

Speculators, Storage and the Price of Rice

Brian Wright

Recent experience in the world rice market does not reveal irrational speculation, greedy manipulation, or disruption due to soaring Asian incomes or recent biofuels mandates. The real lesson is that, without serious steps to ensure collaboration in maintaining market access when supplies are tight, the market could collapse into autarky if stocks appear to be low and aggregate harvests fail to increase as expected.

The past two years have seen steep increases in the prices of major food and feed grains, followed very recently by substantial declines. After several decades of relatively stable, generally down-trending prices for staple foods on the world market, recent market behavior has come as a shock to consumers and governments. Was the prediction of Parson Malthus not wrong but merely premature? Is recent experience due to an aberration—an irrational bubble in prices unconnected to market fundamentals? Or are we witnessing the beginning of a new, less stable price regime? Is global warming changing production prospects? Are biofuels causing supply problems?

Let's first consider the evidence about aggregate food price behavior over the past few years. In 2005 the UN Food and Agriculture Organization (FAO) food price index was less than 20 percent higher than the 1998–2000 average but with no clear trend. In 2006 prices started higher and, by October, were on a sharp uptrend that continued until March 2008, when the price was more than three times the 2005

level. At that time, many started talking of a new food price regime. However, by late summer 2008 prices had started on a steep downward path.

How should we interpret this roller-coaster behavior of food prices? By April 2008 the rise in food prices had caught the attention of the worldwide press, which lined up a confusing array of suspects. To keep things manageable, I focus on the rice market because some major economic relations in this market are more clear-cut.

The Lineup of Suspects

In the global rice market, one widely discussed suspect was the Australian drought, which reduced the supply of irrigation water so dramatically that major rice producing areas (including the region where my family used to grow rice) were shut down altogether. Whether the drought reflects long-term global warming is unclear. But Australian production is only a few percent of the world export market, which in turn is about 5 percent of world consumption. The Australian drought aggravated the situation, but for prime causes we must look elsewhere.

A second widely cited factor is rapid increases in demand in China and India due to unprecedented income growth in both countries. Gross domestic product (GDP) has risen very quickly in China in the past few years, but what is really amazing is that the rapid increase is the continuation of a trend that has been sustained for a decade. The rate of growth since the food prices took off in late 2005 can hardly have been the kind of surprise that could explain the sudden price acceleration. India's GDP growth, too, has been sustained too long to be called a recent shock that can explain the reversal of the price trend

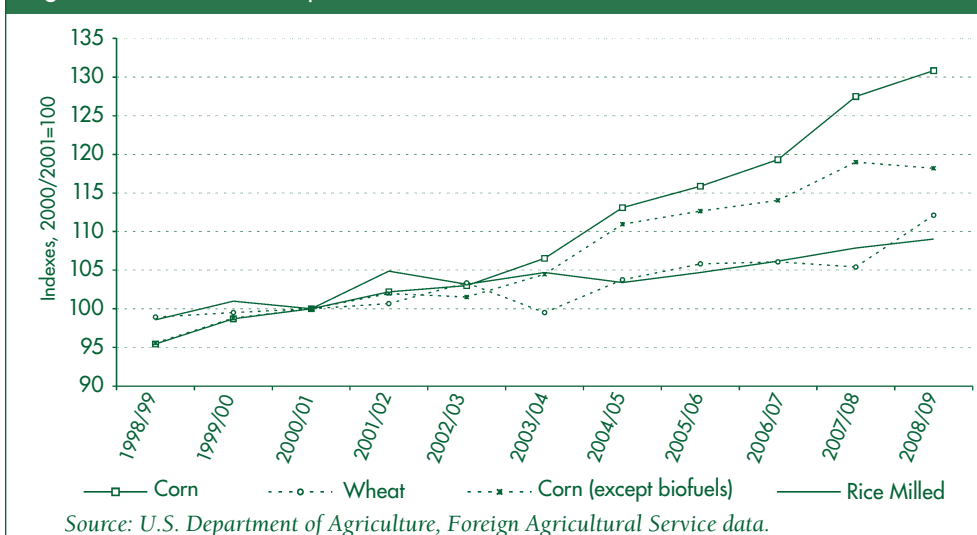
in rice. Moreover, perhaps even more noteworthy is the high and increasing saving rate in both countries, reportedly reaching about 40 percent in China this year. It seems that consumption expenditures have risen more slowly than income. Any direct effect on human rice consumption is surely modest. As incomes increase beyond some threshold, rice consumption per capita tends to stabilize and then fall. For populations that consume rice as a staple, consumption increases generally reflect population increases more than rising personal income, and the rate of population growth in China and India is generally slowing down, not speeding up.

Competition from Feed and Biofuels Markets

Income increases in China and India could affect rice prices indirectly by increasing the demand for animal products and, in turn, diverting some food grains from use as human food to use as animal feed. In China in particular, meat consumption is increasing quickly as incomes rise. The official data show a much smaller effect in India, where many consumers are vegetarians or follow religious restrictions on consumption of animal products.

Another currently popular suspect blamed for recent price increases is the conversion of grains and oilseeds into biofuel in Europe and the United States. In the United States in particular, the diversion of corn and soybeans to biofuel is now substantial (approaching 30 percent for corn and 20 percent for soybeans) and will continue to increase to fulfill federal mandates. By comparison, a drought or pest infestation that reduced output by 20 percent would be viewed as a major market disruption. For example, the southern corn leaf

Figure 1. Global Consumption of Grains



blight infestation of 1971, which cut U.S. corn supply by around 15 percent, was viewed at the time as a serious shock and prompted new concern about the security of the U.S. food supply. Diversion of an equivalent amount of grain for biofuel is even more of a threat to food security since it is a quasi-permanent development rather than a transitory event like a weather-related infestation. On the other hand, the crop diversion can hardly have come as a surprise in 2006. The increasing trend of usage started no later than 2004 and, being the result of government mandates for ethanol use, was clearly foreseeable before prices

took off. Similarly, increased demand for oilseeds for biofuel use in Europe and the United States was no surprise.

Although aggregate supply of grains, including carryover stocks available for human consumption has no doubt been reduced by recent diversion to animal feed and biofuels, the direct effects on consumption of rice are unlikely to have been great. When corn and other feed grain supplies are scarce, diversion of one major food grain, wheat, to feed use occurs. But rice, the other major food grain in most of the world, has no significant feed use. Increasing meat demand does not substantially increase

demand for rice as feed for animals. Furthermore, neither wheat nor rice has any significant use as a biofuel feedstock.

In addition to causing diversion of wheat and other food grains to animal feed uses and, consequently, of rice to food, income increases and biofuel demands might have affected rice production indirectly by diverting inputs to feed grain production. Some rice land might have been diverted to production of corn or soybeans, but this is unlikely to have had a strong impact on overall rice production; the best rice land tends to be ill-suited to corn or soy production in the temperate zones where much of the world's corn and soybeans are grown. However, on Asian croplands where two or three crops are grown in succession each year, wheat can be substituted for rice as a dry-season irrigated crop when its relative price increases. In the last few years, larger effects on rice supply might have come through competition for fertilizer and other scarce inputs; indeed the price of some fertilizers rose faster than any agricultural commodity in the last few years.

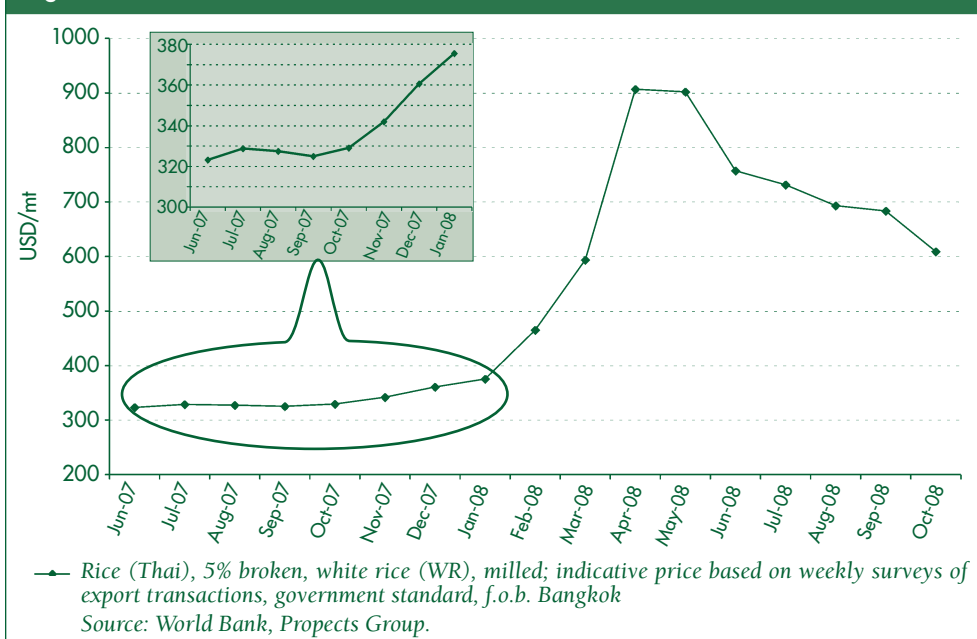
Reality Check

There is one large problem with supply-side arguments linking diversion of land and other inputs induced by surges in feed and biofuel demand to recent high rice prices. In the aggregate, recent reports indicate that global rice production has increased about 2 percent in 2008.

Is It a Bubble?

The reality that overall rice availability increased this year has prompted a quite different rationalization of the crisis in the rice market: there was an "irrational" bubble attributable to "greedy" speculators that burst in the summer. In 2007, one story goes, prices got out of line in the rice market and supplies were withheld in anticipation of greater profits later. A new enthusiasm for investment in commodity futures by

Figure 2. Thai Rice Prices



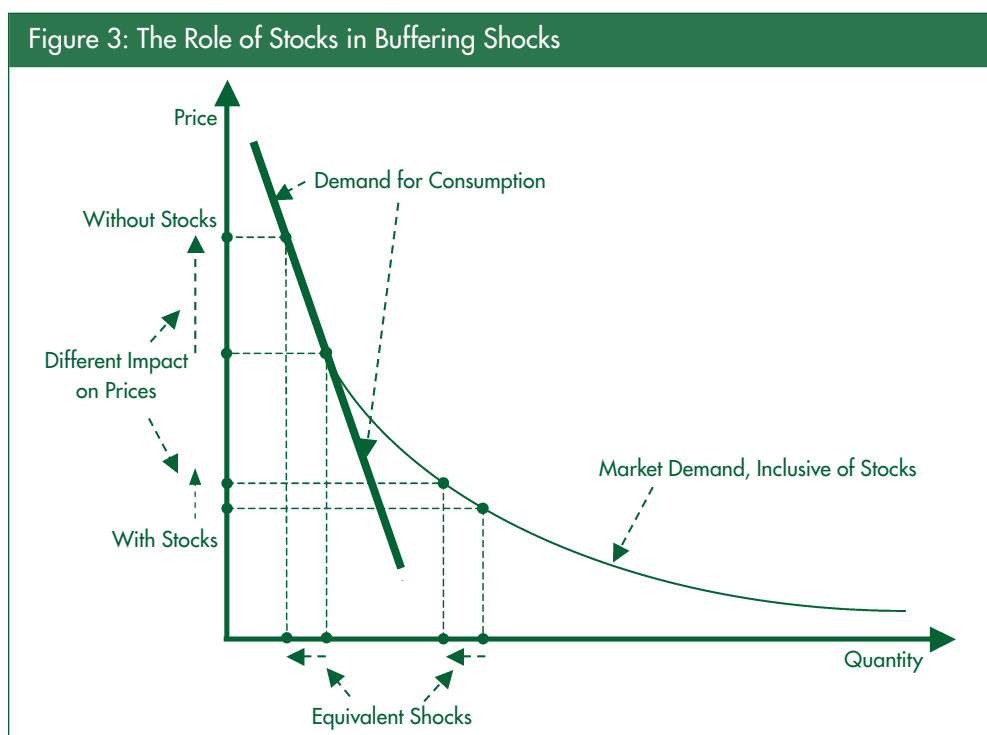
hedge funds was purported to be fanning the speculative flames. The very recent sharp reversal of the rice price trend is viewed as confirmation of this interpretation: the “bubble” proved unsustainable, as bubbles always are.

One problem with application of this notion to rice is that futures markets are less prevalent, and less important, for rice than for other major crops. Rice is a highly differentiated crop and most types are not traded on futures markets. Another problem is that any effect via futures trading must be manifest in increased stocks; how, otherwise, can consumption and prices be influenced? No serious claim of increased speculative rice stocks has been advanced recently. Similarly, a related argument that commodity price increases are caused by falls in interest rates must rest on an effect on speculative stocks that has not been empirically verified. This is not to rule out these causal links entirely; world stocks are notoriously difficult to determine, and this is particularly true of rice.

In any case, attribution of recent price rises to shortfalls in available supply, whether attributable to substitution in production, diversion to feed, or hoarding by speculators, must confront the reality that, of all the major grains, rice consumption appears to have been the steadiest—rising slowly with minor fluctuations (Figure 1). Assuming the data are reliable, modest shortfalls occurred in 2002 and 2004 but there is none to explain a price run-up after 2005.

Panic in a Fragile Market

In reality, the root cause of the problems in the rice market was not an irrational bubble. A key decision in generating the crisis in prices was made one year ago when India announced on October 9, 2007, a ban on rice exports other than basmati. This, it appears, reflected the wish of the unpopular government to reduce inflation in anticipation of the next national election. Immediately the rice price (outside of



India) began to rise along an upward trend that accelerated into last summer (Figure 2). Production problems in some countries encouraged other rice exporters to follow India’s lead and ban exports. It also became clear that China, apparently adequately supplied, would not act as supplier of last resort.

Countries that relied on imports for an important share of their food became increasingly anxious to secure foreign supplies adequate for their needs so they could satisfy politically powerful urban consumers concerned about food security. By April 2008, as reports of production problems in some countries surfaced, developing countries that export rice were also being pressured by their own urban consumers to act to reduce rice prices. These pressures dominated the interests of producers and traders. One by one, they chose to impose their own export bans, including, in March 2008, Vietnam, an important supplier. Thailand was still in the market as the major supplier, but the Thais were reportedly discussing formation of a “rice OPEC.” The crisis was resolved only when it became clear, in the late Northern summer, that the current harvest was

good and that, overall, 2008 rice production would be close to its trendline.

Why Volatility Soars When Stocks Are Low

The whole episode can be understood only when we realize that, when available stocks are low or of uncertain dependability, the price of rice is extraordinarily sensitive to fluctuations in excess supply. The market demand for rice is the aggregate of two demands. One is the demand for consumption in the current period, t ; the other is the demand for rice to store for later consumption. This storage demand will be positive (in excess of minimal working stock levels) only if the rice price, $P(t)$, is expected to rise at a rate that will cover the cost of storage and the interest charge at rate r on the value of the stocks placed in storage.

$$P(t) + \text{cost of storage} = E[P(t+1)]/(1+r), \text{ if stocks} > 0;$$

$$P(t) + \text{cost of storage} \geq E[P(t+1)]/(1+r), \text{ if stocks} = 0.$$

This demand for stocks is added horizontally to consumption demand to form total market demand, as shown in Figure 3. When the price is high

and stocks are low, market demand is dominated by consumption demand. Rice consumers are dominated by those who eat it as their staple food. They will give up other expenditures (including health and education) to continue to eat rice. In other words, the consumption is highly inelastic, that is, very unresponsive to price. When stocks are substantial, their demand, added to consumption demand, makes market demand much more elastic, or responsive to price. The price effect of a modest reduction in available supply depends crucially on whether stocks are plentiful or scarce. In 1972/73, for example, a decline in world wheat production of less than 2 percent at a time when stocks were low caused the annual price to more than double. Figure 3 shows two equivalent supply shocks. In one case, when stocks are high, the impact on price is minor. In the other case, stocks are low and the price impact is large.

In the first half of 2008, rice stocks available to the world market (admittedly a quantity very difficult to measure) apparently were very low. If the mid-summer harvests of rice had been disappointing (reducing available supply for the year by, say, 2–3 percent from trend), then the principal exporter, Thailand, might well have restricted exports, in which case the international rice market might have completely collapsed, with grave consequences for poor importing countries. How can such a catastrophe be avoided if we are not so lucky next time?

What's Needed: Cooperation and Transparency

Obviously, in restricting exports in the first half of 2008, governments of major rice exporters were most likely acting in their own best interests, given that they anticipated others would act similarly. However, if they had all acted cooperatively, guaranteeing continued export supplies, prices for rice exports would have risen less sharply, relieving

pressure from domestic consumers to ban exports, and domestic rice producers would have exported more rice. Exporting countries all have a long-run interest in assuring their consumers that they will be able to import in years when supplies are tight. If they all agree to keep markets open, all can continue to gain from exploiting comparative advantage; the North Korean model of autarky is not attractive.

Two international initiatives should be pursued immediately to encourage cooperation. One is to make a concerted effort to improve the accuracy and timeliness of reporting of stocks from each country to minimize uncertainty about the state of supplies at any particular time. In the global petroleum market, the International Energy Agency receives and reports on public and private petroleum stocks. It also has developed protocols for international collaboration in assuring supplies to a member country for which the import market has been disrupted. Cereal importers should study this model seriously.

Mutual assurance in maintenance of open markets in rice could also be facilitated by inception of disciplines at the World Trade Organization (WTO) with respect to food export quotas and bans, to complement the WTO's current focus on import restrictions. WTO leadership could go a long way in preventing the kind of disruption seen in the global rice market this summer.

Buffer Stock: Proceed with Caution

There has been talk of establishing a regional rice reserve in Asia to improve market stability. This idea might have some merit but deserves study before deciding on implementation. Previous experience with public buffer stock schemes shows that they have often been disruptive rather than stabilizing, especially when they finally collapse. At this stage, it is not clear whether we know enough about the optimal operation of rice stockpiles to be sure

that such initiatives are desirable on a multilateral basis. A careful study of the structure and performance of the U.S. Strategic Petroleum Reserve that emphasizes the interplay between public and private stocks and its affect on international cooperation in market stabilization would be useful. Complications due to the differentiated nature of the rice market and the challenges of multilateral control must be taken into account in considering the design and implementation of any international buffer stock.

Summary

The recent sharp rise in rice export prices has been reversed. But the experience offers a lesson we should not misinterpret or ignore. Given what market participants knew as events unfolded, there is no convincing evidence of an irrational or manipulative bubble. Nor was increased demand from India and China, either directly or indirectly via demand for animal products, a major disruptive influence. While biofuels demand was an important factor in some grain markets, its influence on recent rice market behavior seems to have been tangential at best.

The record over the last year shows the importance of greater transparency in price, production, and stock data and of a collective commitment by exporters to maintain market access when supplies are tight, stocks are low, and the market is fragile. We were lucky last summer to find that harvests turned out to be good in aggregate. Had they been a few percent lower, the export trade might have collapsed completely into autarky, threatening the food security of importing countries and the long-run interests of exporters.

Brian Wright is a professor in the Department of Agricultural and Resource Economics at UC Berkeley. He can be contacted by e-mail at wright@are.berkeley.edu. Significant contributions to this paper were made by Dr. Carlo Cafiero, and Astrid Sky provided excellent research assistance.