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International Rice Trade and Security Stocks

Prospects for an Expanded Asian International Rice Reserve

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ABSTRACT

The surge in international rice (and other cereal) prices in 2007 and 2008 substantially raised the cost of cereal imports and shook the confidence in international markets of many national policymakers. This paper examines the recent experience with international rice reserves in Asia and re-examines the roles of national stocks and international trade in stabilizing domestic rice prices and availability in importing countries.

With the exception of China and India—the two largest rice producers in the world— few countries increased their national rice stocks since the 2008 international price spike. Efforts to promote international rice stocks have likewise been met with little success. Current international rice reserves, accounting for only about 1 percent of world rice stocks and about 3 percent of annual international rice trade (and about 0.25 percent of annual world rice consumption), are too small to make a difference for price stabilization in international markets.

Holding moderate levels of national stocks will likely remain the best option for providing an insurance against short-term disruptions in international rice trade and as a tool to calm domestic rice markets in times of heightened market uncertainty. Nonetheless, there are substantial gains from trade in most years for importing (and exporting) countries, and the evidence suggests that a blend of prudent public stock levels and management, together with openness to trade, is the most effective approach for minimizing disruptions to supply and enhancing stability of rice prices in the short run.

Keywords: rice, strategic food reserve, price stabilization, stocks, international trade

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1. INTRODUCTION

The surge in international cereal prices in 2007 and 2008 substantially raised the cost of cereal imports and adversely affected welfare of consumers in most cereal importing countries. This experience has also brought into question the wisdom of reliance on international markets as a source of cereal supplies, especially in the case of rice importing countries, which faced serious disruptions in supply as major rice exporters (India and Vietnam) cut back their exports and the international rice price rose sharply.

In terms of national policy, greater uncertainty of international supplies suggests the need to increase national stocks in the short run, and in the medium term, to place greater emphasis on increasing domestic production so as to reduce reliance on international markets. Instability in international markets does not negate the benefits of international trade, however, and for most major importing countries, international markets remain an economically efficient means of increasing cereal supplies and keeping cereal prices at affordable levels for consumers. Nonetheless, the 2007–2008 experience has led to increased calls for efforts to stabilize international rice markets through various mechanisms, including prohibition of export bans and international rice reserves.

This paper focuses on the roles of international rice trade, national stocks, and international reserves in stabilizing domestic and international rice prices and enhancing national food security. Section 2 discusses various types of stocks and presents a summary of the literature on price stabilization. Section 3 covers the evolution of national rice stocks and international rice trade over time, with an emphasis on the 2007–2008 price spike and recent developments. Section 4 describes the operations of Asia's two international rice reserves—the South Asian Association for Regional Cooperation (SAARC) Emergency Food Reserve and the ASEAN Plus Three Rice Reserve (APTERR) and its predecessors. The final section summarizes and presents conclusions of the analysis.

2. PRICE STABILIZATION AND THE ROLE OF NATIONAL CEREAL STOCKS

Conceptually, cereal stocks can be characterized according to their major purpose. *Working stocks* for planned distribution programs are typically held by national institutions responsible for food-based safety nets (such as India's Public Distribution System (PDS) and the Bangladesh Public Foodgrain Distribution System (PFDS)). Volumes of stocks needed for these programs are based on relatively straightforward calculations based on timing and location of planned distribution to severely affected households, as well as time needed to replenish stocks from sources of supply. *Emergency food reserves* are used to enable quick response to food needs following natural disasters or major disruptions to supply. These reserves are often pre-positioned in warehouses near the location of intended beneficiaries. Estimates of the appropriate size of emergency reserves is far less straightforward than calculations of working stock requirements, as they require an assessment of the likelihood and scale of future natural or man-made disasters, along with an estimate of how quickly stocks can be replenished in the event of potentially major disruptions to transport.

More controversial and most problematic for management are stocks for price stabilization purposes. Here, the size of the stocks required depends in part on the desired level of price stabilization to be achieved (with greater price stability requiring larger levels of stocks), the source, timing, and price of supplies for stock replenishment (from domestic procurement, international commercial markets, food aid, or government-government transactions), storage losses, and other storage costs (including interest costs). In general, the possibility of international trade can greatly reduce the size of national stocks required for price stabilization as imports can be used to add to domestic supplies to minimize price increases (and exports can provide an outlet for domestic production to avoid sharp price declines).

Rigorous analysis of the use of stocks and international trade for price stabilization typically involves dynamic programming of the costs and benefits of stocks –greater price stability and a (usually weighted) sum of the change in producer net incomes (producer surplus), and consumer surplus. In general, there are four main determinants of optimal storage rules: (1) the probability distribution of future production (and its responsiveness to price); (2) the marginal welfare of changes in consumption (reflected in the price responsiveness of consumer demand); (3) the marginal cost function of storage (where costs include handling costs, rental value of storage space, quality deterioration, risk of theft, insurance, and so on.); and (4) the discount rate (the opportunity cost of holding grain instead of interest bearing financial assets).¹

Substantial research has been done on optimal price stabilization and buffer stock policy showing that on average, some reliance on international trade can reduce costs of price stabilization substantially (for example Goletti 2000; Brennan 2003; World Bank 2006 and the summary by Byerlee et al. 2007). These modeling results derive from the fact that holding stocks entails substantial cost, and that in most countries typical shocks to domestic supply and demand (weather and pest-related production shortfalls, natural disasters, income shocks) are large relative to average levels of supply and demand. The extent to which trade-based price stabilization policies are superior to holding national cereal stocks depends on the degree of stability in international prices and availability, however. For the majority of the three decades between the large international price shocks of the early 1970s and 2007–2008 world price shocks, international markets were relatively stable, and in general, trade-based stabilization policies proved to be effective. However, in years of high world prices (such as 2007 and 2008), openness to international trade will tend to increase, not decrease domestic prices, unless imports are subsidized (or exports are taxed).²

¹Gardner (1979), 18–19. See also Williams and Wright, (1991). The standard theoretical analysis of the benefits of price stabilization in the context of risk aversion is presented in Newbery and Stiglitz (1981).

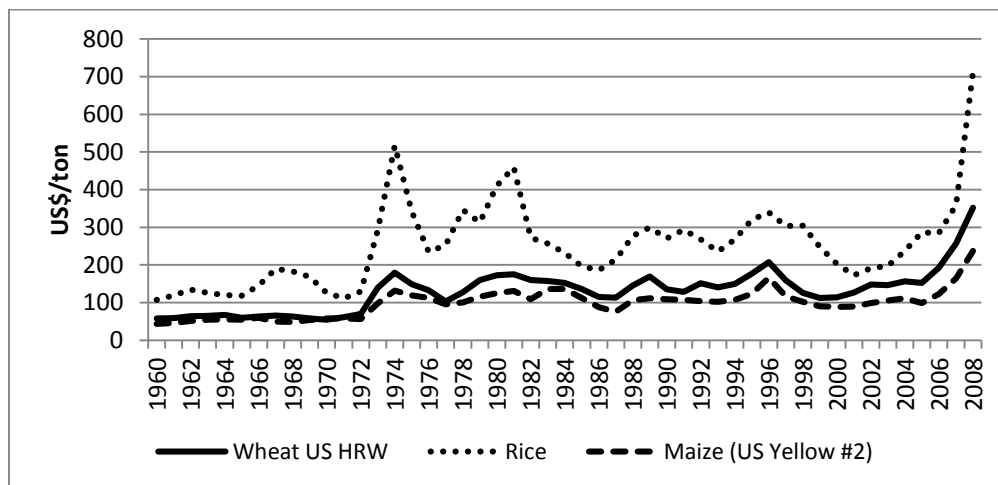
²For this reason, India put a ban on non-basmati rice exports and Pakistan banned wheat exports in 2007–2008 (Dorosh 2009; Dorosh and Rashid 2013).

Although dynamic programming exercises provide important insights into tradeoffs between stock levels, relatively weak institutional capacity and uncertainty regarding model parameters and specification limit their use. Instead, management of national stocks, in practice, is often based on politically influenced decisions and informed judgments on the average size of a national food security stock, programmed and emergency grain distribution, short-term fluctuations in international markets, and production shocks (Dorosh, Farid, and Shahabuddin 2003). For countries with major domestic procurement and public distribution programs such as India and Pakistan, pressure from domestic farmers or consumer interest groups can drive decisions on levels of procurement and distribution, and thereby lead to major fluctuations in national stocks, as in India's huge stock buildup of the 1990s and early 2000s (Rashid et al. 2008; Dorosh 2009) and the surge in Pakistan's wheat stocks in 2010 (Dorosh, Malik, and Krausova 2011).

3. EVOLUTION OF PRICES IN INTERNATIONAL RICE MARKETS

Since the 1960s, there have been dramatic fluctuations in international rice prices in both nominal and real terms; these fluctuations include major price spikes in 1973–1974 and in 2007–2008 (Figures 3.1 and 3.2).³ However, there has been a downward trend in the real long-term prices of rice from the 1960s to present; from 1960 through 2013, real rice prices declined by 2.4 percent per year (as measured using a logarithmic regression). This real price decline has occurred because increases in demand have been largely offset by increases in production, which was made possible by the widespread adoption of green revolution technology. Real prices of wheat and maize have also declined by 2.0 and 2.2 percent per year, respectively.

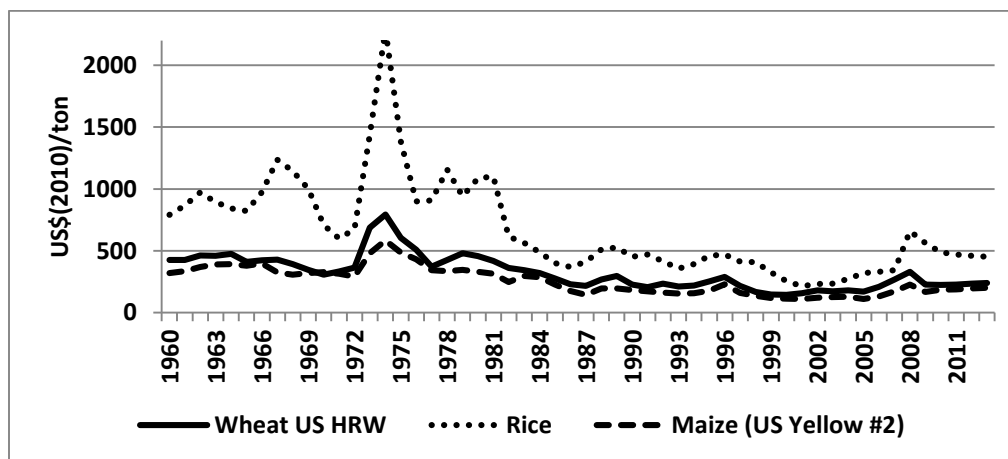
Figure 3.1 Nominal prices of rice, wheat and maize (US dollars per ton): 1960–2013



Source: Calculated from IMF (2013) and FAO (2013b) commodity price data.

Notes: Rice price data is Indica rice 5% broken. Wheat price data is for US Wheat Hard Red Winter (HRW).

Figure 3.2 Real prices of rice, wheat and maize (US dollars 2010 per ton): 1960–2013



Source: Calculated from IMF (2013) and FAO (2013b) commodity price data.

Notes: Rice price data is Indica rice 5% broken. Real prices are nominal prices divided by the IMF (International Monetary Fund) dollar index of commodity prices, (index = 1.00 in 2010). Wheat price data is for US Wheat Hard Red Winter (HRW).

³The US Consumer Price Index (CPI) is used as a deflator.

In real terms (that is, adjusting for overall inflation) the price spike in 1973–1974 was much more severe than the 2007–2008 price spike. Although international rice prices reached record levels in 2008 in nominal terms, real prices for rice in 2008 were less than one-third of those in 1974. Prices of wheat and maize in 2008 were below their 1974 levels by 58 and 61 percent, respectively.⁴

Government policies had a large role in price spikes in 2007–2008; the government of India banned rice exports in an attempt to increase its cereal supply as a result of two successive below-average wheat harvests and lower-than expected government procurement (Dorosh 2009; Timmer 2009b). Vietnam and Cambodia also placed restrictions on exports, causing international rice prices to increase to \$907 per ton in April 2008.⁵ Thailand and the US were the only two major rice exporting countries to continue to supply international markets and importing countries, such as the Philippines, became increasingly anxious (Headey and Fan 2008; Timmer 2009). The Philippines attempted to purchase additional rice imports in the beginning of 2008 by agreeing to pay Vietnam above market prices; this action only exacerbated uncertainty and panic in international rice markets (Dawe and Slayton 2008).

With successful wheat and rice harvests in much of the world later in 2008 and a worldwide financial crisis that depressed market demand in the second half of 2008, rice prices gradually fell to \$532 per ton by December 2008. In real terms, average rice prices from 2009–2012 were 29 percent below the 2008 peak, but remain 36 percent above real prices of 2007.

⁴Adverse production shocks related to poor weather in many countries played a much greater role in the 1973–1974 price surge than in 2007–2008. At the same time, demand on the international market rose as the Soviet Union, following its own national production decline, chose to import cereals rather than cut back domestic feed and food consumption (see Timmer 2010). In contrast, demand shocks and trade restrictions were bigger factors in the price increases of 2007–2008 than in those of 1973–1974.

⁵ \$ refers to US dollars throughout the paper.

4. WORLD RICE STOCKS

World rice stocks have risen sharply since before the 2007/2008 world price surge, from 75.9 million tons at the end of 2006/2007 to 105.4 million tons at the end of 2012/2013 (Table 3.1, USDA 2013). With world net production of rice (adjusting gross production of paddy for milling, seed, feed and losses) of 403.5 million tons, end year world rice stocks are equivalent to 26.1 percent of world net production. World trade in rice is relatively small (compared with wheat and maize). World exports were 37.6 million tons in 2012/2013, equivalent to only 9 percent of world net production. Thus, world rice trade is only about one-third the size of world stocks.

Table 4.1 National rice stocks, production, and trade (million metric tons)

Country	End stocks 2006/2007	End stocks 2012/2013	Net prod* 2009/2010	Net trade 2012/2013	End stocks/ (prod+imps)** 2012/2013	Trade/ End stocks 2012/2013
China	35.9	46.9	115.8	-2.6	39.5%	-5.4%
India	11.4	24.0	90.0	9.0	26.7%	37.5%
Thailand	2.5	12.5	18.3	6.4	66.4%	51.1%
Indonesia	4.6	3.6	35.2	-1.0	9.9%	-27.9%
Philippines	4.9	1.4	1.5	-1.5	47.4%	-106.5%
Vietnam	1.4	1.8	21.7	7.3	8.3%	405.3%
Japan	2.4	2.8	6.4	-0.5	38.8%	-18.2%
Pakistan	0.7	0.7	5.6	3.0	12.4%	425.4%
Bangladesh	0.4	0.9	28.0	-0.3	3.1%	-34.1%
United States	1.3	1.0	6.0	2.7	15.4%	261.1%
ROW	9.9	9.8	75.0	-19.5	9.7%	-199.1%
Total	75.5	105.4	403.5	37.6	26.1%	35.7%

Source: USDA data. (2013).

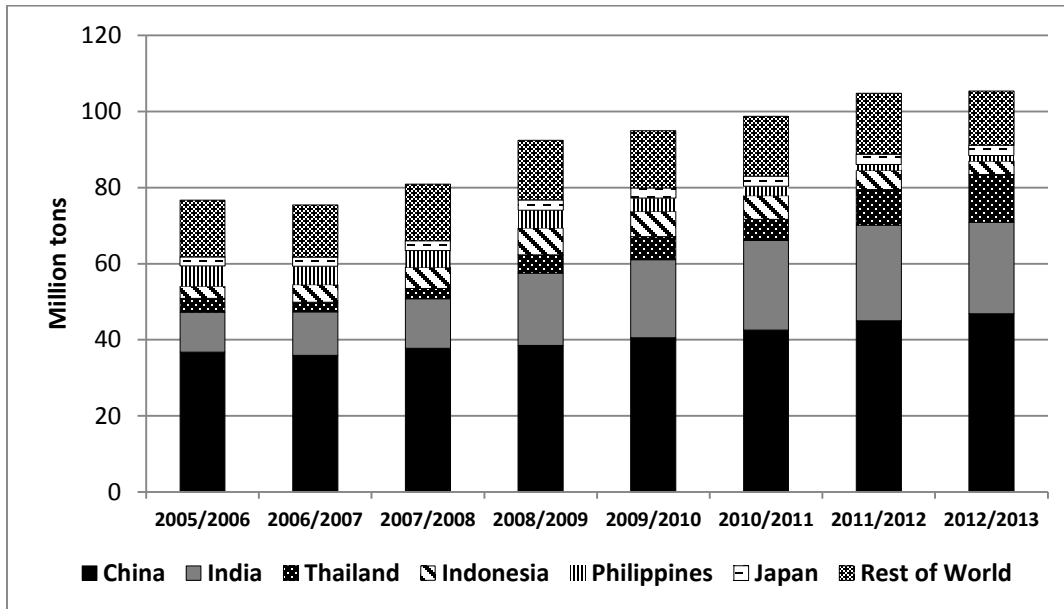
Notes: prod = production; imps = imports; ROW = Rest of the world. The total world trade figure shown here is the USDA figure for gross exports. * Net production of milled rice is calculated as gross production of paddy multiplied by the 0.67 milling rate, less 10 percent for seed, non-food uses and losses. ** End stocks 2012/2013 divided by the sum of 2009/2010 net production and 2012/2013 imports.

There is much variation in the ratio of stocks to net trade across countries, however. Among the major exporters, Vietnam and Pakistan hold stocks that are much smaller than their exports, while India and Thailand have stocks that are significantly larger than their exports. Both China and India currently hold stocks that are much larger than their net trade. Several of the major importers including, China, the Philippines and Bangladesh, hold stocks much larger than their imports, which limits to some extent their susceptibility to major international price shocks.

The world stock increase between 2006/2007 and 2012/2013 has been due almost exclusively to large increases in stocks of just three countries: China, India and Thailand. China, whose stocks accounted for almost half of the world total in both years, increased its stocks by 11 million tons.⁶ India, the world's second largest holder of rice stocks also increased its stocks, more than doubling its rice stocks from the end of 2006/2007 to the end of 2012/2013 (Figure 4.1).

⁶Note, however, that stock estimates of the US Department of Agriculture and FAO differ widely for many countries.

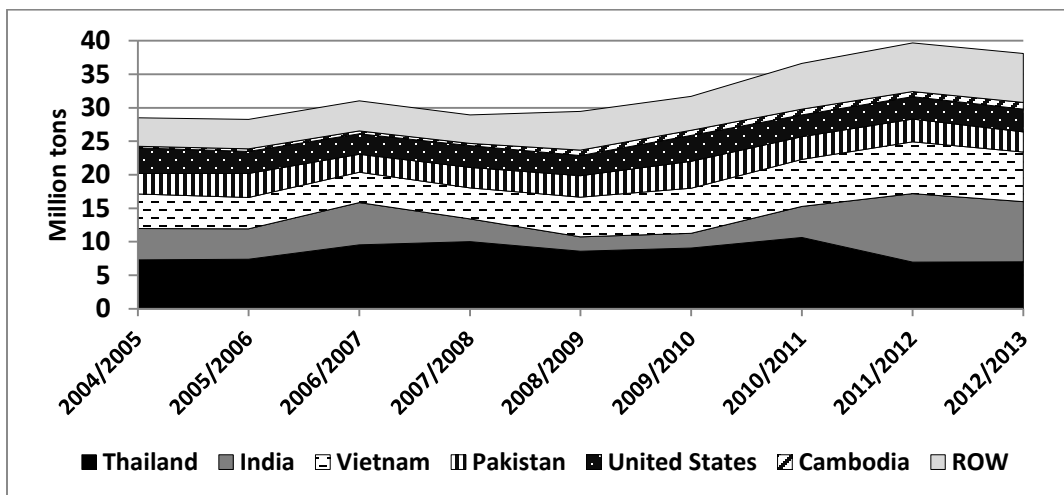
Figure 4.1 National rice stocks, 2005/2006 to 2012/2013



Source: USDA data (2013).

Thailand's increase in stocks has been largely due to an unsuccessful effort to boost international rice prices and its rice export earnings. Thailand substantially raised its support price for paddy in recent years, increasing domestic procurement and reducing exports. Although Thailand's exports decreased from 10.6 million tons in 2010 to only 6.9 million tons in 2011 and 7.0 million tons in 2012 (USDA 2013),⁷ international rice prices did not increase, as other countries increased their exports and filled the gap in supply (Figure 4.2). India's exports rose from 2.23 to 10.25 million tons between 2009/2010 and 2011/2012. Vietnam's exports also rose, from 6.73 to 7.72 million tons, in the same period.

Figure 4.2 Rice exports, 2004/2005 to 2012/2013



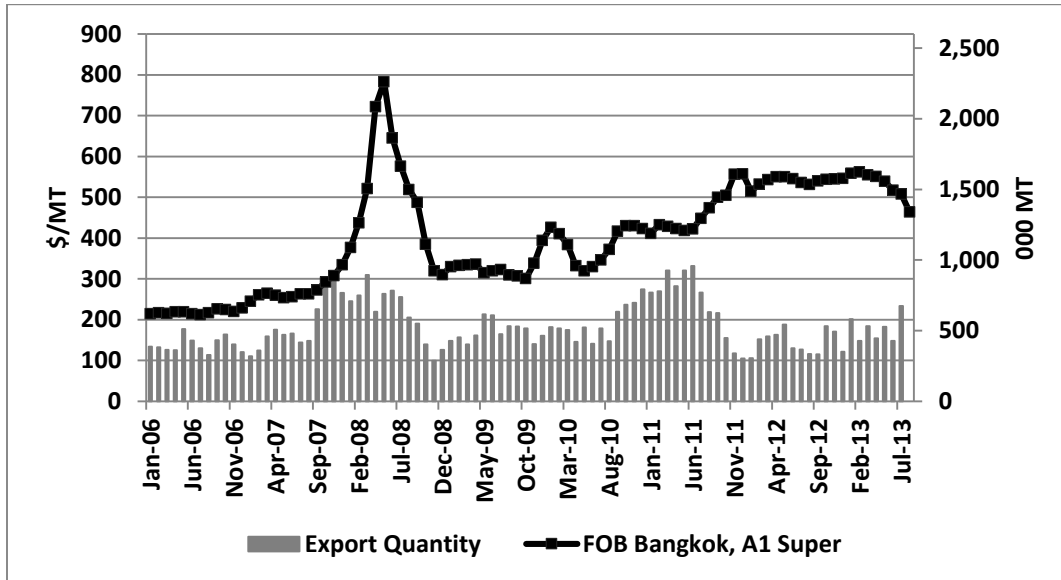
Source: USDA data (2013).

Note: ROW = Rest of the world.

⁷Data from the Thai exporters' association show a similarly large decline in exports, from 8.3 million tons in 2011 to 3.6 million tons in 2013. http://www.thairiceexporters.or.th/statistic_2005.htm

Because world prices have not risen, Thailand's support price of paddy, which had been increased from 11,250 Baht per kilogram in 2011 to 15,000 Baht per kilogram in 2012 (meaning, from \$553 per ton to \$724 per ton in milled rice equivalents), has remained above world export prices, implying a huge fiscal loss if the rice is exported (Figure 4.3). As a result, public stocks have risen from less than 6 million tons in 2010 to more than 15 million in 2013 (Figure 4.4).

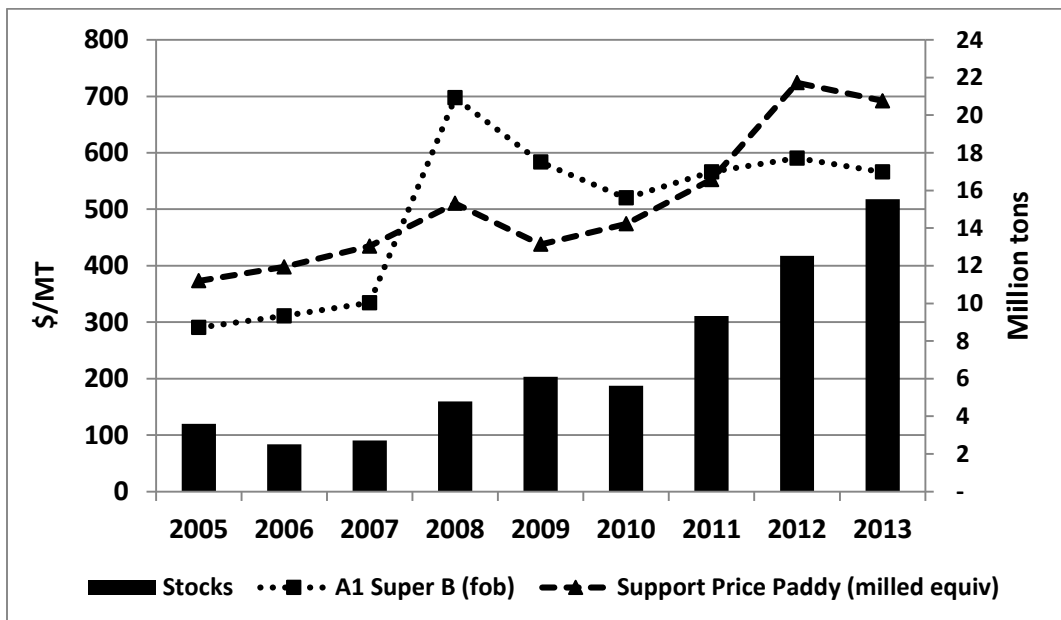
Figure 4.3 Thailand price and quantity of exports, 2006–2013



Source: Calculated from FAO (2013a) and The Rice Exporters Association (2013).

Note: MT = metric tons.

Figure 4.4 Thailand rice prices and stocks, 2005–2013



Source: Calculated from USDA (2013), FAO (2013a), and Finch (2014).

5. NATIONAL STOCK AND TRADE POLICIES

As discussed in the previous section, international trade has the potential to greatly reduce the costs of domestic price stabilization. However, because production outcomes and market conditions vary substantially from year to year, the relative contribution of stocks and trade to price stabilization can change over time, even when countries have liberalized trade regimes as illustrated by the evolution of rice trade and stocks in Bangladesh.

In the 1980s, Bangladesh attempted to stabilize foodgrain (rice and wheat) supplies and domestic prices through large national stocks, a strategy supported by major international donors. Releases from these stocks, together with food aid wheat inflows and government commercial imports of rice enabled the country to ensure food security following major floods in 1987 and 1988, but with a large fiscal cost.

Bangladesh liberalized its import trade in rice in the early 1990s, allowing the private sector to import both rice and wheat. As a result, in years of relatively poor harvests in the mid- to late 1990s, import parity prices provided a price ceiling for Bangladesh domestic market prices. Following the 1998 flood, private sector imports exceeded 200 thousand tons per month for seven consecutive months, stabilizing domestic prices at import parity (based on India wholesale market prices plus transport and marketing costs). At the same time, the Bangladesh government managed major targeted public distribution programs (and large working stocks) to address food security needs at the household level, showing that it is possible to have both public stocks (with a substantial distribution) and to promote private trade at the same time (Dorosh 2001).

From 2003 through mid-2007, however, Bangladesh private sector traders imported rice even in years of normal domestic harvests, as rice was available from India at prices substantially below international market (Vietnam and Thailand) prices. During this period, Bangladesh prices tracked import parity based on subsidized below poverty line (BPL) sales prices.⁸ These large-scale, private-sector rice imports (averaging 950 thousand tons per year) helped keep Bangladesh prices low and extremely stable. This benefitted consumers at no direct cost to the Bangladesh government, but they resulted in lower prices for rice producers (and lower rice production).

In mid-2007, world prices of major cereals rose sharply due to poor harvests in major producing countries and subsequent trade restrictions. India announced a rice export ban in late 2007, but later negotiated a restricted volume of trade at set prices. Bangladesh wholesale prices rose rapidly, but did not reach import parity with Thai rice, as international market prices hit record levels. In early 2008, public stocks were insufficient to allow much more distribution (end April stocks of rice had fallen to only 220 thousand tons). Nor was it able to quickly import sufficient rice from international markets to prevent a major domestic price increase before the next major domestic (winter season) rice crop harvest.

One major reason for the large increase in domestic prices in Bangladesh in this period was increases in private stocks that may have occurred due to uncertainties about import supplies and prices. Simulation analysis suggests that a moderate level of net distribution (an extra 1.1million tons) (with a half month of private stock reduction) would have limited the increase in real prices to only about 3 percent. Moreover, if government stocks had been sufficient to calm markets and private stockholding did not increase, extra net distribution of only 300 thousand tons could have been sufficient to keep prices stable (Dorosh and Rashid 2013).

⁸A specific Indian government program existed in 2002/2003 for subsidized exports of rice obtained from FCI (Food Corporation of India) stocks at BPL prices. There were no explicit policy statements regarding export subsidies in later years. Econometric analysis shows a statistically significant co-integration of wholesale and import parity (BPL) prices (Dorosh and Rashid 2013).

6. THE ROLE OF INTERNATIONAL RICE STOCKS

Both SAARC and ASEAN have implemented international rice reserves, though to date these efforts have been largely ineffective (Tables 6.1a and 6.1b).

SAARC established the SAARC Food Security Reserve in November 1987. Under the initial terms of the agreement, (Article IV: Procedure for the Release of Foodgrains from the Reserve), member countries in need were to directly notify another member country of “the emergency it is facing and the amount of foodgrains required” and the member country being requested for assistance would “take immediate steps to make necessary arrangements to ensure immediate and speedy release of the required foodgrains, subject to availability in the combination requested.” However, “the prices, terms and conditions of payment in kind or otherwise in respect of the foodgrains so released” were not specified, but were “subject of direct negotiations between the member countries concerned (SAARC 2007, 3).”

Table 6.1a International rice stocks: Membership, stock arrangements and goals

Name	Stocks	Goals
SAARC: South Asian Association for Regional Cooperation (1987-present) Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, Sri Lanka	Members contribute a prescribed amount every year, grain is held within country Stocks are earmarked for reserve	No explicit goals, implicit goal is to act as an emergency food reserve system during instances of food shortages and emergencies within the region
AERR: ASEAN Emergency Rice Reserve (1979-2004) Brunei, Cambodia, Indonesia, Lao, Malaysia, Myanmar, Philippines, Singapore, Thailand, Vietnam	Voluntary contribution of stocks by country with the end-goal of a regional stockpile Stocks are earmarked for reserve	<ul style="list-style-type: none"> • Strengthen food security in the region • Enhance international competitiveness of ASEAN food • Enhance ASEAN cooperation • Develop and accelerate the transfer and adoption of new technologies • Enhance private sector involvement • Sustainable development
EAERR: East Asia Emergency Rice Reserve (2004-2010) Brunei, Cambodia, Indonesia, Lao, Malaysia, Myanmar, Philippines, Singapore, Thailand, Vietnam, China, Japan, South Korea	Countries pledge a certain amount of rice; this rice can be used by other Asian countries in instances of emergency. Stocks are earmarked for reserve	<ul style="list-style-type: none"> • Increased rice trade among participating countries • Promotion of regional cooperation through explicit mechanisms • Intra and inter-regional trade
APTERR: ASEAN Plus Three Emergency Rice Reserve (July 2012-present) Brunei, Cambodia, Indonesia, Lao, Malaysia, Myanmar, Philippines, Singapore, Thailand, Vietnam, China, Japan, South Korea	Members are responsible for maintaining reserves and in many cases the commitment to the APTERR will come from national food reserves	<ul style="list-style-type: none"> • Rice is made available during emergencies • Price stabilization of rice sector • Improving farmers income and welfare • Food security without distorting the international market

Source: SAARC (1987), Joshi and Roy (2013), ADB (2011), APTERR (2011).

Note: ASEAN: Association of Southeast Asian Nations.

Table 6.1b International rice stocks: Terms of withdrawal and repayment, and effectiveness

Name	Withdraw	Repayment	Effectiveness of Rice Reserve
SAARC (1987-present)	Members can withdraw grains when needed and then replace into the reserve within two years	Price, terms, and conditions for repayment are based on negotiations between member countries. 1. Price quoted should be lower than prices generally charged 2. Prices should be representative of domestic and international markets	Small regional trade- has been slowly increasing, but tariffs still exist among member states
AERR (1979-2004)	Process of bilateral negotiations between member countries	Terms and price of transaction of rice is determined by the world market	Unused, very little effectiveness. AERR never made a release from its stocks 1. Reserves were too small 2. Bilateral negotiation procedure for AERR was a duplication of regular market transactions No funds in secretariat to allow AERR to function as a regional entity
EAERR (2004-2010)	Tier 1: releases are made under a special commercial transaction (supply and demand matching between countries). Functions as market intermediary or broker Tier 2: terms of release are governed by a loan or grant agreement from the earmarking country Tier 3: release for acute emergency, receiving country is expected to handle the logistics and costs	Terms and price of transaction is determined by the world market prices	Food crisis of 2007/8 led to the creation of APTERR (to act as a long term food security mechanism)
APTERR (July 2012-present)	Tier 1: specialized emergency contracts to meet emergency demand Tier 2: release of earmarked emergency rice reserves in response to emergency demand based on long-term loan agreements between countries supplying and demanding Tier 3: release of physical stockpiles and cash donations for rice purchase to meet acute emergency need (food aid)	Terms of loans and repayment has yet to be decided by the APTERR secretariat; contract pricing is determined by international market prices	<ul style="list-style-type: none"> • Procedures need to be streamlined to make the release of stocks more frequent • Potential distortions to international trade • Financial issues in the mobilization of funds from member countries • Institutional issues in organizational capacity and unharmonized laws, policies, and regulations across member countries

Source: SAARC (1987), Joshi and Roy (2013), ADB (2011), APTERR (2011).

Note: SAARC: South Asian Association for Regional Cooperation; ASEAN: Association of Southeast Asian Nations; AERR: ASEAN Emergency Rice Reserve; EAERR: East Asia Emergency Rice Reserve; APTERR: ASEAN Plus Three Emergency Rice Reserve

The lack of established terms of delivery, price and repayment, however, greatly hindered the use of the food security reserve. In late 1998, following a major flood, the Government of Bangladesh made an effort to access India's stocks in the food security reserve, but ultimately was not able to reach an agreement on repayment terms as the price specified by the Government of India was higher than India's open market price for rice at which private-sector traders were exporting rice to Bangladesh (Dorosh, Farid, and Shahabuddin 2003).

Subsequently, the SAARC food bank was established in 2007, under which member countries of SAARC are obligated to contribute a predetermined quantity of wheat and/or rice to the reserve every year. The grain that each member allocates to the reserve is held within the member country and is earmarked specifically for the SAARC reserve. The original reserve amount was 241,580 metric tons but the reserve amount has increased to 486,000 metric tons as a result of India substantially increasing its contribution in recent years.

While the SAARC food bank has no explicitly stated goals, the underlying goal of the food reserve system is to act as an emergency food reserve system during instances of food shortages and emergencies within the region. SAARC more explicitly seeks to promote regional cooperation and understanding (Joshi and Roy 2013).

The system of withdrawal in the SAARC food bank permits member countries to withdraw grains from the reserves, as needed, as long as those member countries replace the grains withdrawn within two years. This system permits members to have access to grains in instances of food insecurity without penalizing those members; it also gives members adequate time to replace any reserves that have been withdrawn.

Countries within SAARC are expected to conduct bilateral negotiations among themselves to come to an agreement concerning the terms, prices, and conditions about the repayment of reserves. Generally, the SAARC food bank agreement expects that the prices quoted for grains should be lower than those prices generally charged and that the prices quoted should be representative of domestic and international markets.

SAARC's food bank has been largely ineffective since there has been little political and economic motivation to operationalize the system to the larger scale that the food bank was intended to operate on. There has been small regional trade between member states that has been slowly increasing, but tariffs on grains still exist between member states.

ASEAN has established a series of food reserve systems, none of which has been utilized to date. The ASEAN Emergency Rice Reserve (AERR) was a food reserve system for ASEAN countries from 1979 through 2004. The 10 member countries that were members of the AERR were: Brunei, Cambodia, Indonesia, Lao, Malaysia, Myanmar, the Philippines, Singapore, Thailand, and Vietnam. The total reserve amount of the AERR was set at 87,000 metric tons, with countries that were larger rice producers (notably Thailand) contributing more to the reserve than other countries. ASEAN member countries voluntarily contributed to the reserve system; domestic stocks that were earmarked for the reserve. Withdrawal of stocks through the AERR system was mandated by a process of bilateral negotiations between member countries, similar to the process of SAARC. Repayment terms and prices were determined by the world market.

Ultimately, the AERR system was not effective since none of the member countries used the reserve throughout its existence. The reason for the ineffectiveness of the reserve was that the system functioned very similarly to the world market. Therefore, countries within ASEAN preferred to purchase rice from the world market instead of from within the reserve system. Additionally, the reserves were too small to help a country in the event of a real emergency and there were no funds in the secretariat that could allow the AERR to function as a regional entity.

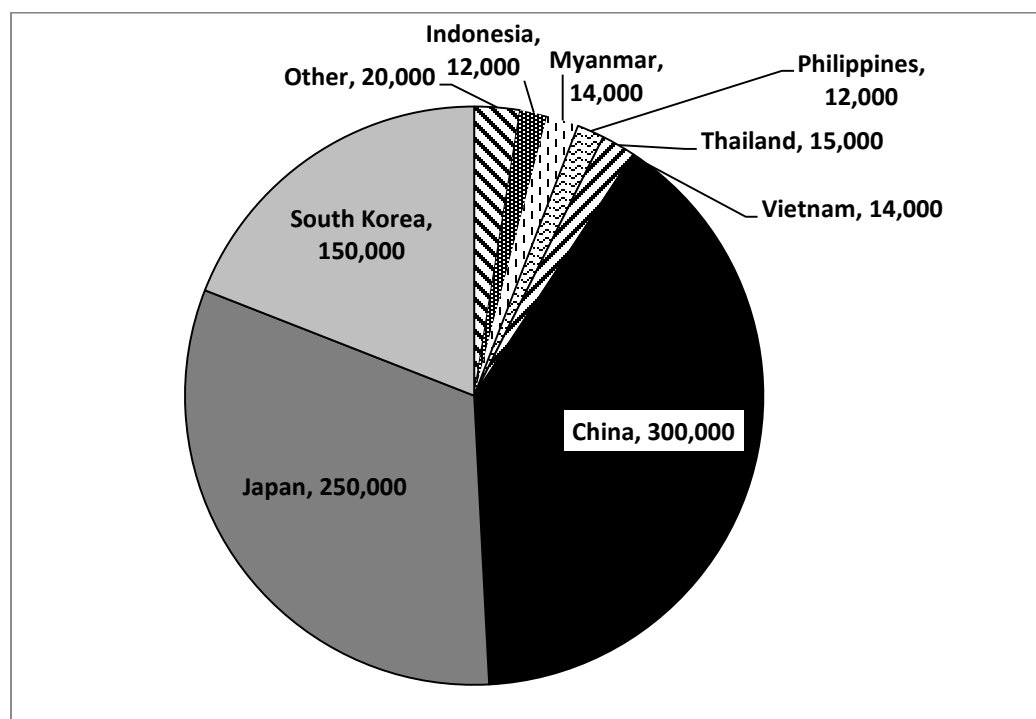
The East Asia Emergency Rice Reserve (EAERR) was a pilot project promoted by Japan and adapted out of the framework to the ineffective AERR. The program was led by Japan and member countries included the ASEAN countries of the AERR as well as China, Japan, and South Korea, and operated from 2004 to 2012. Member countries pledge a certain amount of rice to the program; these stocks that are pledged to the program are supposed to be both earmarked and physical stocks. The total rice reserves in the program are supposed to be 787,000 metric tons, with China, Japan, and South Korea acting as the major contributors.

The process for withdrawing stocks from the system was more complicated than the AERR withdrawal system. The EAERR system was comprised of three tiers, each of which was created to ensure that countries had an incentive to use the system and that the system was effective in ensuring food security for the member countries. In the first tier, releases were made under a special commercial transaction and the EAERR functioned as a market intermediary or broker. In the second tier the terms of the loan were governed by a loan or grant agreement from the earmarking country. Lastly, the third tier allowed for the release of acute emergency reserves, where the receiving country was expected to handle the logistics and costs of the transfer. The terms and prices of the transactions and repayment were determined by the world market.

The world food crisis of 2007/2008 highlighted some of the underlying issues within the EAERR. The crisis led to the creation of a new, long-term food reserve system that could better act as a long term food security mechanism in instances of food crises. The EAERR was effective in bringing countries together and creating a system of physical and earmarked reserves, but the system was too small to be effective during the world food crisis.

In 2012, the EAERR pilot was transformed into the APTERR program. APTERR is a formalized version of the EAERR pilot and contains all of the original countries of the EAERR. The APTERR attempts to improve on the EAERR by mandating that member countries contribute physical and earmarked stocks as well as monetary contributions. Stock contributions are still the same (at 787,000 metric tons) and member countries must also make monetary contributions to the reserve with China, Japan, and South Korea giving the largest contributions (Figure 6.1). Members are responsible for providing a set amount of rice to the reserve every year. Virtual stocks are country guarantees and typically will come from national food reserves. The APTERR also contains physical stocks, but the APTERR secretariat still has to determine where these physical stocks will be located.

Figure 6.1 ASEAN Plus Three Emergency Rice Reserve (APTERR) rice stocks



Source: APTERR (2011).

Note: "Other" includes Brunei, Cambodia, Lao, Malaysia, and Singapore.

Withdrawals of rice stocks are in a three tier system, as with the EAERR. Tier 1 withdrawals are reserved for specialized emergency contracts to meet emergency demand in the instance of a food crisis. Tier 2 withdrawals are for the release of earmarked emergency reserves in response to emergency demand based on long-term loan agreements between countries supplying and purchasing rice. Tier 3 withdrawals are for the release of physical stockpiles and cash donations for the purchase of rice to meet acute emergency rice need. Food aid falls under the category of Tier 3. The terms of loan repayment have yet to be decided by the APTERR secretariat.

The effectiveness of the APTERR has yet to be determined. The system was formalized in July 2012 and there are still several aspects of the system that have to be established by the secretariat, such as the physical location for food stocks and the specific terms of loan repayment for borrowing members.

7. OTHER PROPOSALS FOR INTERNATIONAL RESERVES

Following the surge in world cereal prices in 2007 and 2008, various proposals for stabilizing international markets were advanced, including regulations on futures market trading and establishing international physical and virtual grain reserves.

Though speculation was likely not a major cause of the surge in food prices in 2008, there is some evidence that it did play at least some role in price increases of maize, wheat, soybeans and rice (Robles, Torero, and von Braun 2009).⁹ Proposed options for reducing excessive speculation include monitoring speculative capital and limiting futures trading. Larger international physical grain reserves might also enhance food security and price stability (von Braun, Lin, and Torero 2009). An independent emergency reserve of 300 to 500 thousand tons of basic grains (about 5 percent of current annual food aid flows of 6.7 million tons of wheat equivalents) would enhance emergency response. This grain, supplied by the major grain-producing countries would be physically located in or near developing regions, using existing national storage facilities. In addition, a new international coordinated global food reserve could be constituted, composed of national stocks (in addition to pipeline stocks held by private-sector actors for commercial operations). A high level technical commission would then decide when interventions on spot grain markets were needed.

Another (not mutually exclusive) alternative would be a system of virtual reserves in which member countries would commit to supplying funds, if needed, for intervention in the futures market. In the event of a food price spike, the funds could be utilized for short sales, (meaning, a futures contract to deliver the commodity at a later date at a specified price), thereby putting downward pressure on futures market prices and as a consequence, spot market prices. Preliminary estimates suggest that such a virtual reserve might require \$12-20 billion, equivalent to 30 to 50 percent of normal grain trade volume (von Braun and Torero 2009).¹⁰

Implementation of any or all of these options requires overcoming substantial political and organizational hurdles, however. Some large countries may not be willing to cede control over stocks to an international body or group of experts. Nor is it certain that countries that make commitments at a time when supplies are relatively abundant would actually carry through on these commitments in times of scarcity. Interests of net exporters and net importers differ sharply, especially in the short run. Exporters have sometimes cut exports to prevent price increases in domestic markets (as did India in 2008), thereby harming consumers in net importing countries. Moreover, exporters compete against one another, (for example, Thailand's attempt to boost international prices and export earnings by withholding rice from international markets in 2012, while India and Vietnam increased their exports). Nonetheless, some type of improved coordination across countries could help avoid destabilizing and costly buildups of excessive national stocks.¹¹

⁹See also Timmer (2008; 2009).

¹⁰Gilbert (2012) argues that the case for international stocks of rice is stronger than the case for the other major grains (wheat and maize) in part because of the large volume of private stocks of these latter commodities. Moreover, much of the international rice trade is dominated by governments, and not the private sector and the absence of futures markets in rice may make speculative attack on an international rice stock less likely. Nonetheless, an international rice reserve would still suffer from the national coordination problems discussed below.

¹¹The problem of competing interests and coordination in an international rice reserve system is addressed more generally in international relations theory in terms of neoliberal institutionalism which assumes states focus on absolute gains (and prospects for cooperation), in contrast with structural realism which assumes states focus on relative gains (making conflict more likely). Observed differences in states' behavior may, however, reflect their constraints, as much as their preferences. See Powell (1991).

8. CONCLUSIONS

Supply disruptions and the sharp increase in rice prices in international markets in 2007 and 2008 have shaken the confidence in international markets of many national policy makers and made increases in stocks an attractive option. China and India, the two largest rice producers in the world, augmented their stocks by 11.0 and 12.6 million tons, respectively, between 2006/2007 and 2012/2013, accounting for most of the nearly 30 million ton increase in world rice stocks in this period. Overall, however, the 105 million tons of world rice stocks is still small relative to production (about 400 million tons of milled rice) and trade (about 38 million tons).

Current efforts at international rice reserves are too small to make a difference for price stabilization in international rice markets, though they could conceivably help small population countries in the event of a serious supply disruption. APTERR reserves are only 787 thousand tons, SAARC stocks are even smaller, only 241 thousand tons. Together these international reserves are only about 1 percent of world rice stocks and about 3 percent of annual international rice trade (and about 0.25 percent of annual world rice consumption).

Moreover, to date, international rice reserve arrangements have not been used in major emergencies and there is no evidence that they have added to price stability. Imports in international market can typically be arranged more quickly (and can even be less costly). Specifying terms of repayment in advance could reduce the time required to access these stocks.

Thus, holding moderate levels of national rice stocks will likely remain the best option for providing an insurance against short-term disruptions in trade and a tool to calm domestic rice markets in times of heightened market uncertainty. Nonetheless, there are substantial gains from trade in most years for importing (and exporting) countries, and the evidence suggests that a blend of prudent public stock levels and management, together with openness to trade, is the most effective approach for minimizing disruptions to supply and enhancing stability of rice prices in the short run. Together, with medium term policies to promote technical change and efficient domestic production, a combination of stocks and trade will likely remain the best option for ensuring food availability at the national level.

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