

Irfan Mujahid and Lukas Kornher

17.1 Introduction

High uncertainty and volatility of food prices in the recent years have renewed the interests of many countries in considering food reserves as an important instrument in managing food price instability. These reserves come back into the focus of policy agenda as a result of the huge doubts on the reliability of international trade to guarantee food supply. The 2008 crisis, in particular, highlighted that low levels of food stocks make countries vulnerable to excessive price volatility even only with low levels of supply or demand shocks (Wright 2009).

Countries in Southeast Asia have been using storage-based price stabilization for decades (Rashid et al. 2007). Grain price stabilization in the Philippines started in 1960s, carried out by Rice and Corn Administration (RCA) and Rice and Corn Board (RICOB). In Indonesia, price stabilization is managed by *Badan Urusan Logistik* (BULOG), a national food reserve agency created in 1967. At the regional level, the cooperation on food reserves has been ongoing since the late 1970s, when the original members of the Association of Southeast Asian Nations (ASEAN) established the Agreement on Food Security Reserve (AFSR). The ASEAN Emergency Rice Reserve (AERR) was created in 1979 with the initial earmarks of 50,000 tons of rice to serve as the subset of national stocks in addressing

I. Mujahid (✉)

Center for Development Research, University of Bonn, Bonn, Germany

e-mail: imujahid@uni-bonn.de

L. Kornher

University of Kiel, Kiel, Germany

food emergencies in the region. However, due to small size of the stocks and its complex release mechanism, the AERR had never really been activated during the entire operational period of more than a quarter of a century (Dano 2006).

The recent food price crisis affecting almost all countries in the world led to a new phase of the regional reserve cooperation in Southeast Asia. The ten member countries of ASEAN, in partnership with China, Japan, and Korea, agreed on the ASEAN Plus Three Emergency Rice Reserve (APTERR), which entered into force in July 2012. The APTERR is a permanent reserve scheme which replaces the pilot project East Asia Emergency Rice Reserve (EAERR), which itself was presented as a metamorphosis of the AERR. The initial earmark of APTERR is 787,000 tons of rice, roughly twice the size of von Braun and Torero's (2008) proposal for a modest emergency grain reserve of 300,000–500,000 metric tons for the whole world. However, the APTERR has hardly been tested in practice. Since entering into force, only 200 tons of rice have been released at the end of 2012 for poverty alleviation and the malnutrition eradication program in Indonesia, and another 800 tons of rice in early 2014 for typhoon Haiyan victims in the Philippines. Several other small releases have been made during its pilot phase from 2004 to 2010.¹

This study aims to review the storage-based price-stabilization policy in Southeast Asia, both at the national and regional level, and to discuss the prospect of the policy in the current era of price instability. The remainder of the article is organized as follows: Sect. 17.2 provides information on ASEAN market structure, which will discuss the food trade and development of trade cooperation in the region. Sections 17.3 and 17.4 describe food reserves at the national and regional level in ASEAN, including a discussion on their cost and benefit. The discussion about food reserves at the national level will use several countries in ASEAN as examples, while at the regional level, the discussion will mainly focus on the ASEAN+3.² Section 17.5 analyzes the WTO rules on public stockholding, and the last section provides the concluding remarks.

17.2 ASEAN Food Market Structure

The recent waves of global food price crisis have affected almost all countries in the world. ASEAN countries are among those that are hit by the price crisis. Since 2007, the food price index increases have been higher than the consumer price index increases in the region (Fig. 17.1).

ASEAN countries accounted for 29 % of the total global rice output in 2013, while maize production in this region accounted only for 4 % of the total global output. Countries in this region are not traditional producers of wheat and other

¹www.apterr.org, accessed on 17 September 2014.

²Association of Southeast Asian Nations (ASEAN) members are: Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Thailand, Vietnam; Plus Three Countries (+3) are China, Japan, Rep. Korea.

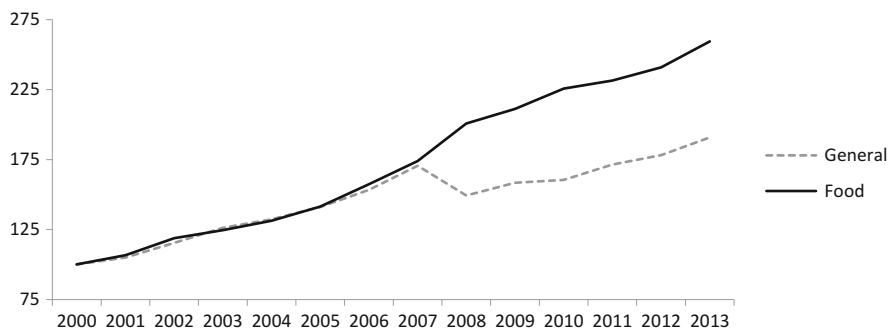


Fig. 17.1 General and food price index in Southeast Asia (2000 = 100). *Source:* FAOSTAT

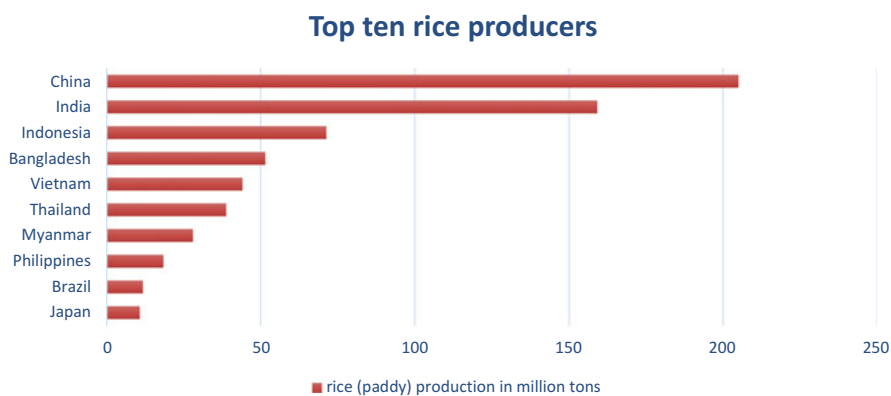


Fig. 17.2 World's rice production in 2013. *Source:* FAOSTAT

cereals. The countries rely heavily on import for their supply of these commodities. Most Southeast Asians eat rice as their main staple food. Rice constitutes more than half of the population's total calorie intake from cereal. In Thailand and Vietnam, rice accounts even for more than two-third of their total calorie intake from cereal.³

ASEAN provides a mix of cases. It is home to some of the world's biggest producers, consumers, exporters, and importers of rice at the same time. Thailand and Vietnam are among the biggest rice exporters, whereas Indonesia, Malaysia, and the Philippines are among the biggest rice importers in the world. However, Indonesia and the Philippines, with their goals to achieve self-sufficiency, view trade as the last source of supply, making them occasional rice importers depending on their production level. Other countries such as Singapore and Brunei are considered as traditional purchasers of rice (Fig. 17.2).

³Own calculation based on FAOSTAT data. The shares are among cereals, in 2012.

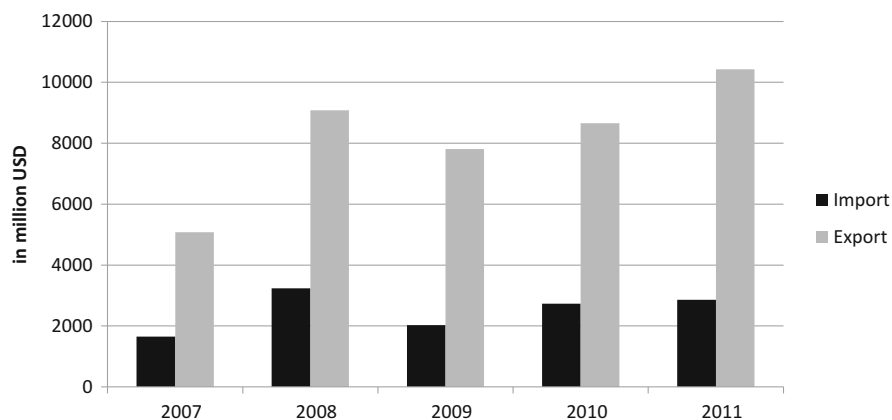


Fig. 17.3 ASEAN rice trade 2007–2011. *Source:* FAOSTAT

Table 17.1 ASEAN rice trade balance 2011 (million USD)

Country	Import	Export	Net import
Brunei	39.6	2.0	37.6
Myanmar	1.6	98.5	−96.9
Indonesia	1513.2	0.8	1512.3
Cambodia	4.9	107.9	−103.1
Lao PDR	9.8	NA	NA
Malaysia	606.1	0.4	605.7
Philippines	383.2	1.7	381.5
Singapore	284.3	52.6	231.6
Thailand	8.9	6507.5	−6498.6
Vietnam	1.3	3656.8	−3655.5

Source: FAOSTAT

The international rice market has been historically thin and unstable (Dawe and Timmer 2012). The geographic concentration of rice production and the thinness of international rice trade with high transactions costs are among the factors contributing to its instability. Only about 5 % of the total global rice production enters the international market, which is mostly concentrated in Asia. Southeast Asia as a region is a net rice exporter (Fig. 17.3), but the bulk of the countries are rice importers (Table 17.1).

ASEAN countries' imports are mainly sourced from within the region. The countries in this region absorb roughly one-third of the total regional exports and send the excess rice supply to the rest of the world (Fig. 17.4).

The average rice tariff rates of ASEAN countries are relatively high compared with other commodities. In 2012, the tariff for rice was 15.94 % on average among ASEAN countries, which was much higher than the total average tariff rates for all commodities (Table 17.2).

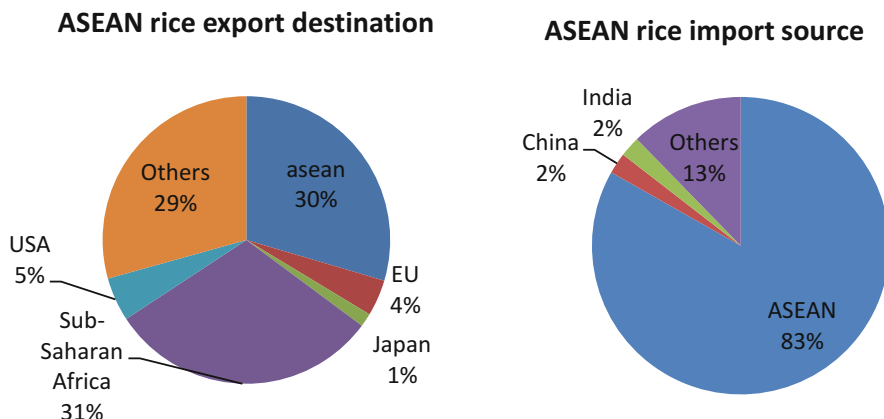


Fig. 17.4 ASEAN rice trade flow 2011. *Source:* UN COMTRADE

Table 17.2 Average tariff rates of ASEAN countries' in 2012 (%)

Sector	Tariff rates
All commodities	5.42
Food commodities	7.01
Rice	15.94

Source: TRAINS database accessed via WITS
Note: Average tariff rates not weighted, classification based on standard product in SITC

Southeast Asian countries liberalize their markets through regional and multi-lateral trade agreements. The cooperation through ASEAN started in 1967, and all ASEAN members are currently also members of the World Trade Organization (WTO). Through the ASEAN Trade in Goods Agreement (ATIGA), which supersedes the Common Effective Preferential Tariff (CEPT) scheme implemented in 1992, international trade within the region is almost without tariffs except for certain sensitive commodities. In addition to bilateral cooperation between ASEAN members and many other countries, the members also build cooperation with neighboring countries while maintaining ASEAN centrality (Fig. 17.5). There are AK-FTA (with Rep. Korea), AC-FTA (with China), AANZFTA (with Australia and New Zealand), and AI-FTA (with India). Although the agreement of ASEAN and Japan has not yet entered into force, many ASEAN members have already established bilateral agreement with Japan. Furthermore, Regional Comprehensive Economic Partnership (RCEP), which will combine ASEAN and their six partners, is currently under negotiation.⁴ ASEAN itself is entering a new phase of stronger cooperation through the ASEAN Economic Community (AEC) in 2015.

⁴RCEP participating countries are ASEAN countries (Brunei, Burma, Cambodia, Indonesia, Laos, Malaysia, Singapore, Thailand, Philippines, Vietnam) plus their six partners (Australia, China, India, Japan, New Zealand, and South Korea), launched in November 2012.

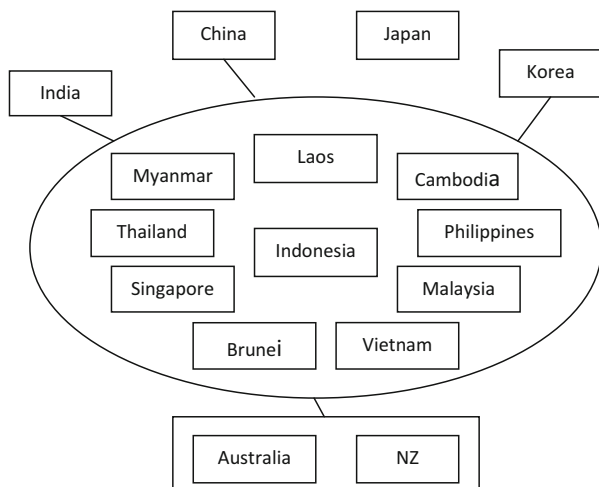


Fig. 17.5 ASEAN free trade agreement. *Source:* WTO

Table 17.3 Tariff of selected agricultural product of different trade agreement regimes 2012 (%)

Commodity	MFN applied	ATIGA	AKFTA	ACFTA	AANZFTA	AIFTA
Animals & product	4.6	0.0	0.1	0.0	0.8	2.2
Dairy products	5.4	0.0	0.0	0.0	0.8	2.2
Fruit, vegetables, & plants	5.3	0.0	0.1	0.0	1.2	3.8
Coffee & tea	6.4	0.0	0.0	0.0	0.4	4.3
Cereals	11.8	7.1	7.3	7.3	7.7	10.1
Oil seeds, fats, & oils	4.3	0.0	0.0	0.0	0.1	2.3
Sugar	12.8	8.1	8.1	8.1	8.1	10.4
Cotton	4.0	0.0	0.0	0.0	0.0	1.6
Other agriculture products	4.1	0.0	0.0	0.0	0.1	2.4

Source: WTO. *Note:* MFN most favoured nations, ATIGA ASEAN Trade in Goods Agreement, AK FTA ASEAN Korea FTA, AC FTA ASEAN China FTA, AANZFTA ASEAN Australia New Zealand FTA, AI FTA ASEAN India FTA

However, despite having significantly reduced their tariffs on many commodities through trade agreements among ASEAN members (and plus countries), considerably high cereals tariffs are still in place (Table 17.3). Cereal products, especially rice, are considered highly sensitive commodities in ASEAN, and thus ASEAN countries still make exceptions by not reducing the tariff on these commodities.

17.3 National Food Reserves in Southeast Asia

The fact that the international rice market has been historically thin and unstable forced countries in this region to prevent the transmission of world price fluctuations to domestic markets (Dawe and Timmer 2012; Rashid et al. 2007). Storage-based public intervention policies have been part of their development agenda for many years to control food availability in the market.

Food price stabilization in the Philippines is managed by the National Food Authority (NFA), which acts as a regulator as well as a corporation engaged in grain trading. The history of the NFA started in the 1960s, when the RICOB and the RCA were still active. In 1972, the National Grains Authority (NGA) replaced these two agencies to promote the integrated growth and development of the grain industry in the country. In 1981, the NGA was transformed to the NFA, and the new organization has two primary mandates: ensuring food security and stabilizing the supply and price of rice. This highlighted the importance of rice in the society. The NFA aimed to fulfill its mandates through procurement, distribution, importation, and buffer stock activities. For the buffer stock activities, the NFA is required to maintain rice stocks which are equivalent to 15 days of consumption for the entire country in its warehouses (Aquino et al. 2013).

In Indonesia, price stabilization was managed by BULOG, a national food reserve agency created in 1967 with the special objective to protect Indonesian domestic markets from sharp price fluctuations on world markets. BULOG buys excess rice production that is not absorbed by the market during harvest seasons from farmers, keeps the rice in its warehouses throughout the country, and distributes the rice at low prices during planting seasons, drought, or other conditions that may cause sharp increases in market rice prices. BULOG maintains a ceiling price policy to ensure the affordability of rice for low-income consumers, especially those living in urban areas. Like the NFA in the Philippines, BULOG also monopolizes rice imports in Indonesia.

As rice importers, Indonesia and the Philippines mainly control rice imports. Other countries, such as Vietnam, which is an exporter country, also use public reserve policies to control rice exports. VINAFOOD in Vietnam is responsible for managing rice availability and rice prices in the market.

17.3.1 Benefits and Costs of National Reserves

Although it is difficult to separate the contributions of policies, we have provided some reviews and discussions on the costs and benefits of national food reserve using qualitative approaches. Rashid et al. (2007) argued that storage-based price-stabilization policies benefit countries through price stability and better agricultural performance. Southeast Asian countries were among those that successfully

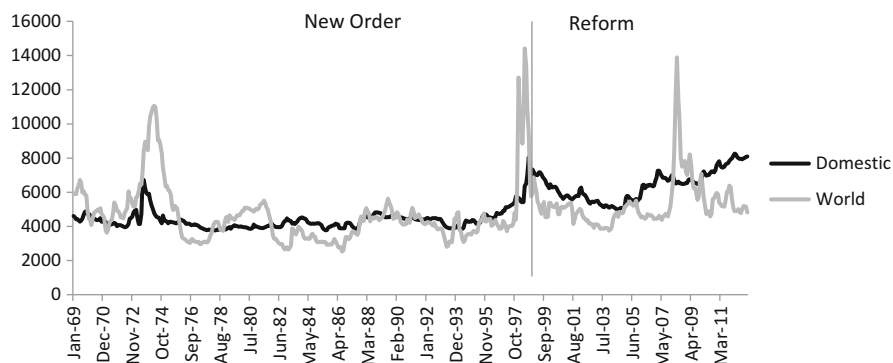


Fig. 17.6 Rice prices in Indonesia during “New Order” and “Reform.” *Source:* Dawe (2008) and GIEWS

managed their domestic food prices for years. Under the “New Order,”⁵ Indonesia was one of the success stories of food price stabilization, especially for rice. From 1969 to 1997, domestic rice prices were substantially less volatile than in the “reform”⁶ period after 1998, when BULOG has less power to intervene in the market⁷ (see Fig. 17.6). In Vietnam, agricultural policies introduced in the early phase of the unification of North and South Vietnam have transformed the country with disappointing agricultural production to one of the biggest rice exporters in the world.

Price stability benefits consumers and producers at the same time (Timmer 1989). Poor consumers in Southeast Asia, like many others in developing countries, spend more than half of their income on food (von Braun and Tadesse 2012). Excessive price volatility and spikes can cause food and nutrition insecurity for those consumers who cannot maintain consumption stability. Reducing food and nutrition intake, even only temporarily, can have short- and long-term effects (Block et al. 2004). Price-stabilization policy serves as a preventive program instead of a response program for emergency cases. This kind of policy can help consumers better manage their expectations on food prices and thus better manage their food and nutritional intake. Price stability also helps producers maintain consumption stability because most farmers in Southeast Asia are also categorized as poor citizen living in rural areas.

Furthermore, price stability allows farmers to better manage price expectations on food crops, which can enhance efficiency in the farming sector through better management of planting systems. Moreover, price stability contributes to social and

⁵“New Order” refers to the government lead by President Soeharto, in power from 1967 to 1998.

⁶“Reform” refers to democratization era in Indonesia after the lost power of Soeharto regime in 1998.

⁷Empirical test using standard deviations of log of prices in difference (SSD) shows 0.05 for the periods before 1998 and 0.1 for the periods after 1998.

political stability. Arezki and Brückner (2014) showed that price movements can induce political instability, which is manifested in political riots and civil conflicts. Sociopolitical instability can in turn make it difficult for governments to promote growth and development.

Food price stability is in fact associated with the rapid economic growth during the early development phase in Southeast Asia (Dawe and Timmer 2012; Cummings et al. 2006). However, the downside of stabilization policies are that the fiscal costs of public reserves are often high, while the benefits may not be as high as expected. In the Philippines, for instance, the government spending on the NFA surpassed its spending on agrarian reform, research and development, and extension services during the period of 2003–2008 (Aquino et al. 2013). In Indonesia, a financial audit report by Arthur Anderson covering the period from April 1993 to March 1998 suggested that total inefficiency of BULOG was about US\$400 million per year (Arifin 2008). Likewise, the economic costs of distorting market and crowding out private storage and trade can also be very high.

Over decades, there have been several shifts in the price-stabilization policies in Southeast Asia. In the 1980s and 1990s, public reserves fell out of favor particularly because of the changing interest of many countries, which wanted to improve market efficiency. Fiscal difficulties caused by the Asian crisis in the late 1990s triggered countries in the region to intervene less in the market. Indonesia loosened its monopolistic structure and created competition within the domestic market. BULOG lost its domestic power to monopolize the sugar and rice trade because Indonesia was required to comply with the International Monetary Foundation (IMF) Letter of Intent by liberalizing its market.

17.4 Regional Food Reserve Cooperation

Following the global food price crisis in 2008, ASEAN countries agreed on the ASEAN Integrated Food Security (AIFS) framework, which aimed to address four major components of the food security challenges: food security arrangements and emergency short-term relief, sustainable food trade development, integrated food security information system, and agricultural innovation. The AIFS framework provides the foundation for the establishment of the APTERR, an ASEAN regional reserve cooperation together with its three partners.⁸ The APTERR was finally agreed upon in October 2011 and entered into force in July 2012.

The history of the APTERR dates back to 1979, when the original members of ASEAN⁹ agreed on the ASEAN Emergency Rice Reserve (AERR). The objective was to build up physical rice reserves that would serve the needs of member countries when the demand in any member country cannot be fulfilled from own

⁸China, Japan, and Rep. Korea.

⁹Five original members are: Indonesia, Malaysia, Philippines, Singapore, and Thailand; current ASEAN members also include Brunei, Cambodia, Laos, and Vietnam.

production or through purchases in international market. The main reason for the cooperation was that the ASEAN countries identified food instability as a common threat and as the consequence of the high vulnerability of the region's food production. The AERR was created with the initial earmarks of 50,000 tons of rice as a subset of national stocks. Releases from the AERR were to be arranged through bilateral negotiation between a country in a state of emergency and a country offering its earmarked reserve. The system, however, was never used, and the amount of rice in the reserve was too undersized to cope with an actual emergency.

The efforts of building up stocks in the region continued. In 2001, ASEAN countries, in partnership with China, Japan, and Korea, initiated a consultation and cooperation process in establishing an emergency rice reserve at the regional level. A pilot project of the East Asia Emergency Rice Reserve (EAERR) was created at the end of 2003 with the political support of the ASEAN Plus Three countries. The purpose of the EAERR is twofold: maintaining food security in case of emergency and contributing toward price stability in the region (APTERR 2014). The food price crisis in 2008 led the ASEAN Plus Three governments to strengthen the financial and stockpiling abilities of the EAERR and move beyond the project beyond its pilot phase. The APTERR was finally agreed upon as a permanent scheme in October 2011 and entered into force in July 2012.

The initial earmarked stock of the APTERR is 787,000 tons of rice, which were voluntarily contributed by the member countries (Table 17.4). The stocks remain owned and controlled by the respective governments for meeting the needs of any other member countries in case of emergency. The governments are also responsible for the management cost of their earmarked stocks to ensure the stocks remain in

Table 17.4 Earmarked stock of APTERR

Country	Earmarked stocks (tons)
<i>ASEAN countries</i>	
Brunei Darussalam	3000
Cambodia	3000
Indonesia	12,000
Lao PDR	3000
Malaysia	6000
Myanmar	14,000
Philippines	12,000
Singapore	5000
Thailand	15,000
Vietnam	14,000
<i>Plus Three countries</i>	
China	300,000
Japan	250,000
Korea	150,000
Total	787,000

Source: APTERR

good quality. Another type of APTERR stock is a stockpiled emergency rice reserve, which could be in form of cash or rice, but is owned collectively by APTERR member countries and managed by the APTERR secretariat under the supervision of the APTERR council.¹⁰

The APTERR is designed to mainly address emergency situations anywhere in the region. Emergency is defined as “the state or condition having suffered extreme and unexpected natural or man-induced calamity, which is unable to cope with such state or condition through its national reserve and is unable to procure the need through normal trade.”¹¹ In principle, given the definition of emergency, extreme price volatility is not a reason for releasing rice from the APTERR.

The APTERR presents itself as a subset of national reserves. Rice release from the APTERR is only possible when a national reserve is unable to cope with extreme shocks. The release of APTERR stock is based on the request of the member country which encounters an emergency rice shortage. The requesting country is also responsible for the transportation and operational costs incurred during the stock release.

The APTERR heavily relies on the commitment and political will of every member country, without any sanction mechanism in place. Nevertheless, APTERR member countries appoint a Management Team to ensure rice releases take place in case of emergency.

17.4.1 The Benefits and Costs of Regional Reserves

There have been extensive debates on storage-based price-stabilization policies (Galtier 2013). On the one hand, countries with public reserve policies can benefit from price stability and better agriculture performances, which are associated with economic success. On the other hand, the policies are often criticized for their high fiscal and economic costs.

National public food reserves in Southeast Asia are largely managed as buffer stocks to address price instability. The size of national public food reserves is usually large, and their stocks are frequently rotated to maintain the quality of the stocks. Consequently, the fiscal costs of storing food/grains are high, and the potential of creating market distortion is high as a result of the high degree of intervention. On the other hand, an emergency public reserve usually holds a low amount of stocks and is only intended for addressing humanitarian needs rather than for price stabilization.

In the competitive storage model, the central idea behind storing food today for tomorrow's consumption is based on the assumption that an equilibrium price can be reached when today's price (p_t) equals the expected price tomorrow (p_{t+1}) plus the costs of storage. Stocks are held in anticipation of profit, which implies that the

¹⁰The APTERR council is composed of one representative from each APTERR member country.

¹¹ASEAN Integrated Food Security Framework.

marginal gain of holding stocks should exceed the marginal cost. However, under this condition, the optimal stock level is not necessarily optimal from the social welfare perspective.

Using this assumption, public involvement in stockholding is needed to address the economy-wide consequences of demand or supply shocks. Difficulties arise when determining the optimal stock level (Gardner 1979) as it depends on the criterion of desirability. For instance, public rice stocks maintained by the NFA in the Philippines are equivalent to 15-day consumption needs of the entire country (Aquino et al. 2013). This stock level is determined based on the assumption that the national stock level (public and private) should be equivalent to the 90-day consumption needs, which covers the lean season, when usually no harvests from domestic production prevail.

Notwithstanding the difficulties in determining the optimal stock level, we provided an illustration on how regional cooperation can significantly reduce the required stocks.¹² Following Kornher and Kalkuhl (2014), we estimated the required stocks as the difference between the largest historic supply shortfall and the percentage of threshold:

$$S = \max \left[\left(1 - \frac{x}{100} \right) E(Q_t) - Q_t \right] \tag{17.1}$$

where x is the level of allowed supply shortfall. For instance, if we want to maintain 97 % consumption stability, then the allowed supply shortfall is 3 %. $E(Q_t)$ is the expected supply level at time t . Since supply for consumption increases with population growth, we measured shortfall around a trend.

Supply shortfalls of countries individually were compared with the total supply shortfalls of the entire region using the coefficient of variation of supply, which can be written as:

$$CV^2 \left(\sum_1^n Q_i \right) = \sum_1^n s_i^2 CV(Q_i) + 2 \sum_1^n \sum_{i+1}^n s_i s_{i+1} + 1 r_{i, i+1} CV(Q_i) CV(Q_{i+1}) \tag{17.2}$$

where $CV^2 \left(\sum_1^n Q_i \right)$ is the coefficient of variation of the regional supply, and Q_i is the supply of each country. s_i and $r_{i, i+1}$ are a country's share and coefficient of correlation, respectively. This condition assumes that there is free flow of food between the countries within the region. Production shortfall can be compensated by imports, which means that the supply shortfall in one country can be compensated by supply surpluses in other countries.

¹²Further discussion on optimal stock level can be found in Kornher and Kalkuhl (2014).

Table 17.5 Stocks required for allowed supply shortfall of 3 % (tons)

	w/o cooperation		With cooperation		Actual APTERR stock	
	Required stock	Stock-to-use ratio	Required stock	Stock-to-use ratio	Earmarked stock	Stock-to-use ratio
<i>ASEAN</i>						
Brunei	1227	23.22	688	13.02	3000	56.76
Cambodia	47,768	12.95	26,799	7.27	3000	0.81
Indonesia	57,413	1.05	32,210	0.59	12,000	0.22
Lao PDR	18,912	10.73	10,610	6.02	3000	1.7
Malaysia	17,947	5.59	10,069	3.14	6000	1.87
Myanmar	34,552	2.37	19,385	1.33	14,000	0.96
Philippines	78,355	5.41	43,960	3.04	12,000	0.83
Singapore	10,420	23.28	5846	13.06	5000	11.17
Thailand	130,132	8.60	73,008	4.82	15,000	0.99
Vietnam	136,657	5.42	76,669	3.04	14,000	0.55
<i>Plus Three</i>						
China	678,268	3.2	380,533	1.8	300,000	1.42
Japan	132,280	8.7	74,214	4.88	250,000	16.45
Korea	59,788	6.93	33,543	3.90	150,000	17.40
Total	1,403,717	3.81	787,535	2.14	787,000	2.14

Source: Own elaboration based on USDA PSD. *Note:* required stocks w/o cooperation and with cooperation are calculated for 2 months consumption

Considering that not all of ASEAN countries are rice producers, supply data (production + imports) was used instead of production data only. Rice supply in Singapore, for instance, relies heavily on imports. Using the actual rice supply data of ASEAN+3 countries from the USDA PSD for the period of 1980–2014, we estimated the required stocks for the 2-month consumption stability at 97 % (allowed supply shortfall of 3 %). Countries' stocks were determined from the regional stocks using their consumption shares. The results of the estimations are presented in Table 17.5.¹³

The simulations showed that regional cooperation can significantly reduce the required rice stock by roughly 44 %, from 1,403,717 to 787,535 tons. This implies that the fiscal costs associated with holding stocks can be reduced through cooperation and risks sharing. The simulations also showed that all countries can reduce the required contributions of stocks through regional risk sharing.

In the APTERR system, stocks remain owned and controlled by the respective governments for the purpose of meeting the needs of any other APTERR member countries when they experience an emergency. However, transportation costs arise when transferring rice from a donor country to a country in need. This transportation costs should also be taken into consideration when calculating the cost reduction

¹³Correlation matrix of supply shortfall, maximum shortfall, average annual supply, and consumption shares that were used for the estimations are available in Appendix.

Table 17.6 Storage and transportation cost (million USD)

	Storage cost		Transportation cost		Total cost	
	Low	High	Low	High	Low	High
w/o cooperation	35	49	–	–	35	49
With cooperation	20	28	0.7	1.1	20.7	29.1
Cost savings					14.3	19.9

Source: own elaboration. *Note:* Storage cost is estimated in the range of US\$25 (low) to US\$35 (high) per ton. Transportation cost within ASEAN+3 countries is estimated in the range of US\$10 (low) to 15 (high) per ton

resulting from cooperation. Since transportation costs arise only when a country within the region experiences a shortfall, we calculated the transportation costs from the expected trade volume¹⁴ in times of shortfall, which was estimated to be equal to the required stocks for 2 months consumption. The results are available in Table 17.6.¹⁵

The total cost saving through food reserve cooperation was estimated to be about US\$14.3–19.9 million when storing enough food to satisfy consumption for 2 months. The saving is roughly 40 % of the estimated cost without cooperation.

The current APTERR stock is roughly equal to the total stocks needed by the region to maintain consumption stability at 97 % for 2 months. However, the voluntary contribution of each member country of the APTERR is not the same as the required stock for each country with cooperation through risks sharing. For instance, Japan and Korea contribute more than what they need, but Cambodia and Lao PDR contribute less than their required stocks. Richer countries of the APTERR are more likely to provide food assistance to their poorer neighboring countries. This can be seen also from the voluntary contributions of APTERR member countries: each of the “Plus Three” countries contributes more than the total contribution from all ASEAN countries. There is a strong indication that the large contribution from the “Plus Three” countries has brought APTERR into practice. Its predecessor, the AERR, which consisted only of ASEAN members with small size of stock, had never released its stock during its entire operational period.

We also conducted a simulation to determine the required stock for ensuring consumption stability of 97 % in different cooperation regimes in order to analyze whether countries benefit from larger cooperation (Table 17.7). Through our simulation of three scenarios—ASEAN, ASEAN+3, and ASEAN+3 plus India—we found that the benefits of cooperation decreased when more countries joined the cooperation. This is possible because the correlation of shortfall risks increases with the increasing number of member countries. However, although the benefits of cooperation were decreasing, the required stock was still significantly reduced.

¹⁴The expected trade volume in times of shortfall is based on the mean value of the historical regional shortfalls.

¹⁵Numbers of supply shortfall for each country are available in Appendix.

Table 17.7 Stocks required for allowed supply shortfall of 3 % in different (tons)

Regional cooperation (simulation)	Required stocks without cooperation	Required stocks with cooperation	Reduced by (%)
ASEAN	533,382	178,885	66
ASEAN+3	1,403,717	787,535	44
ASEAN+3+India	2,362,418	1,637,777	31

Source: Own elaboration based on USDA PSD

For instance, if India also joined the ASEAN+3 cooperation, the required stock would be reduced by 31 %. Moreover, larger cooperation means larger coordination between countries, which can potentially prevent collective action failures.

17.5 WTO Rules on Public Reserve

The central issue in a WTO-compatible framework for developing countries, including those in Southeast Asia, is whether these countries are able to stockpile their staple food (i.e., rice) to ensure stable incomes for their farmers while ensuring that their low-income citizens are able to access the basic food at an affordable price. This issue, however, affects or has the potential to affect other countries. The potential spillovers of public reserves are high in different member countries due to different conditions of countries in ensuring food security for the citizens. The increasing demand for food for stockholding purposes increases prices and potentially reduces supply for immediate consumption in other countries. When food stocks are finally released for consumption, international trade can be distorted, affecting market competition.

The present WTO rules allow member countries to maintain or introduce domestic support measures without any limitations or reduction commitments. To qualify for this, domestic support to food reserves must meet “the fundamental requirement that they have no, or at most minimal, trade distorting effect or effects on production.”¹⁶ Countries, however, may argue the definition of minimal trade distorting effects.

A public reserve is not only economically complex but also politically encumbered. The Bali Package, which has been mentioned as the first-ever agreement reached in the history of the WTO, still makes an exception for public stockholding. In the 9th ministerial meeting held in Bali, Indonesia, at the end of 2013, the WTO member countries adopted an interim solution and agreed to negotiate a permanent solution that would specifically address public reserve by the 11th

¹⁶WTO Agreement on Agriculture.

ministerial conference in 2017. Furthermore, in the Post-Bali work, countries also agreed to continue with the interim solution if the permanent solution cannot be agreed upon by 2017. This means that no agreement has been reached for a public reserve. Nevertheless, the interim solution, which should prevent countries from challenging other countries through dispute settlement mechanism until a permanent solution is found, can be a starting point for a new institutional arrangement to prevent collective action failures of uncoordinated national public reserves, which can further destabilize prices at the international level.

17.6 Conclusion and Policy Implication

Public food reserve policies have been used by many countries for decades. Although in the 1980s and 1990s, public reserves fell out of favor with many countries particularly against the backdrop of changing interest, with the countries turning their attention to improving market efficiency, the policy has always been part of the development agenda of many countries. Storage-based stabilization policy through public food reserve is receiving much more attention today in the era of increasing food price volatility. Food security concerns in the recent years have led many countries to reconsider using public food reserve as the main policy to deal with such uncertainty and price instability.

ASEAN countries have provided an interesting case with their long experience in implementing storage-price-based stabilization policies. Despite the difficulties in measuring the impact of different policies, price stabilization has been an integral part of the development agenda of ASEAN countries for decades and has contributed to price stability, which is associated with the economic successes in this region. ASEAN also has shown that cooperation at the regional level is possible. The APTERR presents itself as a regional effort to face the common challenges of ensuring food security.

One of the main concerns regarding public reserve is that the fiscal cost of storing food is relatively high. The cost, however, can be reduced with cooperation. The simulations have shown that regional cooperation significantly reduces the required stocks, which in turn reduces the costs of holding them. Even when transportation cost arising because of decentralized storage in the different countries is taken into account, the total cost for food reserve with cooperation is still lower than without cooperation. This definitely will be beneficial for all participating countries. Admittedly, determining the optimal stock level is difficult. It always depends on the criterion of desirability. The current earmarked stock of the APTERR is designed mainly to address emergency situation rather than for price stability. However, it may have a calming effect on the market and thereby prevent the rapid increase in food prices.

ASEAN and their partner countries can also consider expanding their cooperation to include other neighboring countries. The simulation which considered India as the “fourth” country showed that such cooperation would still significantly reduce the required stocks that will be beneficial for all member countries involved. India was emphasized in the simulation because of its important role in the region. The fact that the country is home to around 200 million undernourished people¹⁷ has brought serious concerns to the policymakers in the country. With the world’s largest food programs covering public procurement, storage, and distribution of wheat and rice, India has successfully stabilized its food prices for many years. However, the policies give rise to very high fiscal cost. In 2013, the cost is estimated to be around 1.2 % of the country’s GDP (Kozicka et al. 2015).

While India is not part of ASEAN Plus Three countries food reserve cooperation, ASEAN and India have already signed an FTA, which has been in force since January 2010. The countries involved could also consider including food reserve as part of their cooperation which will likely be beneficial to all the participating countries. In addition to reducing the overall fiscal costs, larger cooperation and coordination also mean that collective action failures are diminished.

Learning from ASEAN case, public food reserve is an ancient idea that is still relevant today. The way forward is to build institutional arrangements that facilitate coordination and cooperation among countries through various channels, including the multilateral trading system of the WTO. Each of the ASEAN trade agreements with six countries¹⁸ which could be deepened under the RCEP framework, which combines all ASEAN “plus” agreements together, and this could be a starting point for a stronger and larger cooperation in various areas, including public reserves.

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Appendix

¹⁷Estimated from 17 % of population as stated in the Global Hunger Index, IFPRI et al. (2014).

¹⁸The six countries are Australia, China, India, Japan, Korea, and New Zealand.

Table 17.8 Correlation of supply shortfalls from target consumption of 97 %

	BRN	KHM	IDN	LAO	MYS	MMR	PHL	SGP	THA	VNM	CHN	JPN	KOR
BRN	1												
KHM	-0.0124	1											
IDN	-0.1529	0.0534	1										
LAO	-0.0805	-0.0614	0.3666*	1									
MYS	0.1322	0.1505	0.0084	0.15	1								
MMR	-0.2106	0.0689	0.1542	0.1115	0.6032*	1							
PHL	0.0871	-0.0514	-0.0697	0.0825	0.0027	-0.1111	1						
SGP	-0.1477	0.3081	-0.1211	-0.1792	-0.1117	-0.1291	0.0638	1					
THA	-0.1184	-0.1699	0.0066	0.0013	-0.0322	-0.0356	0.4060*	0.3721*	1				
VNM	-0.1455	-0.1263	-0.0643	-0.1139	-0.0923	-0.1028	-0.0728	0.0142	0.0815	1			
CHN	0.4617*	-0.0895	-0.0635	-0.1097	0.2073	-0.0577	-0.072	0.0488	0.1212	-0.0664	1		
JPN	0.0248	-0.0494	0.224	0.5026*	-0.0518	-0.1373	-0.0028	-0.1397	-0.0782	-0.0897	0.2056	1	
KOR	0.2939	0.0595	-0.0642	-0.0528	0.5680*	0.109	-0.0374	-0.194	-0.1071	-0.1088	0.5560*	0.0391	1

Source: Own calculation based on USDA PSD. Note: BRN Brunei Darussalam, KHM Cambodia, IDN Indonesia, LAO Lao PDR, MYS Malaysia, MMR Myanmar, PHL Philippines, SGP Singapore, THA Thailand, VNM Vietnam, CHN China, JPN Japan, KOR Rep. Korea
* represents significance level at 95 %

Table 17.9 Rice supply, consumption, and shortfall 1980–2014

	Supply		Consumption		Shortfall	
	Annual average (000 tons)	Regional share (%)	Annual average (000 tons)	Regional share (%)	Number of shortfall	Mean of shortfall (000 tons)
<i>ASEAN</i>						
Brunei	31.7	0.01	31.71	0.01	14	1.27
Cambodia	2494.63	0.80	2213.09	1.00	9	36.52
Indonesia	37,250.69	11.94	32,765.20	14.84	3	15.57
Lao PDR	1089.40	0.35	1057.20	0.48	9	11.35
Malaysia	2327.60	0.75	1926.37	0.87	7	6.92
Myanmar	10,019.80	3.21	8751.66	3.96	7	19.50
Philippines	10,958.83	3.51	8685.11	3.93	6	23.72
Singapore	271.86	0.09	268.60	0.12	11	7.09
Thailand	18,737.71	6.01	9079.97	4.11	6	66.28
Vietnam	19,028.09	6.10	15,135.54	6.85	3	39.41
<i>Plus Three</i>						
China	191,979.50	61.56	126,655.20	57.35	4	180.69
Japan	11,315.51	3.63	9118.14	4.13	7	50.65
Rep. Korea	6352.40	2.04	5171.37	2.34	6	41.60
Total	311,857.73	100	220,859.17	100	92	500.57
Regional	311,857.73	100	220,859.17	100	31	506.43

Source: Own calculation based on USDA PSD. Note: Regional refers to ASEAN Plus Three countries as a region

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