

**The Future of the World Rice Market and Policy Options  
to Counteract Rice Price Instability in Indonesia**

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One of the major achievements of Indonesian agricultural policy in the past few decades has been the successful stabilization of domestic rice prices. For a period of nearly 30 years, Indonesian rice farmers and consumers were successfully insulated from severe instability on the world rice market at relatively low cost. Indeed, Indonesia's success at stabilizing domestic rice prices was widely admired around the world. The insulation of domestic prices from the world market was necessary for two main reasons. First, the share of rice in the income of the people and in total economic output was very large, so much so that rice was known as the "barometer of the economy." Thus, large fluctuations in prices would have meant large fluctuations in the purchasing power of both consumers and farmers, and it would have been difficult for many to adapt to these frequent changes. Second, the world rice market was thin and unstable, much more so than other world grain markets.

Today Indonesia still faces the same question: how should farmers and consumers be protected against rice price instability? Under a more liberal trading regime, where the private sector can import from the world market (subject only to a tariff), instability in domestic rice prices can originate from three sources. First, fluctuations in domestic production can cause fluctuations in domestic prices. Second, changes in world market rice prices will be translated into changes in domestic prices if private imports are allowed. For example, a downward fluctuation in world rice prices will encourage private sector traders to import cheap rice in order to sell at the relatively high prices on the domestic market. These imports will put downward pressure on domestic prices. The reverse would happen if there was upward movement in world rice prices. Exports would be encouraged, and there would be upward pressure on domestic prices. Thus, price instability on world markets will be translated into price instability on domestic markets. Third, volatility in the rupiah exchange rate will cause changes in the rupiah equivalent price of rice in the world market, which will then affect domestic rice prices just as if the world market dollar price of rice had changed at a constant rupiah exchange rate. Imagine that the rupiah depreciates significantly. This depreciation increases the amount of rupiah that a trader can get for exporting rice at a fixed dollar price. Rice exports will tend to raise domestic rice prices, and exchange rate instability will have been converted to domestic rice price instability.

What is the best strategy to deal with future instability in domestic rice prices? The answer depends on many factors, including the evolution of the world rice market, the likely sources of potential future instability, and the evolution of the Indonesian domestic economy. The main part of this paper will discuss the evolution of the world rice market in the past 50 years and its likely future course in the near to medium term. Based on this analysis, policy options to deal with rice price instability will then be discussed.

## **The Evolution of the World Rice Market, 1950-1999**

### *Trends in World Rice Prices*

The world rice market has undergone many changes in the past half century, and these changes have affected both the level and the stability of world rice prices. Perhaps the most notable change during this time has been the sustained low level of world rice prices during the past 15 years. The transition to this new period of lower prices was not gradual, but was instead concentrated within a period of four years, 1982-1985. From 1950-1981, world rice prices averaged about US\$860/ton (constant 1998 prices), with no distinct trend over time (Figure 1). Then, from 1982-1985, world prices plunged precipitously, falling by 62% in just four years. From 1985-1999, prices have averaged about US\$327/ton, again without any distinct time trend during this latter period. This transition is truly remarkable. Imagine if world rice prices were to reach US\$860/ton today!

It appears that world rice prices (Thai 100Bs, FOB Bangkok) will reach an all-time low this year of perhaps US\$246/ton in constant 1998 prices (based on prices through November). Thus, current world prices of about US\$225/ton appear to be a bit low, and it is not inconceivable that prices return to their average level during the past six years of US\$290/ton. This would translate to approximately US\$250/ton for Thai 25% broken, which is similar to the typical quality of rice sold in Indonesian retail markets (the average premium for Thai 100Bs over Thai 25% broken was about US\$40/ton from 1994-1999).

In terms of stability, world rice prices have been through three distinct phases in the past 50 years. From 1950-1964, prices were relatively stable, as measured by either the average squared residual from a regression of price versus a time trend, or the average absolute value of the percentage price change from year to year (Figure 2, Table 1). From 1965-1981, prices were substantially more unstable. This period includes the world food crisis of 1973-1975, an event that was important in shaping the attitude of Indonesian policymakers toward instability. Finally, from 1985-1999, world prices have been relatively stable once again. (Price stability in a very short time span is not easy to measure, so the transition period from 1982-1984 is ignored in terms of the price stability analysis).

Thus, to summarize, 1950-1964 was a period of high and stable prices, followed by a period of high and unstable prices (1965-1981). The years 1982-1984 marked a short transition period to a regime of low and stable prices, and this regime has persisted to the present day (1985-1999). Both technological change and political disturbances have contributed to this evolution, and these events will be discussed in the next two sections of the paper.

### *The Level and Stability of Asian Rice Production*

Trends in the level and stability of Asian rice production go a long way toward explaining the trends in world rice prices noted above. For example, the plunge in world prices from 1982-1984 coincided with a sharp increase in per capita rice production in Asia (Figure 3). During

those three years, per capita production reached a new level of roughly 160 kg paddy (104 kg milled rice)/capita, and this level has been approximately maintained ever since. The proximate cause of the price decline was the achievement of rice self-sufficiency by Indonesia in 1984, which in the decade prior to that was by far the world's largest rice importer. From 1981-1984, rice production in Indonesia increased 16% in a span of just three years, and Indonesia's abrupt exit from the world rice market undoubtedly had both real and psychological effects on world prices. But, rice production surged in many other countries at this same time, and it was the combined growth in many countries that allowed world prices to stay at this new low level for the next 15 years, even when Indonesia returned to the world market in the 1990s. For example, production in China also increased rapidly during this period due to the economic reforms begun in 1978. India and Vietnam also saw rapid surges in production during this time (see Table 2). At the same time that Asian rice production surged, the Thai baht was also devalued by nearly 25% during this time, from about 20.70 at the beginning of 1981 to about 27.10 by the end of 1984. The lower value of the baht raised the profitability of rice production in Thailand and exports surged from an average of 2.4 million tons during 1978-1980 to 4.4 million tons from 1984-1986.

Although the magnitude of the surge in per capita production from 1982-1984 was unprecedented, per capita production had been increasing steadily during the previous three decades. Why did these increases not have a similar depressing effect on world prices? The most likely reason is that Asian countries were much poorer in this earlier period, which meant that the income elasticity of demand for rice was still positive. Thus, growth in rice production had to keep pace not only with population growth, but also with income growth. In other words, increased per capita production was necessary to keep world prices constant in real terms. As per capita incomes in Asia reached higher levels, however, the income elasticity of demand for rice declined to zero in many countries, and even became negative for some. Thus, constant levels of per capita rice production are now sufficient to keep prices constant in real terms. In fact, the IMP ACT model of the International Food Policy Research Institute (IFPRI) projects that world rice prices will remain constant provided production growth roughly equals population growth between now and 2020.

At the same time that the level of per capita production has increased during the past half century, it has also become more stable. The magnitude of year to year fluctuations in per capita production has been markedly lower in the past 15 years than it was previously (Figure 4). Prior to 1985, fluctuations in per capita production of greater than plus or minus 3% were relatively common, occurring 22 times in the 29 years from 1952-1980. Since then, fluctuations of this magnitude have occurred just 5 times in 18 years. The average absolute value of annual changes in per capita production was 4.4% from 1952-1964, 3.7% from 1965-1981 and just 1.9% from 1985-1998 (Table 3). The average squared residual from a regression of per capita production on time for each of those three periods shows a similar pattern (Table 3).

This improvement in the stability of per capita production is most likely due to two major technological influences. First, the proportion of rice grown under irrigated conditions has increased over time. Reliable supplies of water have substantially reduced production fluctuations relative to a situation where production relies solely on the vagaries of rainfall. Production stability has been further enhanced by the development of modern rice varieties that have become progressively more resistant to pests and diseases. The first modern high yielding semi-dwarf variety, IR8, suffered frequent attacks by diseases and insect pests. IR36 was released in 1976, and this new variety incorporated resistance to multiple pests and diseases. It was so successful that it is still grown in many areas today, including Indonesia. Other derivative varieties also incorporated much of this resistance, and this has proved to be a successful approach for stabilizing yields.

To summarize, both the level and the stability of per capita rice production in Asia have increased substantially over time, and these developments would appear to explain why world prices have been so low and stable for the past 15 years. Yet, this cannot be the whole story. For example, why were world rice prices relatively stable from 1950-1964 in spite of very unstable production?

#### *The Fall and Rise of Commercially Oriented Rice Exporters*

For most of this century, the major rice exporters in the world market have been the nations of mainland Southeast Asia: Thailand, Burma, Cambodia, and South (or southern) Vietnam. During the 1950s, Burma and Thailand dominated world rice exports, with Cambodia also being an important player. More important, exports were a large share of domestic production for all of these countries. From 1950-1963, the average share of exports in domestic production was 40% in Burma, 32% in Cambodia, and 24% in Thailand. South Vietnam was also a net exporter in the 1950s, but its total exports were roughly only one-third of Cambodia's, and its share of exports in domestic production was also quite low.

An important reason for the commercial orientation of these major exporters was that rice was responsible for a large share of foreign exchange earnings, especially at a time when none of these nations had diversified economies. It was also an important source of government revenue. For example, in Thailand taxes on rice exports consistently accounted for more than 10% of all government revenue in the years from 1950-1965, and the share occasionally reached more than 25%. Thus, whenever there was a shortfall in Asian rice production, one or more of these countries would typically step in to fill the breach and prevent world prices from spiraling out of control. For example, Figure 4 shows large falls in per capita production in 1954 and 1957 (due to a major La Nina event in 1954/55 and a major El Nino event in 1957(58). To meet the shortfall in 1954, Burma stepped into the market and exported a then record 1.7 million tons, followed by another record of 2.0 million tons in 1955. In these two years, its share of exports in domestic production surged to 49%, relative to an average of just 33% in the preceding three years.

In 1957, Asian per capita production fell by 4%. Aggravating matters, production dropped sharply in the two major exporters, by 15% in Burma and 33% in Thailand. Nevertheless, these two countries responded. Exports from Burma fell compared to the record high of the previous year, but they still reached 43% of domestic production in spite of the production shortfall. In Thailand, exports hit a near record of 1.5 million tons, with 40% of production being sent to the world market. Thailand did enact quantitative restrictions at this time, but they were not very severe in their effect. As a result of exports from these two countries, world prices barely budged during the mid to late 1950s.

Another major shortfall in per capita production occurred from 1959-1961, but this was primarily due to the policies of the Great Leap Forward in China that led to a dramatic collapse of production. Because of China's isolation at that time, it did not enter world markets to try and make up the deficit with increased imports. Again, world prices did not increase substantially.

The situation had changed considerably by the mid-1960s, when a major El Nino event led to a sharp fall of 6% in per capita Asian production in 1965. By this time, Burma, the leading rice exporter in the 1950s, was well into a period of sharp decline due to the restrictive policies of General Ne Win, who had seized power in a coup in 1962. Exports were falling, and by 1967, they had declined to just 11% of domestic production (Figure 5) as world prices surged 30% (Figure 2). The proportion of Cambodia's production that found its way onto world markets was also in a period of decline (Figure 5). South Vietnam banned exports in 1965, and it did not return to the world market as an exporter until the late 1980s. Perhaps more surprisingly, even Thailand was becoming less commercially oriented. By 1967, revenue from rice export taxes had fallen to just 6% of total government revenues, and this would decline to just 1% by 1971 (compared to 10-25% during the 1950s). Since the government was no longer so reliant on export tax revenue, it had more flexibility to constrain exports in the interests of domestic price stabilization. As a result, during the world price spike in 1967, Thailand raised its rice premium (a form of export tax) to levels more than double that of its previous high.

By the early 1970s, the situation had become even worse. The proximate cause of the world food crisis of 1973-1975 was a severe El Nino in 1972-1973, followed by major La Nina events in 1973-74 and 1975-76. But this situation was exacerbated considerably by the behavior of the traditional commercial rice exporters. Thailand's exports fell to just 10% of domestic production from 1973-1975, reaching their lowest point in the post-war period. Thailand banned exports for a few months in 1973, and for a time there was no rice to be had on world markets at any price. By this time, Cambodia had joined South Vietnam and completely exited the market, while Burma was also out for all practical purposes (Figure 5).

By the mid to late 1980s, this situation had changed considerably for the better. Thailand's commercial orientation has increased steadily since the world food crisis, with exports now typically accounting for 40% of domestic production. Vietnam has reentered the world rice market, with exports accounting for approximately 20% of domestic production in each of the

past two years. The presence of Thailand and Vietnam as commercially oriented rice exporters was a major factor in stabilizing the world market in 1998 in the face of a major El Nino event that led to a fall of more than 4% in per capita Asian rice production (Figure 4). Thai exports surged to a record 6.4 million tons, while exports from Vietnam jumped to 3.8 million tons. The devaluation of the Thai baht undoubtedly played an important role in spurring exports, but Figure 5 shows that Thailand is now much more commercially oriented compared to the mid-1970s. This is reflected in current Thai policy, which now allows free trade in rice even if the consequence is increased domestic prices (i.e. export taxes have been abolished). During the recent financial crisis, domestic rice prices in Thailand rose by more than 50% in real terms between November 1997 and January 1998 (Figure 6). Despite this rapid rise, the government allowed domestic prices to track world prices one for one. This is an important policy change that adds considerably to the stability of the world market.

Myanmar and Cambodia have yet to return to the world market to play a major role. Especially in Myanmar, more liberal domestic policies would increase domestic production and exports substantially. Nevertheless, other exporters have emerged to complement Thailand and Vietnam. The share of exports in production in Pakistan has steadily increased during the past two decades, and is now typically 40%. China and India have also emerged as important exporters in recent years. Although the vast majority of rice production in the world's two largest countries is consumed domestically, both have proved able to export large quantities in recent years. India was the world's second largest exporter (behind only Thailand) in 1996 and 1998, exporting more than 5 million tons in 1998. China exported more than 3.5 million tons in 1998. The apparent willingness of these countries to supply world markets lends added stability in times of crisis.<sup>1</sup>

The renewed presence of several commercially oriented rice exporters is reflected in the share of world rice production that is traded on world markets. Between 1961 and 1993, world trade fluctuated between 3.5% and 5% of world production (on average, it was 4.3%). Since 1994, however, the ratio has exceeded 5% every single year, and the share traded has averaged 5.9% (Figure 7). This does not make the world rice market as heavily traded as world wheat and maize markets, but it still represents an important increase. Furthermore, although the world rice market is less heavily traded than other grain markets, world rice prices are no longer more unstable than world wheat and maize prices, as was true during the 1970s. In fact, from 1987-1998, the coefficient of variation of world rice prices was just 11%, compared to 16% for wheat and 15% for maize. It is no longer clear that the world rice market is fundamentally different than other world grain markets.

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<sup>1</sup> Although the United States is also a major exporter, most U.S. rice is too expensive to enter the Asian trade on a purely commercial basis.

### **Future Sources of Rice Price Instability and Policy Options**

What does the future hold for the world rice market? Based on its evolution during the past 50 years, it seems likely that world prices will generally remain stable in the near future, just as they have during the past fifteen years. The improvement in stability has come about due to the greater importance of irrigation in rice production, the improved pest and disease resistance of modern varieties, and the re-emergence and strengthening of the commercial orientation of major rice exporting nations. None of these trends are likely to be reversed. Although the growth of irrigation is slowing in Asia, the share of irrigated land in total rice area is still increasing (albeit slowly). Plant breeders continue to improve the insect and disease resistance of modern varieties, and biotechnology holds out hope for even more improvements in this area. Finally, as the world economy moves toward freer trade and increasing integration, it is unlikely that Thailand and Vietnam will turn their back on the world rice market. And with some luck, Myanmar and Cambodia may emerge to become important players once again sometime in the next decade.

In addition to these trends, the effect of any given level of rice price instability is much less today than it was 30 years ago when Bulog first started its stabilization operations. The gross value of rice production was equal to nearly 20% of Indonesia's GNP in the late 1960s, but this share had fallen to about 5% by the mid-1990s. These numbers show that rice has a much smaller effect on the macro-economy today than it did before. In addition, with the massive reductions in poverty during the last 30 years, Indonesian citizens now spend a much smaller share of their budget on rice.

These arguments are not to say that the effects of instability are now negligible. There are still many poor Indonesians for whom price fluctuations cause serious problems, and as a result there can still be political repercussions from this instability. And, while the world rice market is likely to be relatively quiet in the future, increased financial market liberalization means that exchange rate instability will be larger in the future. Under free trade, instability in exchange rates translates to instability in domestic rice prices just as much as instability in world rice prices. What is the optimal way to deal with this instability?

First, it is important to remember that the magnitude of the instability problem is less severe than it was 30 years ago, primarily due to the structural transformation of the Indonesian economy. This means that today's solutions must have lower costs, because the benefits from stabilization, while still positive, are now lower. Second, assume for the sake of argument that there will be a tariff on rice. While the primary effect of a tariff is to raise the average level of prices, a tariff also provides stabilization for farmers (but not for consumers). For example, imagine that domestic rice prices are equal to world prices, given the exchange rate current at the time. If there is a tariff of 20%, world prices can decline by 20%, and there will be no effect on farmers whatsoever, since it will not be profitable for traders to import at those prices. (The tariff would also protect farmers from an equivalent appreciation of the exchange rate ). In the

absence of this tariff, domestic prices would have followed world prices and declined by 20%. Thus, the tariff provides some shelter from downward price movements on world markets.

Since farmers are wealthier and more diversified than they were 30 years ago, they are now better able to handle instability, and if there is a tariff, this will provide some stabilization. The implication of these arguments is that there is less need for a floor price. This is especially true because effective implementation of a floor price carries with it high costs if it is done properly. On the other hand, if it is not defended properly, the credibility of the government will suffer at the same time that resources are being wasted on ineffective policies.

But if a moderate tariff of 25% provides some stabilization to farmers from abnormally low world market prices, won't a tariff of 50% provide even more stabilization for farmers? This assertion is true as far as it goes, but it ignores the importance of stabilization for consumers, and the fact that instability can originate from domestic production as well as from the world market.

Large upward movements in domestic rice prices that adversely affect consumers can occur due to a large upward price spike on world rice markets, a large depreciation of the exchange rate, or a large shortfall in domestic production. Given the above arguments about the world rice market, the first scenario is relatively unlikely. Yet the latter two events are real possibilities. Perhaps the most likely problem is a shortfall in domestic production due to another El Nino or La Nina. In such a case, price stability is best assured by allowing the private sector to step in with commercial imports. The private sector will be willing to perform this function provided that the tariff on rice is not set prohibitively high. If the tariff is too high, however, domestic prices will have considerable room to increase, and yet it will still not be profitable to import. Of course, the tariff could be temporarily lowered in such an event, but this will inevitably take time to negotiate in a democratic government, and prices may spiral out of control in the meantime. Furthermore, if the lower tariff is just temporary, the private sector will be less able and more reluctant to respond as quickly as necessary. Of course, the government could then step in, but this process would probably be even slower and would just constitute a return to the old regime of a government monopoly on imports that is subject to corruption and other problems. Thus, once the urban consumer side of price stabilization is considered, progressively higher tariffs do not provide progressively more stabilization. In fact, stabilization for consumers in the face of shocks to domestic production is maximized by very low tariffs. Thus, in terms of stabilization, the optimal tariff will need to consider the interests of both farmers and consumers, suggesting that a moderate tariff will be best.

But consumers can not be completely protected by a low tariff alone. There is always some lag between the contracting of imports and their arrival at port, and a modest level of domestic food security stocks (perhaps half a million tons) held by the government would provide help in this situation.

Finally, consumers can also be affected by a depreciation of the exchange rate, which puts upward pressure on domestic prices. This only poses a problem if the spike is very large, however. Small depreciations of the exchange rate (on the order of 25-30%) are probably not sufficient to encourage large exports of Indonesian rice even if domestic prices fall below the equivalent world price because of quality problems with Indonesian rice. A very large depreciation, however, similar to what occurred in late 1997 and early 1998, might generate incentives to export large quantities, which would put upward pressure on domestic prices. In such a case, the only remedy is a temporary restriction on exports: either a ban or a prohibitively high export tax. Such restrictions would only be necessary in very unusual situations, however. They would be potentially difficult to enforce, but if they were implemented only for a short period of time on rare occasions (once in 20 years, for example), it would probably be possible to secure adequate enforcement.

To summarize, the world rice market will probably be relatively stable in the near to medium term. Indonesia will still need to be concerned with rice price instability, but it is not as important an issue as it was in the past and it will be necessary to pursue new low cost solutions. A set of policies that fulfills this requirement would consist of a moderate tariff, food security stocks, and the possibility of an emergency export ban in very unusual circumstances.

Table 1. Stability of World Market Rice Prices.

	Avg. Absolute Value of Annual Fluctuations	Avg. Absolute Values of the Residuals from Regression vs. time (1998 US\$/ton)
1950-1964	7%	61
1965-1981	24%	282
1985-1999	11%	36

Table 2. Increases in Paddy Production, various countries.

	Average Production 000 tons		Average Annual Growth
	1977-1981	1985-1989	
Indonesia	27565	41048	5.1%
China	141690	175298	2.7%
India	76657	97723	3.1%
Vietnam	11163	16595	5.1%

Table 3. Stability of Asian per capita rice production.

	Avg. Absolute Value of Annual Fluctuations	Avg. Absolute Values of the Residuals from Regression vs. time (kg paddy/capita)
1951-1964	4.4%	6.2
1965-1981	3.7%	3.5
1985-1998	1.9%	3.1

Figure 1. Real World Rice Prices (100Bs, FOB Bangkok)

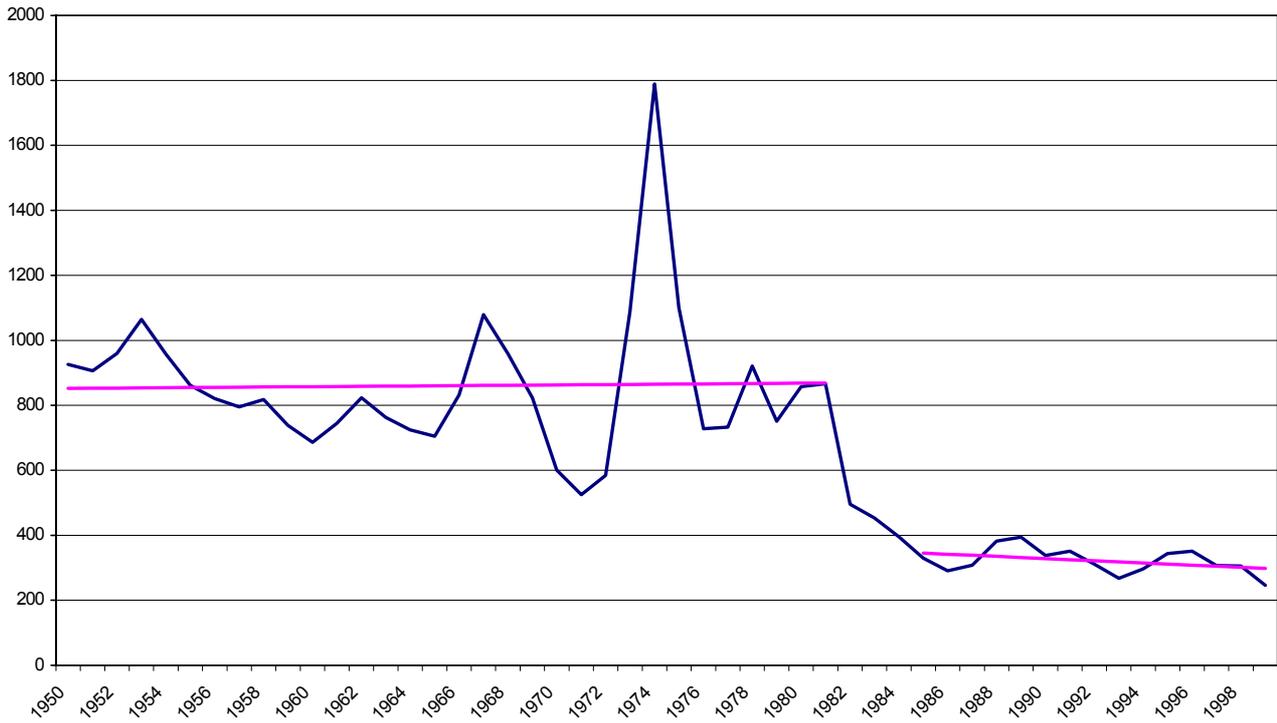


Figure 2. Annual Fluctuations in Real World Rice Prices

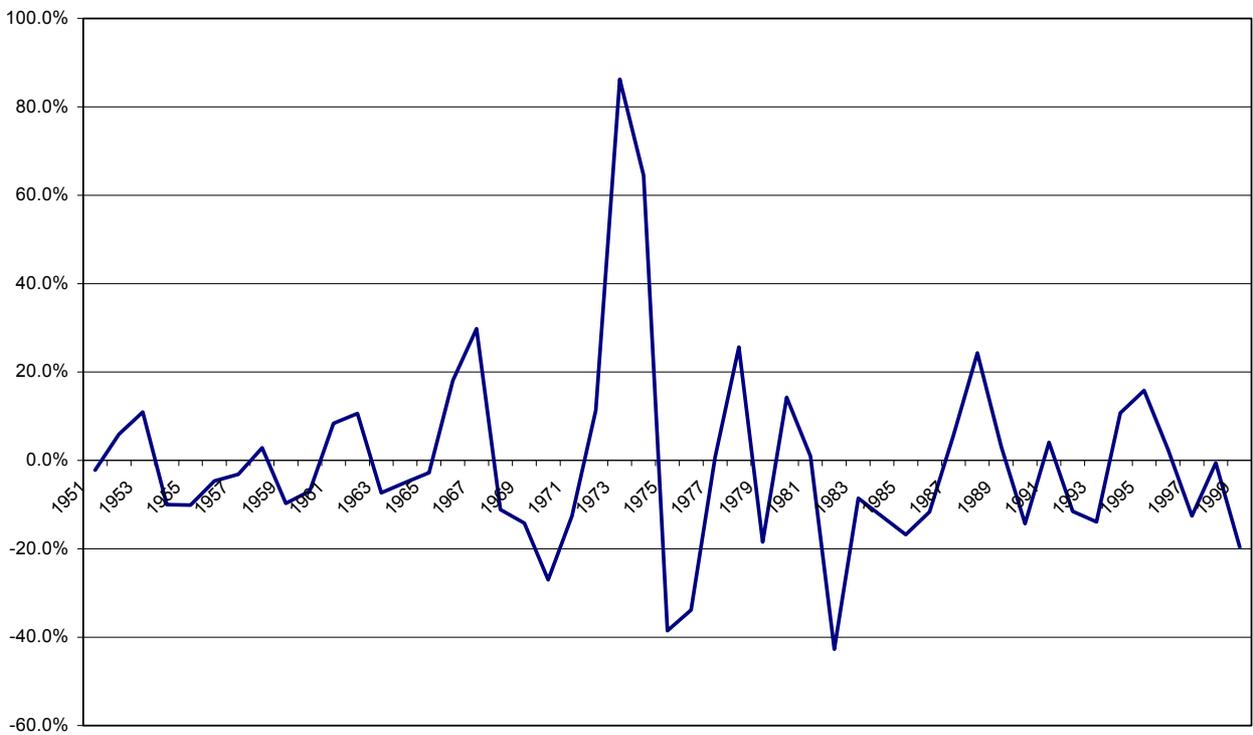


Figure 3. Per Capita Asian Rice Production

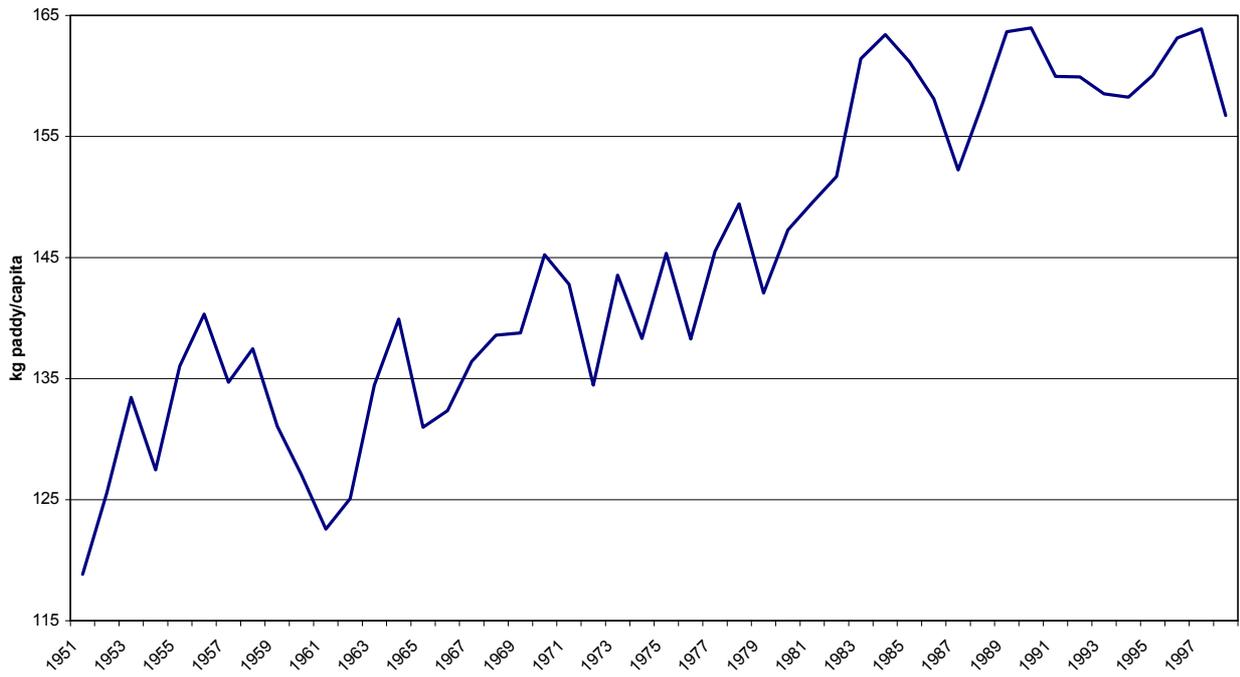
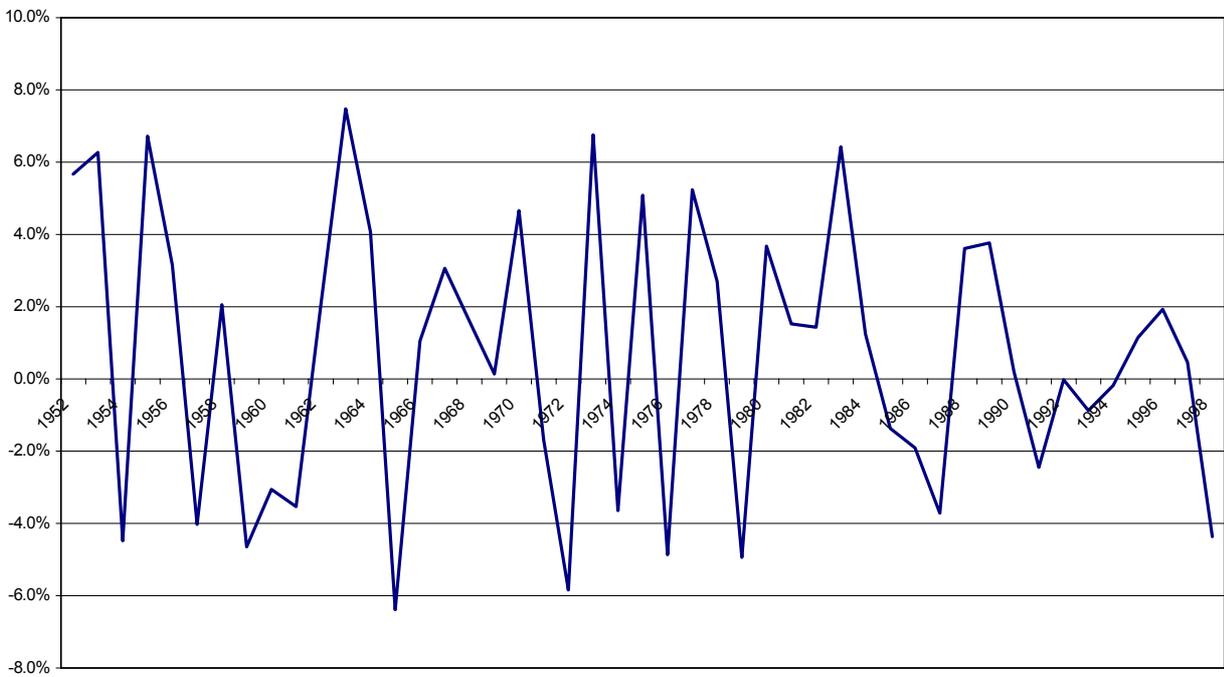
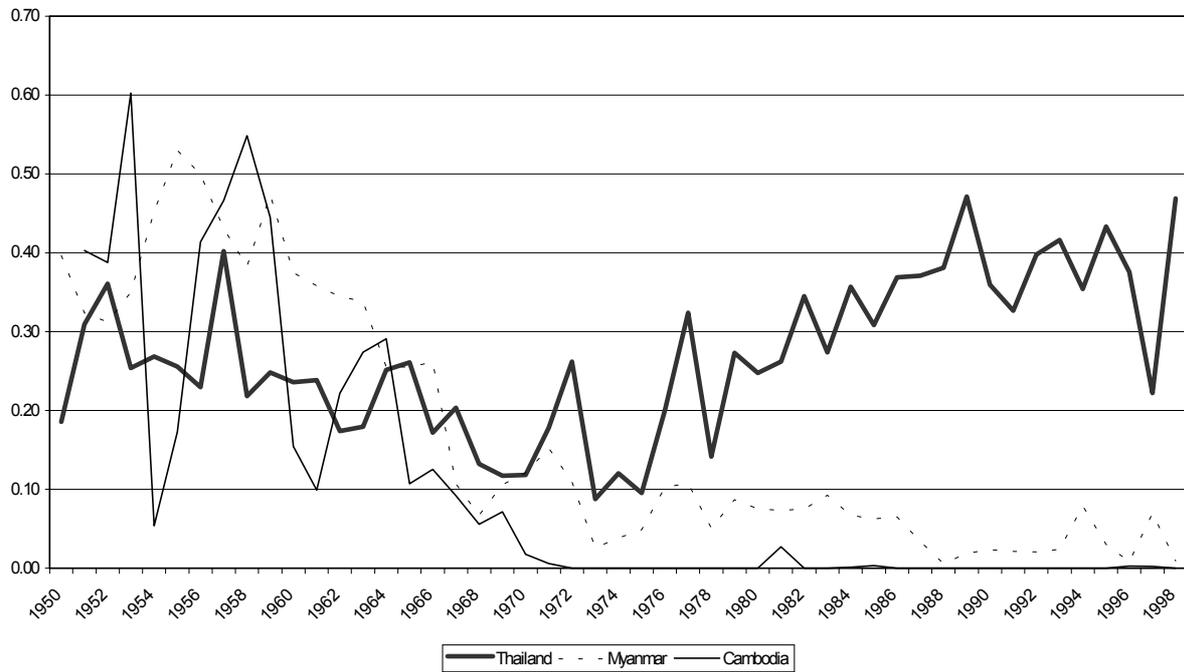


Figure 4. Fluctuations in Per Capita Asian Rice Production



**Figure 5. Ratio of Exports to Domestic Production  
Thailand, Myanmar, and Cambodia**



**Figure 6. Real Domestic Rice Prices in Thailand (100Bs)  
Dec.1993-July 1999**

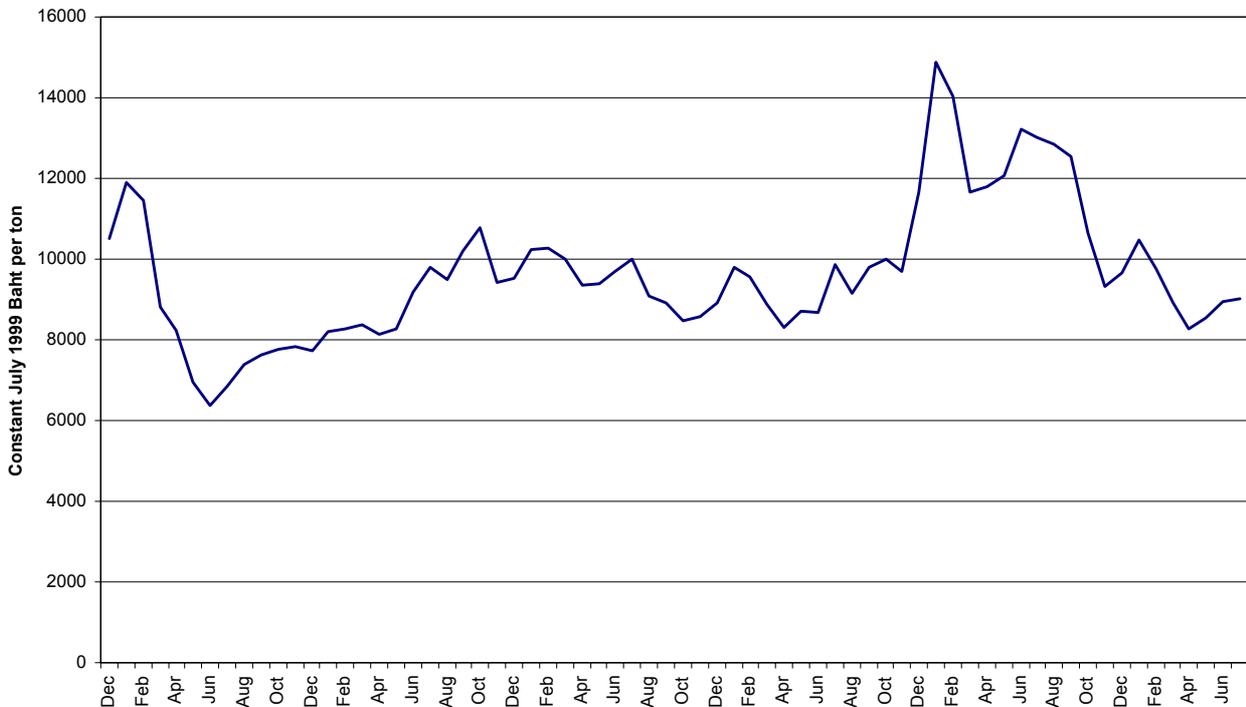


Figure 7. World Rice Exports as a share of World Rice Production

