POLICY BRIEF NO. 9

WHITHER THE WORLD RICE MARKET?

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World rice prices have plunged in the past five years. The price of 25% brokens, FOB Bangkok, declined from about US$360 per ton in November 1995 to just US$150 per ton late in the year 2000. In real terms, this represents a decline of 63%. Such a large percentage decline is unprecedented in the post-war history of the world rice market, with one exception. From 1981-86, real prices fell 66%, marking a transition from thirty years of high and often unstable prices (averaging more than US$860 per ton in constant year 2000 US$) to a period of ten years where prices were relatively stable and averaged about US$330 per ton.[1] Because prices never recovered the last time they declined so precipitously on the world market, it is unwarranted to simply assume that because prices are so low today there is a high probability that they will rebound to previous levels in excess of US$300 per ton.

The large decline in prices from 1981-86 was caused by several factors. First, Indonesia's achievement of self-sufficiency and the consequent exit of the world's largest importer from the world market. Second, a devaluation of the Thai baht. Third, a spurt in Asian rice production (especially in China, India, Indonesia, and Vietnam). The circumstances in the late 1990s are eerily similar. First, after importing 6 million tons in 1998, Indonesia has greatly reduced its exposure to the world market this year. The reasons are different this time around (a recovery in production from the El Niño drought, a depreciation of the exchange rate, and a tariff on rice), but the consequences are the same: lower world prices. Second, the Thai baht was devalued during the Asian financial crisis. Third, rice production has surged recently in Bangladesh, Vietnam, Pakistan, and India. From 1995-99 (just four years), production surged 28%, 21%, 29%, and 11% respectively in these four large countries. Much of this recent surge was underpinned by public and private investments in water control. For example, the proportion of irrigated area in Bangladesh was just 25% in the early 1990s, but it is now more than half due to the expansion of private sector shallow tubewell irrigation. Vietnam has recently invested heavily in constructing sluice gates to control salinization and new canal systems to increase rice area in the Mekong Delta. The recent overall increase in production for Asia as a whole was not as large

[1] There is of course one other exception: the large decline coming after the large increase during the world food crisis of the mid-1970s. But this was a decline from a level of prices that was unprecedented. This is not relevant for the current situation.

as it was from 1981-86. But widespread economic growth in Asia since that time has caused many consumers to diversify their diets away from rice according to Bennett's Law. This transition reduces demand growth for rice and makes it more likely that rice prices will decline in response to a given increase in production.

Given these circumstances, what is the world rice price likely to be in the near to medium term? One approach to answering this question is to construct and estimate a structural model of the world rice market. The above discussion motivates the choice of three independent variables to explain the real world price of 25% brokens: Indonesian imports, the value of the Thai baht to the US dollar, and per capita rice production in nine key large developing Asian countries.[2] Indonesian imports were hypothesized to have a contemporaneous effect on world prices. The value of the Thai baht was hypothesized to affect the world price with a one-year lag in order to allow time for a domestic supply response by farmers to affect Thai exports. Finally, rice production was hypothesized to affect prices on the world market with lags of one and two years. Because population growth is the main source of demand growth in the Asian rice economy, production was normalized by population, i.e. per capita rice production was used as the independent variable. This normalization keeps the demand curve fixed and allows estimation without resort to a system of simultaneous equations. It should be noted that net trade in rice for the group of nine countries included is a very small percentage of total production.

Policy differences in Thailand and Indonesia account for the different manner in which these two countries affect world prices. During the past twenty years, private sector rice exports from Thailand have been largely unrestricted. Thus, export quantities are endogenous to world prices and it is necessary to use the value of the baht instead of exports in order to have the independent variable be exogenous. On the other hand, net Indonesian imports are used because import and export decisions were under monopoly control of the Indonesian government until recently and were made in response to domestic needs, not the level of the world price. Thus, Indonesian imports are also effectively exogenous to world prices.

[2] The nine countries are China, India, Indonesia, Bangladesh, Vietnam, Thailand, Myanmar and the Philippines.

The model was estimated with annual data in first differences over the period 1983 to 2000, and the parameter estimates are reported in Table 1 (data constraints prevent estimation with a longer time series). All estimated coefficients are of the expected sign and have relatively low p-values. Furthermore, the model explains 67% of annual price changes, relatively high explanatory power for a first difference model. The magnitude of the coefficient estimate for the variable measuring net Indonesian imports implies that an increase in Indonesian imports from one year to the next of 1 million tons is associated with an increase in world prices of US$10 per ton, other things equal. The magnitude of the coefficient on the value of the Thai baht implies that a depreciation of the baht by 10% in year t is associated with a decline in world prices of US$20 per ton in year ($t+1$). The coefficients on the two lags of per capita production imply that an increase in per capita production of 1 kg paddy per capita in year t is associated with a decline in prices of US$4 per ton in year ($t+1$) and a further US$6 per ton in year ($t+2$). (Current per capita production is approximately 170 kg paddy per capita). Finally, the estimate of the constant is statistically equal to zero, implying that there is no drift in prices over time that is not accounted for by structural variables.

Figure 1 shows how the model tracks world prices from 1984 to 2000. The model tracks quite well, and it captures the large decline in prices that began in 1996. However, the average price in year 2000 of about US$170 per ton is still US$35 per ton below the predicted value, suggesting that the price structure is not currently in equilibrium. The degree of disequilibrium is not large, however.

Research has shown that structural price models are often weak predictors of future prices. An alternative is to use the current price as the predictor of the future price. While the current price is also a weak predictor of future prices, it often does better than sophisticated econometric models. In the present case, however, both approaches point to a future world price somewhere in the neighborhood of US$200 per ton for 25% brokens, FOB Bangkok, perhaps plus or minus US$30 per ton. In the near term, it is hard to find support for higher rice prices. There is still currency weakness in Indonesia and the Philippines that reduces demand for imports, and oil prices are unlikely to increase much above current levels (meaning no surge in demand from the Middle East). Stock levels are high in the main exporting countries, and for the

moment, there are no abnormalities in weather conditions that might presage a strong El Niño event. In the medium term, it is also hard to find support for high prices. Myanmar and Cambodia are still largely absent from the export market, but both countries have large export potential in the future. If these countries return to the world market in a big way, prices could fall even further.

The one countervailing factor is the long-term slowdown in yield growth that has occurred throughout Asia. This phenomenon has been most pronounced in countries like Indonesia and the Philippines that were among the first to embrace the modern varieties of the Green Revolution. In both of these countries, rice yields are no higher today than they were ten years ago. If yield growth continues to decelerate throughout Asia, and does so faster than population growth, then per capita production will probably begin to decline and this may cause rice prices to rise. At the moment, though, it seems unlikely that these forces are strong enough to cause a large sustained increase in the price of rice on world markets.

Table 1. Coefficient estimates for structural model of real world rice prices, 25% brokens.
Estimation uses annual data from 1984-2000. Dependent variable is first difference of real price.

Variable	Coefficient estimate	Standard error	t-statistic	p-value
Constant	0.46	8.98	0.05	0.96
➥PCP(-1)	-3.98	2.29	-1.74	0.11
➥PCP(-2)	-6.01	2.23	-2.69	0.02
➥lnBahtUS$(-1)	-218.7	96.54	-2.27	0.04
➥IndonImports	10.4	5.17	2.00	0.07

PCP is per capita rice production for aggregate of nine large Asian developing countries (see footnote 2).

LnBaht US$ is the natural logarithm of the Thai baht/US$ exchange rate.
IndonImports is net rice imports by Indonesia.
Number of observations = 17
$R^2 = 0.67$
Adjusted $R^2 = 0.56$