ripple effects throughout many other commodity markets. Corn is a primary feedstuff for livestock, but competes in this end use with wheat. But wheat and rice are consumption substitutes in many parts of Asia. In another direction, corn oil competes with soyoil and palm oil. Rapid growth in vegetable oil demand in Asia can indirectly stimulate corn production in the US.

The competition and substitution can also take place on the supply side. Corn and soybeans compete directly for acreage in much of the US. Increased demand for corn for biofuel production can reduce soybean acreage, causing soymeal and soyoil prices to rise. Thus there are many mechanisms by which higher demand for corn to convert into ethanol might have an impact on a wide range of food commodity prices around the world. With stock-to-use levels for corn so low in the mid-2000s (Figure 2.3.10), it was these mechanisms that led analysts such as Mitchell (2008) and Collins (2008) to single out rising demand for ethanol in the US as the trigger for higher food prices across the board.

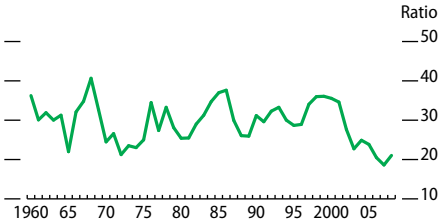
Whether the demand was from Congressional mandates or from high gasoline prices, establishing a direct link between energy prices and food prices is a "game changer" in global commodity markets. The outlook for continued high crude oil prices (see the chapter, *Are high oil prices here to stay?* also in Part 2) thus has direct implications for the outlook for staple food prices. Most knowledgeable analysts of the US biofuel industry feel that corn-based ethanol will be economically competitive if crude oil stays above $80 a barrel (in 2008 prices) and if corn is available to local refiners at less than $5–6 a bushel. As noted, because of its multiple end uses in consumption, and area competition with soybeans (and to a lesser extent, with wheat) in the US, high-priced corn (specifically) means high-priced food (generally), including even rice in the long run.

2.3.8 Palm oil price movements



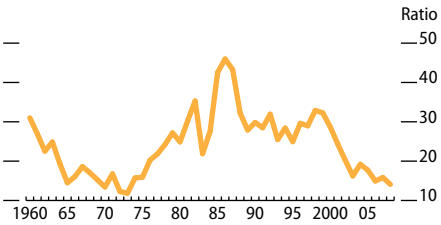
Note: Prices refer to Malaysian oil palm (Rotterdam).
Source: Datastream, downloaded on 28 August 2008.
Click here for figure data

2.3.9 World wheat stock-to-use ratio



Note: The stock-to-use ratio indicates the level of stocks held at the end of the period as a share of total use.
Source: Foreign Agricultural Service, United States Department of Agriculture, *Production, Supply and Distribution* online, available http://www.fas.usda.gov/psdonline/psdHome.aspx, downloaded 2 September 2008.
Click here for figure data

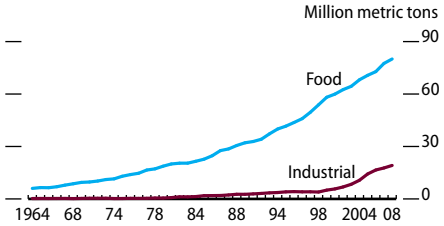
2.3.10 World corn stock-to-use ratio



Note: The stock-to-use ratio indicates the level of stocks held at the end of the period as a share of total use.
Source: Foreign Agricultural Service, United States Department of Agriculture, *Production, Supply and Distribution* online, available: http://www.fas.usda.gov/psdonline/psdHome.aspx, downloaded 2 September 2008.
Click here for figure data

The price trajectory for vegetable oils is similar to the basic path for staple food grains (see Figure 2.3.8 for palm oil prices since 2000). The connections are established from both their food uses and their industrial uses. Figure 2.3.11 shows food uses of vegetable oils on an exponentially increasing path, led especially by rapid growth in demand in the developing world. But industrial use, after growing very slowly for decades, has also started an exponential increase since 2000. This growth is almost entirely due to the use of vegetable oils to make biodiesel fuels. Rapeseed oil and palm oil are used for this purpose in Europe and some soyoil is used for biodiesel in the US (Figure 2.3.12). Again, once a price connection is established between vegetable oils and liquid fuels, the price dynamics for vegetable oils will be driven largely by the world market for petroleum. All the evidence suggests that these connections are well established at petroleum prices over $80 per barrel and thus are likely to be permanent features of vegetable oil price dynamics for the foreseeable future, whatever happens to legislative mandates (Elliott 2008; Abbot, Hurt, and Tyner 2008).

2.3.11 World vegetables oils: Food versus industrial uses



Note: Vegetable oil refers to soy, palm, and rapeseed oil.

Source: Foreign Agricultural Service, United States Department of Agriculture, *Production, Supply and Distribution* online, available: http://www.fas.usda.gov/psdonline/psdHome.aspx, downloaded 2 September 2008.

Click here for figure data

The rice difference

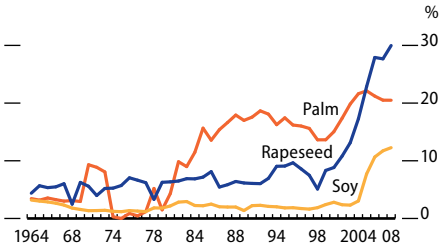
For rice, the story is more complicated. The actual production–consumption balance for rice has been relatively favorable since 2005, with rice stock-to-use ratios improving slightly. This stock buildup was a rational response to the very low stocks seen in the middle of the decade and to gradually rising rice prices. Short-run substitutions in both production and consumption between rice and other food commodities are limited, and until late 2007 it seemed that the rice market might "dodge the bullet" of price spikes seen in the wheat, corn, and vegetable oil markets. The lack of a deeply traded futures market for rice also made financial speculation less attractive.

But the world rice market is very thin, trading just 6–7% of global production. While this is a significant improvement over the 4–5% traded in the 1960s and 1970s, it still leaves the global market subject to large price moves from relatively small quantity moves.

The global rice market is also relatively concentrated, with Thailand, Viet Nam, India, US, and Pakistan (in order of their share of rice exports) routinely providing nearly four fifths of available supplies. Only in the US is rice not a political commodity from a consumer's perspective (although it certainly is a political commodity for producers there). All Asian countries show understandable concern over access of their citizens to daily rice supplies. Both importing and exporting countries watch the world market carefully for signals about changing scarcity, while simultaneously trying to keep their domestic rice economy stable.

As concerns grew in 2007 that world food supplies were limited and prices for wheat, corn, and vegetable oils were rising, several Asian countries reconsidered the wisdom of maintaining low domestic stocks of rice. The Philippines, in particular, tried to build up stocks to protect itself against shortages in the future. If every other country, household, or individual does the same thing, panic will grip the market. This will lead to commodity shortages and subsequent price surges. Such price panics have been fairly common over the past 50 years, but the hope was that deeper markets, more open trading regimes, and wealthier consumers

2.3.12 World vegetable oils: Industrial use as share of total



Notes: Vegetable oil refers to soy, palm, and rapeseed oil. Total use is the sum of industrial, food, and feedwaste uses.

Source: Foreign Agricultural Service, United States Department of Agriculture, *Production, Supply and Distribution* online, available: http://www.fas.usda.gov/psdonline/psdHome.aspx, downloaded 2 September 2008.

Click here for figure data

able to adjust more flexibly to price changes had made markets more stable. This was wishful thinking, as the price record for rice shows (Figures 2.3.1–2.3.3 above).

After the acceleration in the gradual price increases that had been seen for half a decade started in September 2007, concern over the impact of higher rice prices in exporting countries, especially India, Thailand, and Viet Nam, started to translate into talk, and then action, on export controls.[2] Importing countries, especially the Philippines, started to scramble for supplies. Fears of shortages spread and a cumulative price spiral started that fed on the fear itself.

The panic was set off by the complex interlinkages among certain commodities. In 2007, wheat harvests in India, as in other parts of the globe, were damaged by drought and disease. This left the Food Corporation of India with inadequate wheat supplies for its public distribution system. The Government could have imported as much wheat as it did in 2006 (about 7 million metric tons) to meet the shortfall, but while importing was an option, it would have been too costly (both economically and politically), as wheat prices were already elevated at the time. The Food Corporation of India instead decided to substitute rice for wheat and announced increased procurement of rice from domestic producers. Restrictions were imposed on rice exports in September 2007, and by February 2008, an outright ban on non-basmati rice exports was in place. (India is the world's third-largest rice exporter, supplying 4.1 million metric tons in 2007.)

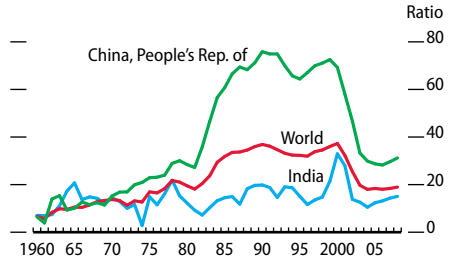
As rice prices picked up, other rice-exporting countries followed India's actions. Thailand's newly elected populist Government, for instance, openly discussed similar export restraints on rice to avoid a sharp increase in domestic retail prices. (Thailand is the world's top rice exporter, supplying 10.0 million tons in 2007.)

These actions by two large rice exporters caused rice prices to jump to $750 per metric ton on 28 March 2008. Prices continued to surge, breaching $1,100 per metric ton in April. All because of panic.

Dwindling global stocks have generally been recognized as the major trigger for the rise in prices, and indeed rice consumption has been significantly outstripping production since 2000 (Figure 2.3.13). Over the past decade, rice stocks in the PRC have been shrinking in response to declining world prices and to increased reliance on trade for a ready supply. However, in the rest of the world, there has been relatively little change in rice stocks—just small increases in the stock-to-use ratio since 2005. Since holding large stocks of rice in tropical conditions is extremely costly, a dependable flow of rice in international trade can sharply reduce outlays. With the recent experience of exporting countries readily putting bans on rice exports to protect their own consumers, importing countries will now be forced to accumulate significant domestic stockpiles. That is a tragedy for poor consumers and takes a toll on economic growth, since capital is used to fund large inventories rather than being allocated to investment that would foster productivity and growth.

The psychology of hoarding behavior is important in explaining why rice prices suddenly shot up from late 2007. Financial speculation seems to have played only a small role (partly because futures markets for rice are very thinly traded). Instead, decisions by millions of households,

2.3.13 Rice stock-to-use ratio



Note: The stock-to-use ratio indicates the level of stocks held at the end of the period as a share of total use.

Source: Foreign Agricultural Service, United States Department of Agriculture, *Production, Supply and Distribution* online, available http://www.fas.usda.gov/psdonline/psdHome.aspx, downloaded 2 September 2008.

Click here for figure data

farmers, traders, and some governments sparked a sudden surge in demand for rice and changed the gradual increase in rice prices from 2002 to 2007 into an explosion: this was "precautionary" demand even if not "speculative" demand.

A rough calculation of the effect of household hoarding of rice shows the potential. Assume that 1 billion households each consumes 1 kilogram of rice a day (for a total consumption of 365 million metric tons, for the year, which is the right order of magnitude).

Assume that they keep a 1-week supply in their pantry, or 7 kilograms per household, which is 7 million metric tons of household stocks in total. This quantity probably varies by income class, with the very poor buying hand to mouth, and better off households storing more just for convenience. When prices start to rise, or the media start talking about shortages of rice, each household, acting independently, decides to double its own storage, thus buying an additional 7 kilograms. This means that the world rice market—the source of marginal supplies (and demand) for many countries—needs to supply an additional 7 million metric tons of rice over a short period (perhaps a few weeks). But this quantity is about one quarter of total annual international trade in rice (recent levels have been 27–30 million metric tons per year).

And this is just the added demand from households. Farmers, traders, rice millers, and even governments will also want to hold more stocks in these circumstances. As an example, the Government of Malaysia announced in July that it was doubling the size of the national buffer stock held by Padiberas Nasional Berhad, even though it had to pay extremely high prices to do so. The Philippines is seeking to increase its government-held stocks. Indonesia has announced plans to triple its level of buffer stocks to 3 million metric tons.

Now, put realistic short-run supply and demand parameters into the price determination mechanism: -0.1 for demand and 0.05 for supply. With a 25% (sudden) increase in short-run demand on the world market, the world price will have to rise by 167% to get a new equilibrium. That is close to what happened—panicked hoarding caused the rice price spike.

Fortunately, a speculative run can be ended by "pricking the bubble" and deflating expectations. Once the price starts to drop, the psychology reverses on hoarding behavior by households, farmers, traders, and even governments. When the Government of Japan announced in May, after considerable international urging, that it would sell 300,000 tons of its surplus "World Trade Organization" rice stocks to the Philippines, prices in world rice markets started to fall immediately (Slayton and Timmer 2008; Mallaby 2008). By late August, medium-quality rice for export from Viet Nam was available for half what it sold for in late April.

Summing up the factors causing high food prices

Three fundamental factors, all interrelated, combined to drive up food prices. First, rapid economic growth, especially in the PRC and India, put pressure on a variety of natural resources such as oil, metals, timber, and fertilizers. Demand simply increased faster than supply for these commodities.

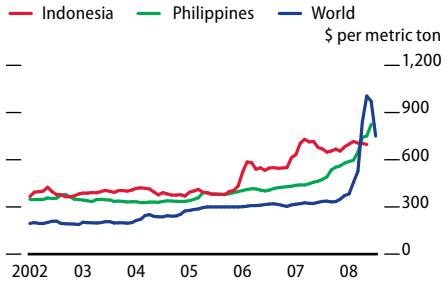
Second, a sustained decline in the dollar since mid-decade added to the upward price pressure on dollar-denominated commodity prices

directly, and indirectly fueled a search for speculative hedges against the declining dollar. Increasingly from 2006, these hedges were found first in petroleum, then in other widely traded commodities, including wheat, corn, and vegetable oils.

Third, the combination of high fuel prices and legislative mandates to increase production of biofuels established a price link between fuel prices and ethanol/biodiesel feed stocks—corn in the US and vegetable oils in Europe. Because of inter-commodity linkages in both supply and demand, food prices now have a floor established by their potential conversion into biofuel. These linkages are not always tight or effective in the short run—rice and corn prices can be disconnected for some time, as the discussion above indicated. But the long-run forces for substitution in both production and consumption are very powerful. If high fuel prices are here to stay, high food prices are, too.

To complicate matters, in the short to medium run the specifics of individual commodity dynamics can produce divergent price paths. Rice is the clearest example, as large Asian countries act for their own short-run political interests with little or no regard to consequences for the international market or traditional trading partners. Without significant hope for binding international agreements between rice exporters and importers, this source of unique instability seems likely to last a long time.

2.3.14 World vs domestic rice prices of importers



Note: World rice refers to Thailand 100% grade B; Indonesian rice refers to the retail price in Jakarta; and Philippine rice refers to ordinary (C4) rice.

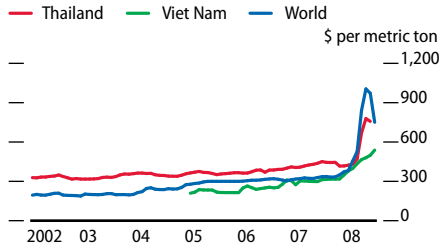
Sources: CEIC Data Company Ltd.; International Monetary Fund, *International Financial Statistics* online; both downloaded 22 August 2008.

Click here for figure data

Transmission of world commodity prices into domestic economies[3]

A key question is the extent to which changes in world market prices have been transmitted to domestic economies in recent years, especially for cereals. The extent of transmission is important for two reasons. First, domestic prices affect the *welfare* of poor consumers and farmers, not world prices. Second, the magnitude of price transmission will influence the extent to which *adjustments* by producers and consumers help stabilize world price movements. These adjustments (reduced consumption, increased production) will only take place if world prices are transmitted to domestic prices (see also Imai, Gaiha, and Thapa 2008). It is obvious from Figure 2.3.14 that world rice prices are not immediately transmitted into the Philippines and Indonesia, two important rice importers. Figure 2.3.15, however, shows that price transmission for exporters is quicker and more complete, despite Viet Nam's efforts to insulate domestic rice prices from the runup in world prices.

2.3.15 World vs domestic rice prices of exporters



Note: World rice refers to Thailand 100% grade B; Thailand rice refers to the retail price of white rice 5%; and Viet Nam rice refers to the retail price of ordinary rice in An Giang province.

Sources: CEIC Data Company Ltd.; International Monetary Fund, *International Financial Statistics* online; both downloaded 22 August 2008; Information Center for Agricultural and Rural development, Institute of Policy and Strategy for Agricultural and Rural Development, available: www.agro.gov.vn.

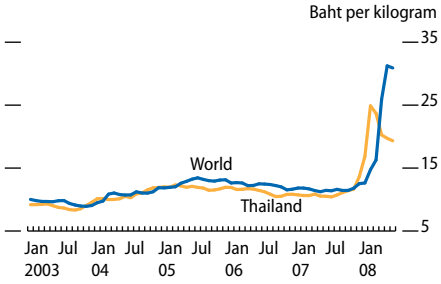
Click here for figure data

The extent of price transmission is a function of three key variables: the exchange rate at which dollar prices are converted to domestic currency prices; trade policy barriers at the border, which restrict (or enhance) the flow of commodities across the border; and the time horizon of adjustment. Normal marketing lags as well as policy interventions delay the immediate transmittal of international prices into domestic economies, but the longer there is a substantial difference between the two prices, the more pressure there is for convergence. Accordingly, Imai, Gaiha, and Thapa use an error-correction model (to allow for lags in price convergence) to test for price transmission of important foodstuffs into the PRC and India. They summarize their findings as follows:

> This paper examines the extent to which changes in global agricultural commodity price[s] are transmitted to domestic prices in India and PRC. The focus is on short and medium-run adjustment processes using an error correction specification. In particular, we show that the extent of adjustment in the short and medium-run (from 0 to 3 years) is generally larger in PRC than in India. Second, the adjustment is larger for wheat, maize and rice than for fruits and vegetables in both India and PRC. In fact, the adjustment is the weakest for vegetables in both countries. Third, while most of the domestic commodity prices co-move with global prices, the transmission is *incomplete* presumably because of distortionary government interventions (e.g. subsidies for agricultural commodities) and failure to exploit spatial arbitrage. So potential benefits to farmers of higher food prices – especially in India – may be restricted, as also the supply response (Imai, Gaiha and Thapa, 2008 p. 1).

Figure 2.3.16 shows that Thai wholesale prices for rice adjust very quickly to world prices. The core of the analysis carried out by Dawe (2008) is 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.

2.3.16 Real price movements of rice: World vs wholesale price in Thailand



Notes: World rice refers to Thailand 100% grade B; the wholesale price of rice for Thailand refers to white rice 5% new. Prices were deflated by the US consumer price index, with December 2007 prices as base.

Sources: CEIC Data Company Ltd; International Monetary Fund, *International Financial Statistics* online; both downloaded 28 August 2008.

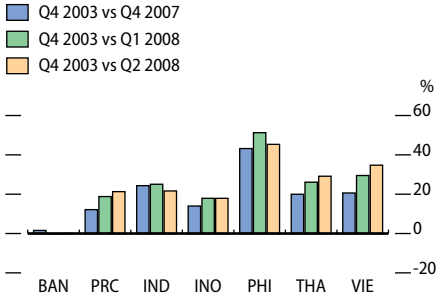
Click here for figure data

Exchange rates

Even before the dramatic surge in prices in 2008, world market prices had increased substantially in real dollar terms in recent years. Comparing Q4 2007 with Q4 2003, world market prices increased by 56% for rice, 91% for wheat, 40% for corn, and 107% for urea (a source of nitrogen and the main fertilizer used by Asian farmers). During that time, however, the dollar depreciated substantially against many currencies;[4] Figure 2.3.17 shows the percentage appreciation of the real exchange rate for the seven countries included in the analysis.

Real exchange rate appreciation vis-à-vis the dollar, to the extent that it occurs, will neutralize some of the impact of increased prices in dollar terms. Because the magnitude of real exchange rate 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 columns (1) and (2) of Table 2.3.2 shows that, for a substantial group of Asian countries, world market rice prices did not in effect increase by as much as was commonly believed (the figure in column 1). For some countries, however, such as Bangladesh, world price increases were substantial because the real exchange rate was approximately constant.[5]

2.3.17 Real exchange rate appreciation of domestic currencies vs US dollar



BAN = Bangladesh; PRC = China, People's Republic of; IND = India; INO = Indonesia; PHI = Philippines; THA = Thailand; VIE = Viet Nam.

Sources: CEIC Data Company Ltd.; International Monetary Fund, *International Financial Statistics* online; both downloaded 29 August 2008.

Click here for figure data

Transmission to domestic economies

The extent to which international prices of rice have been transmitted into domestic markets in developing Asia has been influenced by movements of exchange rates. This can readily be seen by comparing columns (1) and (2) in Table 2.3.2. The appreciation of Asian currencies against the US dollar (the currency in which international prices are set) means that, in domestic currency terms, the percentage increase is less than in US dollar terms.

2.3.2 Cumulative changes in real rice prices, Q4 2003 to Q4 2007 (%)

Country	World price ($) (1)	World price (DC) (2)	Domestic price (DC) (3)	DC pass-through (%) = (3)/(2) (4)
Bangladesh	56	55	24	44[a]
China, People's Rep. of	56	34	30	88[b]
India	56	25	5	20[a]
Indonesia	56	36	23	64
Philippines	56	10	3	30[a]
Thailand	56	30	30	100[b]
Viet Nam	56	25	3	12[a]

DC = domestic currency. [a] "Stabilizers." [b] "Free traders."
Sources: Dawe (2008); author's calculations.

Consumer prices of rice: Pass-through is incomplete

Column (3) shows that not all the change in the international price of rice measured in domestic currency was passed through to domestic markets. Dawe (2008) uses wholesale prices rather than retail prices to measure pass-through. This seems a valid procedure because rice at the wholesale level is milled and packaged and is quite close to that sold in the retail market.

There is quite a range of pass-through shown in column (4) of Table 2.3.2, and this indicates that some countries made a major effort to shield consumers from the spike in prices. The countries (indicated by "a" in column 4) with the low pass-through percentages are referred to by Dawe (2008) as "stabilizers" while those for which pass-through exceeds 75% are called "free traders." Thus Bangladesh, India, Philippines, and Viet Nam are classified as "stabilizers" and the PRC and Thailand as "free traders." Implicitly this classification excludes the exchange rate policies of the countries and only considers commodity-specific policies, such as procurement, public distribution and subsidies, and international trade restrictions.

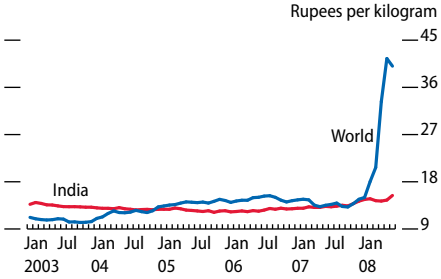
For "stabilizers," domestic prices should move with less volatility and variance than international prices. This turns out to be the case for Bangladesh, India, Philippines, and Viet Nam but not for Indonesia. Rice prices in India are representative of "stabilizer" behavior (Figure 2.3.18). Price signals from the international market are not getting through to consumers and farmers in these countries, but are being muted. This is likely to have costs in terms of supply responses and consumer behavior.

In contrast, the PRC's and Thailand's rice prices have moved closely with international prices and although there are some trade restrictions and government interventions, this means that consumers and producers are getting full price signals from the international market.

Indonesia has traditionally tried to stabilize domestic rice prices (Timmer 1986, 1996) but this policy was abandoned in 2004 when imports were curtailed and domestic prices rose well above global prices. Since then, Indonesian rice prices have tended to be more volatile than international prices and thus the country cannot be classified as a "stabilizer."

The conclusion that emerges from the above discussion is that the real increase in domestic rice prices has averaged only about one third of the increase in international prices in real dollar terms. This indicates

2.3.18 Real price movements of rice: World vs domestic retail price in India



Notes: World rice refers to Thailand 100% grade B; the domestic price for India is the average retail price of rice in four large cities: Bangalore, Calcutta, Delhi, and Mumbai. Prices were deflated by the US consumer price index, with December 2007 prices as base.

Sources: CEIC Data Company Ltd.; International Monetary Fund, *International Financial Statistics* online; both downloaded 28 August 2008.

Click here for figure data

that the pass-through of international to domestic rice prices was muted though the end of 2007. Have things changed in 2008?

Price movements in early 2008

World market rice prices rose from 2003 to end-2007, but this increase was relatively steady and gradual. Thus in October 2007, prices were $335 per ton for Thai 100% grade B, just 5% 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 $1,000 per ton in April and May (more than triple the level seen in the previous October). To what extent were these large price increases transmitted to domestic economies?

Table 2.3.3 shows that, again, less than half of these most recent price increases on world markets were transmitted to domestic economies, with the exception of Thailand and, barely, Viet Nam. The simple average pass-through of dollar prices to domestic prices, excluding Thailand and Viet Nam, was lower, at about 17%, than the average of 49% from Q4 2003 to Q4 2007. Given the much larger price increase on the world market, however, domestic prices increased substantially in several countries. In Bangladesh, Philippines, Thailand, and Viet Nam, real prices increased by nearly 50% or more in the span of 1 year, whereas prices did not increase more than 30% in any country in the 4 years between Q4 2003 and Q4 2007. Such large rises have serious repercussions for household food security, and often for domestic politics as well.

There have been substantial differences across countries during the past year with respect to the extent of price transmission, just as there were in 2003–2007. The obvious question is: Why did prices increase so much in some countries, but much less in others? There is no general answer: individual country analyses are required.

Summary of price transmission results

There are two important reasons for wanting to understand the extent of price transmission from world to domestic markets. First is to understand the impact on consumers, especially those who must buy most of or all their staple foods from the market. Second is to understand the impact on incentives facing farmers. If high world prices are passed through to domestic producers, a more vigorous production result will be forthcoming than otherwise.

Working against a supply response, however, are increases in input prices, especially for fertilizer, fuel, and seeds (prices of the last input 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 the gross value of production). The ratio of one sixth suggests that the negative effect on farmer incentives of a 60% increase in fertilizer prices will be offset by just a 10% increase in output prices.

If fuel and fertilizer are the only inputs whose prices have increased in real terms, even if they have doubled, it seems likely that incentives for farmers have improved on balance. Especially in rice-exporting countries where world prices have been transmitted to a substantial extent, even

2.3.3 Cumulative changes in real rice prices, "early" 2007 to "early" 2008 (%)

Country	World price ($) (1)	World price (DC) (2)	Domestic price (DC) (3)	DC pass-through (%) = (3)/(2) (4)
Bangladesh	203	171	54	32
China, People's Rep. of	144	115	5	4
India	203	178	15	8
Indonesia	203	174	-5	-3
Philippines	144	104	46	44
Thailand	203	169	131	78
Viet Nam	202	158	85	54

DC = domestic currency.

Notes: With regard to "early," all calculations compare a 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, Indonesia, and Thailand, that month is April. For Viet Nam it is May, and for the PRC and the Philippines it is June.

Source: Author's calculations.

after the depressing effect of higher fertilizer prices is taken into account, farmers will have substantially enhanced incentives to expand production. If wages and land rents have also increased, incentives from higher output prices could be muted (although land-owning farmers providing most of their own labor will see these higher factor prices as higher incomes). Unfortunately, up-to-date data on prices for labor and land are not easily available. Early evidence from Asian rice harvests through August 2008—especially in India, Indonesia, Thailand, and Viet Nam—suggests that farmers are responding quite enthusiastically to higher rice prices.

Still, the magnitude of the improved incentives is much less than the price increases reported on world markets due to less than perfect transmission of world prices to domestic markets, and to increases in input prices. Thus, the ultimate supply response is still subject to a great deal of uncertainty in both the short run and the long run.

Country results: Contrasting experiences of rice importers and exporters

Policies are complex and differ from one country to another. The recent experiences of two exporters—Thailand and Viet Nam—and two importers—Indonesia and the Philippines—are discussed in this section to show the dramatic impact of diverse policy approaches.

In the broadest terms, there were three alternative policy approaches pursued by these four countries. Despite much internal political discussion after the new Government was elected in early 2008, Thailand kept its border open and did not restrict rice exports. It did not release any of the 2.1 million metric tons of government-owned rice stocks that had accumulated since a farm-price support program began in 2005 (despite strong internal and external pressures), but it did not prevent private traders from selling into the world market.

At the other extreme, Indonesia stayed resolutely out of the world rice market. It had maintained very high rice prices since 2004, with sharp

price runups late in 2005 and again in 2006 (Figure 2.3.19). These high prices were tolerated in the name of "food security," and the implied political support from rice farmers.

The Philippines and Viet Nam seem to be tied at the waist by their mutual export-import relationship. Both countries sought to stabilize their domestic rice prices, and they engaged in very extensive rice trade with each other, on government account. Figure 2.3.14 above has already shown that rice prices increased rapidly in the Philippines, and Table 2.3.3 above has shown that domestic rice prices increased by 44% between early 2007 and early 2008.

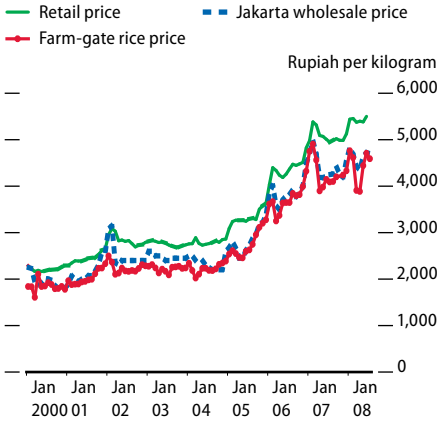
Similarly, despite a ban on rice exports initiated early in 2008 and not lifted until July, Vietnamese rice prices shot up by 85% over the same period (Table 2.3.3 and Figure 2.3.15 above). What can explain such bizarrely unstable prices in the face of such active, and expensive, efforts to stabilize them? The only credible explanation is that price expectations changed on the part of key participants in the rice economy of both countries, partly because the two countries were so actively, and publicly, engaged with each other in the rice trade.[6] These changed expectations then led to precautionary hoarding on the part of farmers, traders, and consumers. (A "run" on retail rice supplies in Ho Chi Minh City supermarkets in May showed how powerful this hoarding mentality could be.)

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 account 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. Large import contracts were being negotiated, so domestic supplies were adequate in quantity terms. Viet Nam typically exports about 20% of domestic production and the export bans it put in place should have ensured ample local supplies.

Supplies were adequate in both countries and neither allows the private sector to arbitrage prices between domestic and international markets.[7] Thus the most likely explanation for the surge in domestic prices was speculation and panic on the part of domestic farmers, traders, and consumers in those two countries, who were well informed about the trades on the international market between the Philippines and Viet Nam in early 2008. Of course, once retail prices started to rise, this behavior became self-reinforcing.

The contrast with Indonesia and Thailand is striking. In the end, after much political debate—even talk of establishing an OPEC-like rice exporters' cartel—Thailand allowed exports to continue and domestic prices to follow world prices. For several months Thailand was the only country with significant exportable supplies, and it picked up customers from India and Viet Nam. Although domestic rice prices shot up—by 131% from early 2007 to early 2008—the overall impact on the rate of inflation in Thailand was modest, as food and beverages make up only 36.1% of the overall consumer price index (Figure 2.3.20), and rice is a relatively small part of that. As Figure 2.3.21a shows, food price inflation surged to more than 10% early in 2008, but nonfood inflation also rose sharply. Inflation was more of a macroeconomic phenomenon than a food phenomenon in Thailand.

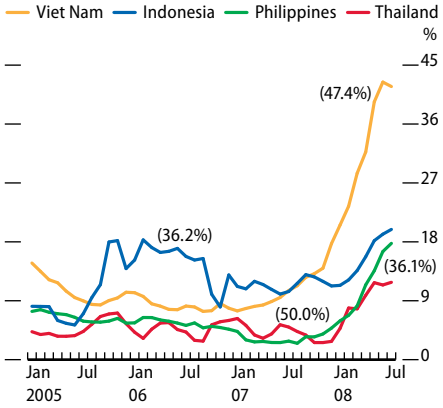
2.3.19 Rice prices in Indonesia



Notes: Farm-gate rice prices are quoted in terms of wet paddy. After drying and milling, 100 kilograms of wet paddy produce roughly 55 kilograms of rice. Rp 2,500 per kilogram of wet paddy is therefore equivalent to Rp 4,545 per kilogram of rice.

Sources: Retail price from Ministry of Trade of the Republic of Indonesia; wholesale price from PT Food Station; farm-gate price from Badan Pusat Statistik, Republic of Indonesia (adapted from P. Rosner 2008).

2.3.20 Food price inflation, selected countries



Note: Figures in parentheses indicate weights for food in overall inflation.

Sources: CEIC Data Company Ltd.; International Monetary Fund, *International Financial Statistics* online; both downloaded 28 August 2008; various national statistical offices.

Click here for figure data

Partly because rice prices were already so high in Indonesia, none of the runup in world prices was passed into domestic prices (indeed, Indonesian rice prices actually fell slightly between early 2007 and early 2008 in the wake of an excellent harvest, stimulated by high producer prices and very good rains from La Niña weather pattern—see Table 2.3.3 and Figure 2.3.19 above). Much of the food price inflation seen in Figure 2.3.21b was due to rising palm oil prices (despite efforts to stablize domestic palm oil prices through higher export taxes) and the cost of *tahu* and *tempe*, both derived mostly from imported soybeans, and a staple of Indonesian diets. However, food price inflation in early 2008 in Indonesia was roughly double the rate of that in Thailand, despite the radically different pass-through of rice prices from the world market to domestic consumers.

The parallels between Viet Nam and the Philippines can be seen in Figures 2.3.21c and 2.3.21d. In contrast to Thailand, both countries showed more than threefold increases in the rate of food price inflation (although from a much lower base in the Philippines than in Viet Nam). Efforts at food price stabilization in both countries clearly failed. By contrast, Indonesia managed to stabilize rice prices—at extremely high levels—but failed to contain food price inflation in other important commodities. Thailand, with the most open border and the biggest runup in rice prices, did best in overall food price stability. What a paradox, and also what a guideline to current and future trade policy makers!

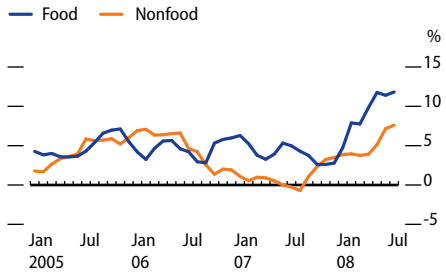
Can anything be done about high food prices?

The main explanatory factors behind the *gradual* runup in food prices from the early 2000s to mid-2007 were spillover from the broad resource demands generated by rapid demand growth, the declining dollar, and the lagged effect of earlier declines in real food prices and their (endogenous) impact on stock-to-use ratios. But these factors do not explain the *sharp* runup in many staple food prices from mid-2007 to mid-2008. The explanation for this varies by commodity and period, but in addition to the broad factors affecting all commodity markets just noted—especially high oil prices and the declining dollar—new end uses for food grains and vegetable oils as biofuels, bad weather and diseases, and political decisions by food exporters to insulate their consumers from world prices led to the sharp increases in food prices. Panicked hoarding on the part of countries and individuals clearly played a role in the spike in rice prices, and financial speculation may have contributed to spikes in other commodities, especially oil, wheat, corn, and vegetable oils.

The longer-term issue is whether supply responses can meet the outlook for the rapid growth in demand. In the past, when food prices spiked and talk of an impending Malthusian crisis arose, output responded to bring world food prices to their long-run downward trend, though with a lag (Figure 2.3.2 above). This time, however, expectations are that such a benign output response may not be forthcoming, for the following reasons:

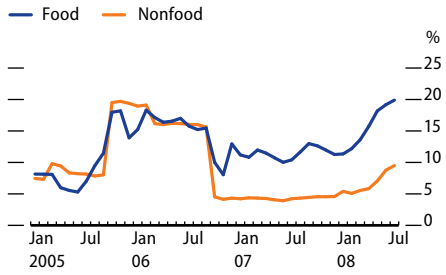
- little high-quality agricultural land is now available for farming;
- yields of existing agricultural technologies have essentially been unchanged for decades because of the paucity of investment in

2.3.21a Food vs nonfood price inflation, Thailand



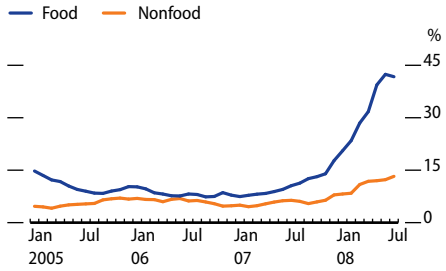
Click here for figure data

2.3.21b Food vs nonfood price inflation, Indonesia



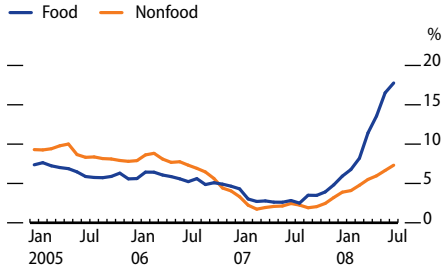
Click here for figure data

2.3.21c Food vs nonfood price inflation, Viet Nam



Click here for figure data

2.3.21d Food vs nonfood price inflation, Philippines



Sources: CEIC Data Company Ltd.; International Monetary Fund, *International Financial Statistics* online; both downloaded 28 August 2008.

Click here for figure data

research during this time. Thus raising yields from actual farmer practices to the present technology potential is the only source of increased output until new agricultural technologies are developed. New technologies, however, are at least a decade away. Moreover, the yield gap to full potential has largely been closed except for Africa; and

- the costs of essential inputs—fuel, fertilizer, and water—to obtain greater yields are both high and growing rapidly. In addition, prolonged periods of high grain prices could raise land rents and rural labor costs.

In view of these difficulties, it seems unlikely that basic food prices will return to their real long-run downward trend, seen so clearly in Figure 2.3.2 above. Instead, a return to the real average prices seen in 2007 would be considered a major accomplishment from the perspective of late August 2008. That is, when the panic subsides and the financial speculators move on to "greener pastures," the new equilibrium price for rice, for example, is likely to be in the $500–600 range, not in the $300–400 range (in 2007 prices). Other basic food commodities are likely to exhibit similar patterns.

Should policy makers try to do anything about this new equilibrium? Clearly, it was appropriate to do everything possible to prick the speculative price bubbles, especially for rice, since reversing the dynamics of rising price expectations, and the private hoarding that exacerbated them, brought dramatic price relief in just a few months. It is unfortunate that the world does not have any internationally-mandated mechanism for stabilizing grain prices, or for keeping large countries from destabilizing them. But that is the world we live in. Domestic policies will trump international cooperation whenever politicians see a short-run advantage in closing borders or subsidizing trade. The world was lucky that Japan had 1.5 million metric tons of unwanted rice imports in storage and received a World Trade Organization waiver from the US to reexport some of it to the Philippines. The deal marked the turning point in world rice prices (even though the rice has yet to be shipped, as of early September—thus emphasizing again the importance of expectations in short-run price formation).

Equally, it was also appropriate for the international community to rally resources on behalf of increased food aid to the most affected populations. Safety nets for poor consumers are essential in a world of highly unstable food prices. But no one should be fooled into thinking that such safety nets are a solution to poverty, or even high food prices, in more than a transitory way. The only sustainable solution for these households is inclusive, or pro-poor, economic growth that provides reliable real incomes and stable access to food from home production or in local markets.

The appropriate policy response to high food prices, then, is to find ways to stimulate such growth. Much of the action is likely to be in the agriculture sector, especially in investments to raise productivity of basic food crops. High food prices now provide plenty of incentives to make those investments, but many of those investments—especially in research and extension—would have paid off at the prices of a decade ago if donors and governments had recognized the full social value of

rising agricultural productivity (Timmer 1995, 2008b). These are political decisions that are driven only indirectly by market realities. Perhaps it is good news that the market is sending very clear signals on what to do.

Endnotes

1 Interestingly, as of end-August, the rice had not actually been shipped from Japan to the Philippines, although the Japanese Ministry of Agriculture insists that it will be when all the details are agreed to by the Philippines. Obviously, what was important to the market in May was the signal that additional supplies would become available, at which point market psychology reversed.

2 It is almost amusing that Indonesia announced a ban on rice exports early in 2008, before its main rice harvest started in March. Historically, Indonesia has been the world's largest rice importer, surpassed only recently by the Philippines, and no one in the world rice trade was looking to Indonesia for export supplies. But there was a rationale to the announcement by the Minister of Trade—it signaled that Indonesia would not be needing imports and was thus not vulnerable to the skyrocketing prices in world markets. The calming effect on domestic rice market participants meant that little of the hoarding behavior seen in Viet Nam and the Philippines was evident in Indonesia.

3 This section relies heavily on Dawe (2008).

4 In fact, this depreciation is one cause of the recent high commodity prices.

5 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 is 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 with the size of their foreign exchange markets and compared with total exports and imports (this is true even at current high price levels). Thus, exchange rate changes in these countries are taken as exogenous for the purposes of discussing commodity price transmission.

6 The President's Office in the Philippines routinely made public statements on the extent of necessary imports and the need to obtain them from Viet Nam.

7 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.

References

Abbott, Philip C., Christopher Hurt, and Wallace E. Tyner. 2008. "What's Driving Food Prices?" Farm Foundation Issue Report (FFIR), Oak Brook, IL. Available: http://www.farmfoundation.org/news/articlefiles/404-FINAL WDFP REPORT 7-28-08.pdf.

Asian Development Bank (ADB). 2008. "Special Report: Food Prices and Inflation in Developing Asia: Is Poverty Reduction Coming to an End?" Economics and Research Department, Asian Development Bank, Manila, Philippines. Available: http://www.adb.org/Documents/reports/food-prices-inflation/food-prices-inflation.pdf.

Brennan, Michael J. 1958. "The Supply of Storage." *American Economic Review*. Vol. 48, No. 1, pp. 50-72. Available: http://www.econ.kuleuven.be/public/NDBAE55/Brennan%201958.pdf.

Chen, Yu-Chin, Kenneth Rogoff, and Barbara Rossi. 2008. "Can Exchange Rates Forecast Commodity Prices?" NBER Working Paper 13901, National Bureau of Economic Research, Cambridge, MA. March. Available: http://www.nber.org/papers/w13901.pdf.

Collins, Keith J. 2008. "The Role of Biofuels and Other Factors in Increasing Farm and Food Prices: A Review of Recent Developments with a Focus on Feed Grain Markets and Market Prospects." Supporting material for a review conducted by Kraft Foods Global, Inc., pp. 1-32, 19 June.

Dawe, David. 2008. "Have Recent Increases in International Cereal Prices been Transmitted to Domestic Economies? The Experience in Seven Large Asian Countries." Paper presented at the Asian Agricultural Economics Association 6th Annual Meetings in Manila, Philippines, 28 August. Food and Agriculture Organization of the United Nations, Rome. Available: ftp://ftp.fao.org/docrep/fao/010/ai506e/ai506e00.pdf.

Elliott, Kimberly Ann. 2008. "Biofuels and the Food Price Crisis: A Survey of the Issues." Working Paper No. 151, Center for Global Development, Washington, DC. August. Available: http://www.cgdev.org/files/16499_file_Elliott_Biofuels_Food_Crisis.pdf.

Frankel, Jeffrey. 2006. "The Effect of Monetary Policy on Real Commodity Prices." NBER Working Paper No. 12713. National Bureau of Economic Research, Cambridge, MA. December. Available: http://www.nber.org/papers/w12713.

Imai, Katsushi, Raghav Gaiha, and Ganesh Thapa. 2008. "Transmission of World Commodity Prices to Domestic Commodity Prices in India and China." BWPI Working Paper 45, Brooks World Poverty Institute, School of Social Sciences (Economics), University of Manchester, United Kingdom. June. Available: http://www.bwpi.manchester.ac.uk/resources/Working-Papers/45-imai-et-al-international-price-transmission.pdf.

Mallaby, Sebastian. 2008. "Rice and Baloney: Irrational Policies the World Over are Making the Food Crisis Worse." *The Washington Post*, p. A-17, 18 May. Available: http://www.washingtonpost.com/wp-dyn/content/article/2008/05/18/AR2008051801917.html.

Mitchell, Donald. 2008. "A Note on Rising Food Prices." Policy Research Working Paper WPS 4682, World Bank, Washington, DC. Available: http://www-wds.worldbank.org/external/default/WDSContentServer/IW3P/IB/2008/07/28/000020439_20080728103002/Rendered/PDF/WP4682.pdf.

Naylor, Rosamond L., Adam Liska, Marshall B. Burke, Walter P. Falcon, Joanne C. Gaskell, Scott D. Rozelle, and Kenneth G. Cassman. 2007. "The Ripple Effect: Biofuels, Food Security and the Environment." Environment, Vol. 49, No. 9, pp. 30-43. November. Available: http://www.environmentmagazine.org/Editorials/Naylor-Nov07-full.html.

Naylor, Rosamond, and Walter P. Falcon. 2008. "Our Daily Bread." *The Boston Review*, pp. 13-18. September/October.

Nerlove, Marc. 1958. *The Dynamics of Supply: Estimation of Farmers' Response to Price*. Baltimore, MD: Johns Hopkins University Press.

Organisation for Economic Co-operation and Development (OECD). 2008. "The Relative Impact on World Commodity Prices of Temporal and Longer Term Structural Changes in Agricultural Markets: A Note on the Role of Investment Capital in the US Agricultural Futures Markets and the Possible Effect on Cash Prices." TAD/CA/APM/CFS/MD(2008)6. Trade and Agriculture Directorate, Committee for Agriculture. Paris, France. March.

Rosegrant. Mark W. 2008. "Biofuels and Grain Prices: Impacts and Policy Responses," International Food Policy Research Institute, Washington, DC. Available: http://www.ifpri.org/pubs/testimony/rosegrant20080507.pdf.

Rosner, L. Peter. 2008. "Rice Market Update." World Bank, Jakarta, Indonesia. August.

Runge, C. Ford, and Robbin Johnson. 2008. "The Browning of Biofuels: Environment and Food Security at Risk." Woodrow Wilson Center for Scholars, Washington, DC, p. 23. May.

Slayton, Tom, and C. Peter Timmer. 2008. "Japan, China and Thailand Can Solve the Rice Crisis—But U.S. Leadership is Needed." CGD Notes, Center for Global Development, Washington, DC., pp. 1-6. May. Available: http://www.cgdev.org/files/16028_file_Solve_the_Rice_Crisis_UPDATED.pdf.

Timmer, C. Peter. 1986. *Getting Prices Right: The Scope and Limits of Agricultural Price Policy*. Ithaca: Cornell University Press.

———. 1995. "Getting Agriculture Moving: Do Markets Provide the Right Signals?" *Food Policy*, Vol. 20, No. 5, pp. 455-72. October.

———. 1996. "Does BULOG Stabilize Rice Prices in Indonesia? Should It Try?" *Bulletin of Indonesian Economic Studies*, 32, pp. 45–74.

———. 2008a. "The Threat of Global Food Shortages—Part 1: Hoarding by Countries and Speculative Bidding on Food Exacerbate Scarcity and Cause Prices to Climb." YaleGlobal Online, 5 May. Available: http://yaleglobal.yale.edu/article.print?id=10749.

———. 2008b. "A World Without Agriculture: The Structural Transformation in Historical Perspective." Henry Wendt Memorial Lecture, American Enterprise Institute, Washington, DC.

Timmer, C. Peter, Walter P. Falcon, and Scott R. Pearson. 1983. *Food Policy Analysis*. Baltimore, MD: Johns Hopkins University Press for the World Bank.

von Braun, Joachim. 2008. "Rising Food Prices: What Should be Done?" IFPRI Policy Brief, International Food Policy Research Institute, Washington, DC. Available: http://www.ifpri.org/pubs/bp001.asp.

Williams, Jeffrey C., and Brian D. Wright. 1991. *Storage and Commodity Markets*. Cambridge, United Kingdom: Cambridge University Press.