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Assessing Food Policy Options in Asia to Reduce Price Volatility of Rice Market

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by

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ABSTRACT

Rice is a staple food in Asia and its prices at national and international levels are largely influenced by different policy actions of trading countries. The consequence of the 2008 food crisis was food riots and rationing of rice in many nations. The ASEAN Plus Three (APT) countries have adopted an institutional framework called ASEAN Plus Three Emergency Rice Reserves (APTERR) to address food security concerns of ASEAN countries that may arise due to climate change, supply chain disruptions or price speculation in the regional rice market. The RICEFLOW model is used to study the effectiveness of the strategic grain reserves to mitigate rising rice prices in case of weather related calamities. The objective of the study is to address price volatility in the Philippines and other ASEAN countries due to production shortfalls. The simulated results from the RICEFLOW model show that the APTERR stocks are ideal to address short term emergency situations like disaster relief during floods and typhoons but are not sufficient under current design to address extreme price volatility. With increased commitment by member nations to the size of the APTERR grain reserves can offer a policy leverage to reduce extreme price volatility if there is a production shortfall due to natural calamities or speculation in international rice market.

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DEDICATION

This dissertation is dedicated to my family.

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LIST OF ABBREVIATIONS

ADB	Asian Development Bank
AERR	ASEAN Emergency Rice Reserve
AIFS	ASEAN Integrated Food Security
AMAF	ASEAN Ministerial Meeting on Agriculture and Forestry
AMF	Asian Monetary Fund
APEC	Asia Pacific Economic Cooperation
APT	ASEAN Plus Three
APTERR	ASEAN Plus Three Emergency Rice Reserve
ASEAN	Association of South East Asian Nations
CIGAR	Consultative Group on International Agricultural Research
DDR	Doha Development Round
EAEC	East Asia Economic Caucus
EAERR	East Asia Emergency Rice Reserve
EU	European Union
FAO	Food and Agriculture Organization
FDI	Foreign Direct Investment
GRiSP	Global Rice Science Partnership
IFAD	International Fund for Agricultural Development
IFPRI	International Food Policy Research Institute
IMF	International Monetary Fund
IRRI	International Rice Research Institute
LDC	Least Developed Countries
MGC	Multinational Grain Companies
MOAC	Ministry of Agriculture and Cooperatives of Thailand
MT- EAERR	Management Team of the East Asia Emergency Rice Reserve
NAFTA	North American Free Trade Agreement
NFIDC	Net Food Importing Countries
OECD	Organization for Economic Co-operation and Development
SAARC	South Asian Association for Regional Cooperation
SDAC	Southern African Development Community
SEANWFZ	Southeast Asian Nuclear Weapon Free Zone
SEATO	Southeast Asia Treaty Organization
SOM	Senior Official Meeting
SPA-FS	Strategic Plan of Action for Food Security
STE	State Trading Enterprise
TAC	Treaty of Amity and Cooperation
UNCTAD	United Nations Conference on Trade and Development
UN-HLTF	United Nations High Level Task Force
WB	World Bank
WFP	World Food Program
WTO	World Trade Organization

Chapter 1 INTRODUCTION

Rice is an important staple food to the Asian population; it is a source of food and income for the rural poor (Asia Society, 2010). In Asia, food security is often equated with availability as well as ability of poor consumers to purchase rice (table 1.1). Governments have historically intervened in their rice markets to ensure availability at affordable prices. Market interventions include price supports and price ceilings, export restrictions, input subsidies, and export and import tariffs (Wailes, 2005).

Rice is consumed primarily where it is produced. This, along with the high levels of trade protection exercised by importing countries, result in a very thin international market. Moreover, exports are highly concentrated, with five countries (Thailand, Vietnam, India, Pakistan and the United States) accounting for roughly 80% of global trade over the last decade. One of the most important challenges facing Asian countries is the uncertainty and volatility of food prices especially with respect to rice. Most recently, the food price spike of 2008 sent tremors through Asian governments who became quickly vulnerable to a near tripling of the basic food staple. Even though responses to the crisis quelled the panic and lowered the international rice prices, it has taken a long time for prices to have reached the equilibrium to pre-2008 level (Dawe, 2010; Wong, 2010). To be specific, the price of rice as well as uncertainty of supply in international rice markets are the most important food security challenges facing Asian countries. These challenges provide an overarching opportunity to pursue policy innovation at national and regional levels to improve food security.

Table 1.1 Per Capita Rice Consumption for APT Countries on Milled Equivalent in 2009

Country	kcal/capita/day
Brunei Darussalam	749
Cambodia	1530
China	794
Indonesia	1259
Japan	581
Lao PDR	1465
Malaysia	731
Myanmar	1204
Philippines	1213
South Korea	883
Thailand	1323
Vietnam	1390
Source: FAO STAT, 2011 Note: International average per capita calorie requirement is 2000 kcal /day	

In Asia, regional food security has become a major focus of the Association of Southeast Asian Nations[1](ASEAN). Since 1996 ASEAN Plus Three (APT) (China, Japan, and South Korea) have worked to develop a framework to pursue regional rice food security. These efforts have not been particularly effective as witnessed by the events of the rice crisis in 2008. As demonstrated in 2008, the rice market is much more volatile than any other agricultural commodity market (figure 1.1). A large part of the rice price hike in 2008 is explained by market policy fundamentals, e.g., reactive government interventions in rice markets, but speculators are also to blame for such a hike in rice prices (Wong, 2010). The only policy option that was designed by ASEAN countries in response to the earlier price spike of 1974 was the East Asia Emergency Rice Reserve (EAERR). This was not effective in addressing 2008 price spike largely due to its weak institutional framework. Likewise, the limited success of emergency rice reserves to address pre 2008 food crises was due to lack of adequate volume and logistical constraints (Trethewie & Ewings, 2012). In the second chapter a discussion is presented on the history of grain reserves, and its role in addressing price volatility.

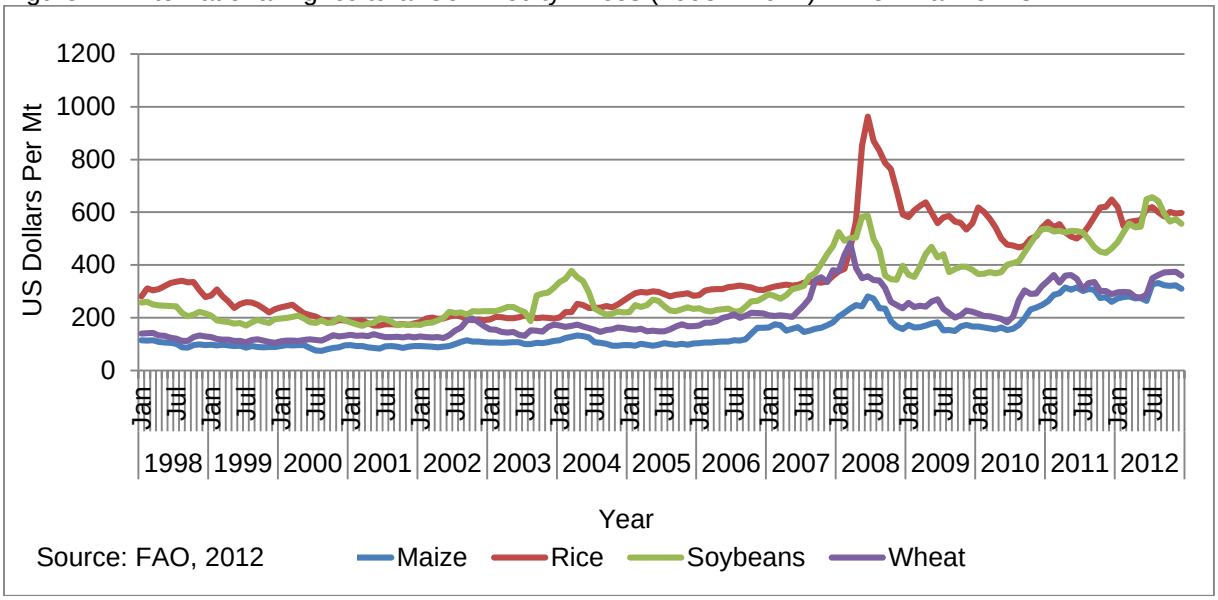
In order to explore food policy options it is important to understand price volatility, its causes, and consequences. However, it is equally important to understand the regional policy framework and organization where regional food policies are developed and implemented. The next section offers a description on the political economy of ASEAN Plus Three (APT).

1.1 ASEAN and ASEAN Plus Three (APT)

The Association of Southeast Asian Nations (ASEAN) is a regional geo-political and economic organization established on 8th August 1967 with Indonesia, Malaysia, the Philippines, Singapore and Thailand being its founding members. The organization has expanded to include Brunei, Myanmar, Cambodia, Laos, and Vietnam. Since 1996 China, Japan, and South Korea have joined ASEAN countries to form the APT framework. An in depth discussion on APT organizational structure, decision making and its role in promoting food security is presented in Chapter 2.

[1]ASEAN Countries: Brunei Darussalam, Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, Philippines, Singapore Thailand, Vietnam.

Figure 1.1 International Agricultural Commodity Prices (1998 – 2012) in Nominal Terms



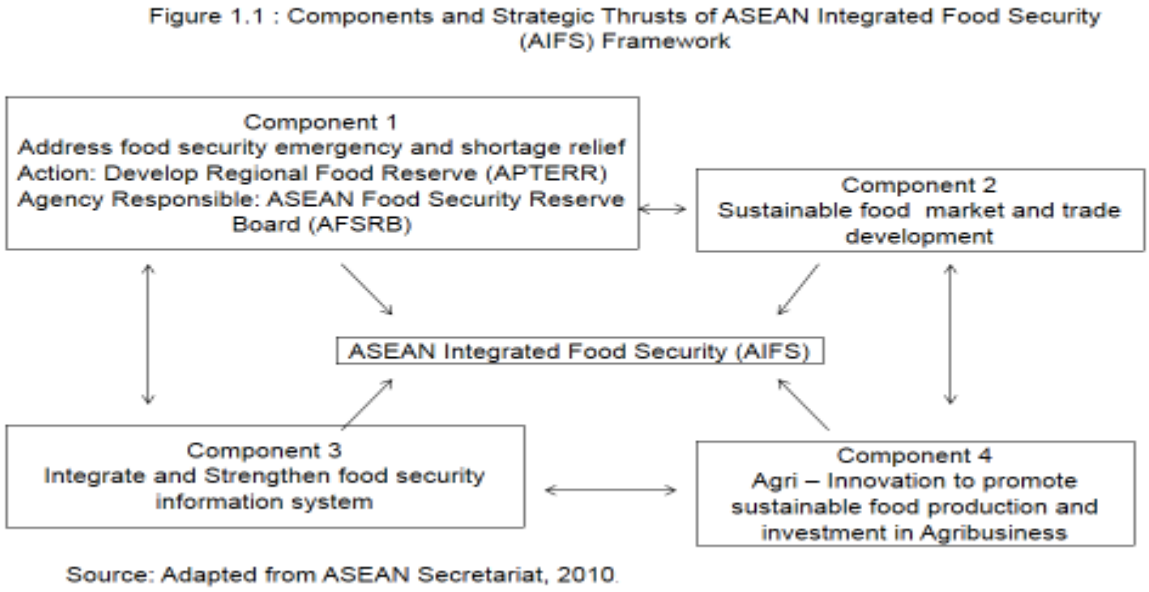
In response to the 2007-2008 global rise in food prices APT members have undertaken a series of strategies and formulated policies that would stabilize rice prices for ASEAN economies. In 2009, ASEAN member countries adopted a regional food security strategy: ASEAN Integrated Food Security (AIFS) has a Strategic Plan of Action for Food Security (SPA-FS) (ADB, 2009).The SPA-FS objectives are to address food security issues in APT countries. Based on the 14th ASEAN summit in Chaam, Thailand the AIFS framework working document[2] on food security, there are four strategic objectives to achieve food security in ASEAN countries:1) enhance trade in rice, 2) manage a regional buffer stock (Emergency Rice Reserve), 3) enhance food security information, and 4) promote agricultural innovation and sustainable food production. These objectives are inter-related and address the food security concerns of ASEAN countries (see figure 1.2).

1.2 Political Economy of ASEAN and ASEAN Plus Three (APT) Countries

Southeast Asia in the absence of any superpowers influence has successfully established several regional organizations (ASEAN, ASEAN Plus Three, ASEM, AFTA) that have structures and procedures that incorporate Southeast Asian preferences (Simon, 2008).

[2] Unofficial Text

Figure 1.2 Components and Strategic Thrusts of ASEAN Integrated Food Security (AIFS) Framework



Regionalism is shaped by different elements such as the location, local cultures, religious beliefs, and social norms which define relations of member states within the organization (Stubbs, 2008). The regional ideology of ASEAN on ways and means to address international and regional relations is shaped by a series of historical events starting with colonialism followed by the Cold War and later globalization (Jetschke & Ruland, 2007; Stubbs, 2005). The idea of South East Asian regionalism can be better understood if we take into account under what circumstances the regional organizations came into existence and what possible future these organizations can have in addressing the regional food security. In 1976, the ASEAN organization started with Indonesia, Malaysia, Philippines, Singapore, and Thailand to address two important events in South East Asia (Stubbs, 2008). First, it was organized to settle the border dispute confrontation between Indonesia and Malaysia. Second, it was developed to counter the spread of communism in South East Asia. Therefore in 1967 the famous Bangkok declaration was made with the objective of achieving a spirit of “equality and partnership” for peace, freedom, social justice, and economic well-being and to prevent the subversion of national independence and development (ASEAN Secretariat, 1967). Likewise, according to Stubbs (2002) other events such as economic progress due to the US spending in south east Asia for Vietnam War as well as Foreign Direct Investment (FDI) from the

US and Japan offered a stable environment to develop other subsequent regional agreements. These included the Zone of Peace, Freedom and Neutrality (ZOPFAN)[3] in 1971, the Treaty of Amity and Cooperation[4] (TAC) in 1967, and the Southeast Asian Nuclear-Weapon-Free-Zone[5] (SEANWFZ) in 1997 to foster the non-communist Asian countries towards a successful regional organization (Stubbs, 2002). The idea of developing a neutral bloc or an indigenous alternative to the Southeast Asia Treaty Organization[6] (SEATO) (Kaushik, 1975, Acharya, 2005a) led to the Bandung (Indonesia) conference that stipulated relations between countries must be based on the values and interests of the members and that there should be no use of force to change the regime (Acharya, 2005a). The Bandung conference concluded that all member disputes in ASEAN should be solved by consultation, consensus, and compromise by adopting informal and non-confrontational ways (Acharya 2005b; Mackie 2005). In Southeast Asia "malaya culture" believes in the practice of consultation, and consensus, important regional norms that have been embedded into the ASEAN organization (Acharya, 2001, p 63-70; Jetschke & Ruland, 2009). This approach is often called as the "*ASEAN Way"* (Stubbs, 2008; Dosch, 2008). The same approach has dominated the Asian Regional Forum (ARF), ASEAN Plus Three (APT), East Asian Summit and APEC meetings (Stubbs, 2005).The South Korean initiative in 1970 on an Asian Common Market followed with the formation of the East Asia Economic Caucus (EAEC), which was the forerunner of the APT movement (Stubbs, 2002). Later in 1997, APT was informally adopted as a regional organization by ASEAN (asean.org). The APT as a framework or forum has East Asian characteristics that place a premium on family, community, social harmony, duty, and respect for hierarchy and authority (Pye, 1985). Capitalism employed in the majority of the APT economies is not based much on the rule of law but more on social obligation and trust (Hamilton, 1991). The operational difference between APT and other regional organizations such as North American Free Trade Agreement (NAFTA) and European Union (EU), as elaborated by Pye (1985) and Hamilton (1991), makes

[3]Signed by ASEAN foreign Ministers in 1971 to keep ASEAN member nations free from Cold War rivalry and enhance cooperation among ASEAN members.
[4]Signed by ASEAN founding members at the First ASEAN Meeting in 1967 also called the Bali Treaty (Jones & Smith, 2007).
[5]Signed in 1997 by ASEAN members to make ASEAN region free from nuclear weapons also called as the Bangkok Treaty.
[6]SEATO was formed in 1954 following the formation of NATO in South Asia included the United States, France, Great Britain, New Zealand, Australia, the Philippines, Thailand and Pakistan.

operational understanding on working of the APT quite complex. Although APT members have a long history of political differences they share a common cultural trait that can be identified as the binding force of the organization (Stubbs, 2002). The ASEAN paradigm is about respect for each member state: an indigenous approach to solve conflicts by adapting western global norms that can accommodate local norms and identities (Acharya, 2004).The rigidity in ASEAN as an organization is based on the fact that goals and norms to conduct inter and intra organizational relations is grounded in the Asian culture and history. The historical assessment of Asian political economy made by Myrdal (1968) states that Asian countries have emphasis on settling disputes peacefully and by mutual agreement. Therefore, ASEAN countries have maintained the same philosophy as their guiding principle to settle disputes. To further strengthen Myrdal's (1968) argument policies in South Asia are often regarded as piecemeal or gradualist, therefore any democratic planning with reliance on persuasion is not effective. Therefore, no matter how passionate or radical the social and economic reforms, there is largely a cautious approach at large (Myrdal 1968). In Asia, at the micro level there is origin of heterogeneity or confusion over oneness and individuals have a competing and conflicting opinion on traditional and modern ideas (Myrdal, 1971). At the macro level South Asia is not nationally consolidated, there are groups of people within as well as among countries demanding autonomy (Myrdal, 1968). To conclude, Myrdal's (1968) analysis states that South Asian states are "soft states" and policies that are decided are not enforced and even if any policies are enacted there is no obligation place on people[7] . The ASEAN countries represent a mosaic of multiethnic communities within a group of nations. The concept of Asian Culture explains the inherent difference between countries in their approach to any specific issue. The difference in culture is better explained by the ASEAN approach to human rights. The Asian culture argument made by Jones and Acharya (1995) places importance on collective rights and not on individual rights in the ASEAN countries. The emphasis on community welfare as argued by Acharya (1995) states that economic prosperity is achieved in a stable political environment outweighs individual human rights especially in a highly multiethnic Southeast Asian society. The ASEAN position on human rights gives us an idea that there are different interpretations of cultural norms within ASEAN countries (Jones, 1993). The human

[7]There is exception in case of a communist state where government policies are strictly enforced.

rights values of Islamic nations like Indonesia and Malaysia differ from Catholic Philippines, or Buddhist Thailand or Confucian Singapore (Acharya, 1995). The concept of ASEAN culture is exploited by ASEAN members to their political advantage when its suits their interests (Acharya, 1995). In case of APT countries, China has successfully used Confucian values to its advantage; first abandoning it when the idea was an obstacle in modernizing of country and embracing it when there is assessment of human rights by international media (Acharya, 1995).

1.3 Challenges in ASEAN Plus Three (APT) as an Organization

There is immense heterogeneity among countries as well as within countries in Southeast Asia with respect to its culture (Myrdal 1971).The APT members give the impression of having a common Asian culture. But, all member nations are quite distinct in their history, language, political and social environment (table 1.2).

Table 1.2 Differences of Governance, Ethnicity, and Language in ASEAN Plus Three Countries.

Country	Language	Major Ethnic Group	Major Religion	Type of Government
Brunei Darussalam	Malay*	Malay	Muslim	Constitutional Islamic Monarchy
Cambodia	Khmer*	Khmer	Buddhist	Multiparty Democracy under a Constitutional Monarchy
China	Chinese or Mandarin	Han Chinese	Atheist	Communist State
Indonesia	Bahasa Indonesia*	Javanese	Muslim	Republic
Japan	Japanese	Japanese	Shintoism	Parliamentary Government with a Constitutional Monarchy
Lao PDR	Lao*	Lao	Buddhist	Communist state
Malaysia	Bahasa Malaysia*	Malay	Muslim	Constitutional Monarchy
Myanmar	Burmese*	Burman	Buddhist	Military Regime
Philippines	Filipino*	Tagalog	Roman Catholic	Republic
Singapore	Mandarin*, English*, Malay*, Tamil*	Chinese	Buddhist	Parliamentary Republic
South Korea	Korean		Christianity	Republic
Thailand	Thai	Thai	Buddhist	Constitutional Monarchy
Vietnam	Vietnamese*	Kinh	Atheist	Communist State
Source: CIA Fact book, 2011 *Official Language				

Based on Stubbs' (2002) assessment there are five major reasons that can obstruct the rise of the APT as a regional force. First, within APT members there is growing sentiment of nationalism. In the absence of an appropriate policy response to 2008 price spike at a regional level by the ASEAN, member

countries like the Philippines and Indonesia are focusing more on national self-sufficiency with domestic production of rice rather than relying on the imports from member ASEAN countries. Second, there are other major domestic issues such lack of proper governance, excessive corruption and poverty hampering individual APT members so there is less time and resources devoted to the APT issues as part of the common regional foreign policy. Third, regional rivalry for leadership between Japan and China or economic disparity between the APT member countries such as between Singapore and Cambodia can create different interests for members within the APT (Stubbs, 2008). Fourth, increases in bilateral trade agreements between the APT members and the non-APT members have challenged the APT's leadership as a regional trade organization. Individual trade agreements of APT members with non APT members undermine the role of APT as an economic union that promotes free trade in Asia. Fifth, the external pressures from superpowers such as the US have reservations that the APT as a regional trading organization would seriously undermine the US goals and ambitions in promoting the Asia Pacific Economic Cooperation (APEC[8]) and the World Trade Organization (WTO). Furthermore, based on Jones' (2010) assessment, ASEAN is often branded as an organization that is ineffective when it comes to taking action as in the case of the Asian economic crises of 1997 and the transnational security threat. The ASEAN belief of non-interference into the matters of the member states as argued by Acharya as the "*ASEAN Way*" in reality has made the organization counterproductive. To elaborate the policy responses of ASEAN to events of humanitarian crises in Myanmar and East Timor are deeply disturbing as ASEAN policy of non-interference has severely undermined the effectiveness of the organization (Jones 2010). According to Moller (1998) without interference the organization can be meaningless. Therefore, Stubbs' (2002, 2008) assessments on the ASEAN role or contribution in regional and international diplomacy is that it has been very marginal due to the original mandate of non-interference that makes member states ineffective in addressing regional and global issues. Finally, Jones (2011) concludes that the ASEAN policy of non-interference is not sustainable and needs to change over time to accommodate social and economic changes in the international environment. The ASEAN member states are very strategic in marginalizing regional interests and agendas that do not promote their vested self interest in the

[8]Asia-Pacific Economic Cooperation (APEC) consist of Thailand, United States, Indonesia, Australia, Brunei Darussalam, Peru, Philippines, Russia, Canada, Chile, China, Hong Kong, China, New Zealand, Papua New Guinea, Singapore, Chinese Taipei, Japan, South Korea, Malaysia, Mexico, and Viet Nam

organization (Jessop, 2008). There is evidence (see details in Jones, 2010) where member states have interfered into the domestic affairs of other member states since the start of Cold War up to the recent humanitarian crises in East Timor and Myanmar. Likewise, a series of events since 1997 such as economic crises, loss of FDI in ASEAN members, and a standby approach to the autocratic rule in Myanmar have weakened credibility of the ASEAN. The recent ASEAN initiative to add South Korea, Japan and China to form the APT has generated or renewed the credibility of the organization at the regional level. Despite its domestic problems, ASEAN has an impressive commitment in binding its members to non ASEAN members in different regional agreements (Simon, 2008).

Table 1.3 Basic Economic Indicators for APT Countries for 2009

ASEAN Countries	Total Land Area	Total Population	Gross Domestic Product	Gross Domestic Product per Capita
			at current prices	
	Km^2	(1000)	USD Million	USD
Brunei Darussalam	5,765	399	NA	NA
Cambodia	181,035	14,139	112,423	795
Indonesia	1,860,360	239,870	7,065,582	2,946
Laos PDR	236,800	6,201	72,964	1,177
Malaysia	330,252	28,401	2,377,969	8,373
Myanmar (Burma)	676,577	47,963	NA	NA
Philippines	300,000	93,261	1,995,894	2,140
Singapore	710	5,077	2,087,650	41,120
Thailand	513,120	69,122	3,185,223	4,608
Vietnam	331,051	86,928	1,064,268	1,224
PLUS THREE Countries[1]		-		
China	9,596,961	1,338,300	59,266,120	4,428
Japan	377,915	127,451	54,588,367	42,831
South Korea	99,720	48,875	10,144,832	20,757
Source: ASEAN Finance and Macro-economic Surveillance Unit Database, 2009,[1]CIA, 2012.				

1.4 Need for ASEAN Plus Three (APT)

The need for APT is because ASEAN on its own could not muster the economic or political will to act as a regional body to address its food security concerns. Despite the current territorial dispute in South China Sea between ASEAN and plus three countries. ASEAN as an organization needs assistance of plus three countries to address its food security needs as plus three countries have adequate financial resources to support broad objectives of food security as outlined in figure 1.1. South Korea, China and Japan combined have a GDP seven times as that of all ASEAN countries (table 1.3) The ASEAN organization in recent years has been shaped by the democratic movements and the rise of middle class in ASEAN

countries that have challenged the organization to be more reformist. Furthermore, the rise of civil societies and legislative reforms at the domestic levels in member countries have forced the ASEAN leadership to take a responsible role in addressing ASEANs' foreign policy (Jones, 2009; Ruland 2009). APT can be one of the largest food security agreement in terms of its membership to represent trade interests of south Asian countries in the WTO. APEC and the ASEAN are the two key southeast regional organizations that can compete for the regional leadership but both these organization have their own limitations. In case of the APEC, it is a trans-regional body rather than a regional body (Ravenhill, 2000). Likewise other factors that make the APEC less appealing in terms of providing leadership for southeast Asia are first, the distinction between Asian[9] and Anglo-American[10] economies on the pace and priorities of trade liberalization within APEC economies (Stubbs, 2002). Second, as the size of APEC has increased from, 12 to 23 members, it is more difficult to reach consensus (Stubbs, 2002). Unlike APEC, ASEAN has also increased its membership to Indo-China[11] countries and with new members such as Vietnam and Myanmar has continued to insist on keeping the status quo principle of non-interference (Simon, 2008). The founding ASEAN members want to get involved in the affairs of other member states via flexible engagement or constructive intervention (Stubbs, 2002). Therefore, to counter both arguments the APT can be viewed as an attempt to foster East Asian cooperation and leadership to address regional and international issues which the APEC and the ASEAN have failed to address in the past.

1.41 ASEAN Plus Three (APT) and Food Security

Rice is an important source of employment, income and nutrition in the APT countries (FAO, 2009a). Likewise, the structure of rice farming in the APT region consists of a large number of small farmers. Therefore, any drop in rice prices at the producer level has a serious welfare consequence for farm households and the rural poor thereby causing economic hardship, and ultimately leading to food insecure households (FAO, 2009a) (figure 1.3). Likewise, sharp increases in rice prices have an especially devastating impact on the welfare of poor urban households. During the past decade,

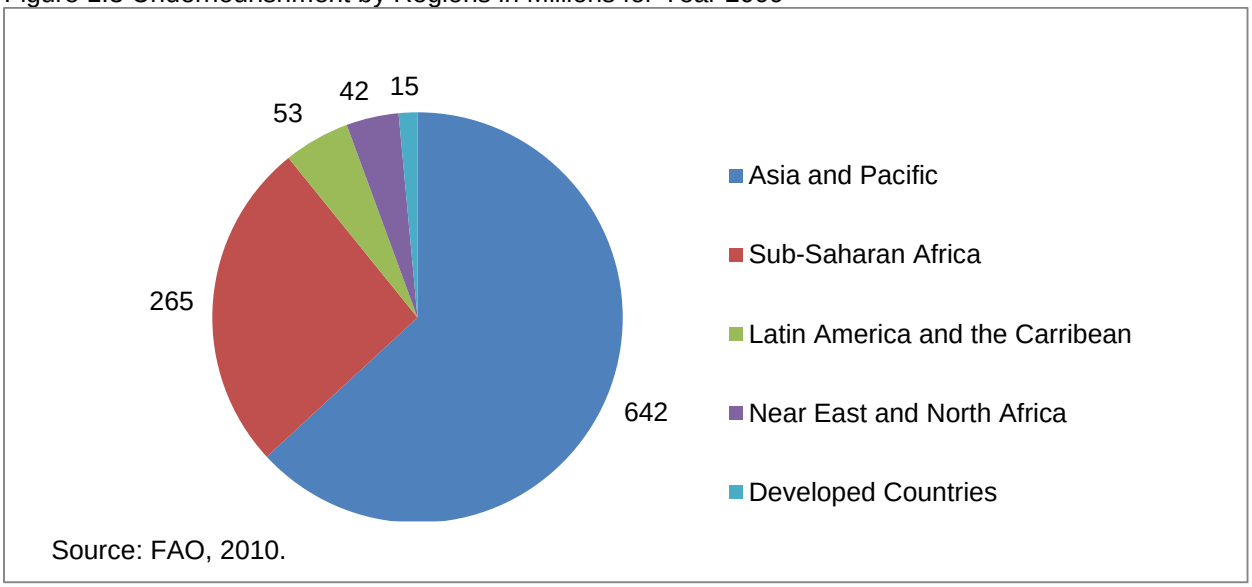
[9] Asian Economies (China and Malaysia) in APEC had priority for trade liberalization in form of economic and technical cooperation on trade facilitation.
[10] Anglo American Economies (Canada, New Zealand, Australia and the U.S) had priority on binding target for trade liberalization.
[11]Indo-China countries include Cambodia, Lao PDR, Vietnam

economic reforms such as trade liberalization and rapid Foreign Direct Investment (FDI) in the APT countries resulted in economic growth but, some of the other consequences of economic reforms were unintended such as increased inflation of food prices resulting in hunger and malnutrition. The price spike of 2008 was not due to a lack of adequate supplies of rice but rather to the lack of purchasing power and reactionary policies by uninformed policy decision-makers (FAO, 2009a). In other words, the structure of a political and economic regime[12] provides a better explanation for poverty such as economic inequality or capitalism (Stone, 1989). A lack of market reforms (towards capitalism) in Asia is the structural cause as well as historical cause for poverty and food insecurity. Based on Gilbert's (2008) analysis of agricultural trade reforms in Asia and Pacific countries, only comprehensive trade reforms can consistently lower poverty in the Asia and Pacific region. In Asia, a majority of governments in the APT countries are sandwiched between socialist and capitalist forms of governance. The governing structure often fails to solve the majority of problems and in the words of Stone (1989) "People who are victimized by a problem do not seek political change because they do not see the problem as changeable, do not believe they could bring about change, and need the material resources for survival provided by the status quo" (p. 288). Therefore, citizens in either regime, democratic or communist are less interested in any policy change as long as their governments are able to provide rice at affordable prices either through a State Trading Enterprise (STE) or private enterprise irrespective of any policy reforms. Therefore, the APT countries regardless of the type of governance (table 1.2) will be interested in policy options such as free trade, futures markets and grains reserves as long as it addresses their food security concerns during emergency situations like floods or droughts. In response to the 2008 food crisis, worldwide and national efforts in developing strategies aimed at mitigating the volatility of the rice market are being pursued. For example, international agencies, such as the International Rice Research Institute (IRRI) under the Global Rice Science Partnership (GRiSP) has accelerated funding of programs to increase rice productivity and promote sustainable rice farming (www.irri.org). Financial institutes like the Asian Development Bank (ADB) and World Bank (WB) have made commitments to increase their funding for infrastructure development for efficient rice supply chains (Reardon, Chen, Minten, & Adriano, 2012). Likewise, the World Food Program (WFP) has renewed its commitment for emergency food relief even

[12]A rigid systems are formed due to no change in a political and economic regime

under the constraint budget (WFP, 2008) Furthermore, increasing concerns about the potential impact of climate change and resource constraints on the volatility of the rice market are also raising concerns and have resulted in mobilizing resources among agents involved in the rice market to come up with innovative plans of actions to minimize food price volatility.

Figure 1.3 Undernourishment by Regions in Millions for Year 2009



Source: FAO, 2010.

1.5 Price Volatility

The term price volatility refers to the variability in price. Based on Gilbert's (2011) argument of asymmetry, when prices are higher they are more volatile. The argument is supported by the logic of limited inventory. As higher prices are typically more volatile and when there is less inventory and deficit production, prices will rise and available inventory will be used only to the extent of exhaustion to meet the positive demand or production shortfall thereby cumulatively adding to increased price volatility (Gilbert & Morgan, 2010; Gilbert 2011). Prakash (2011) using time series analysis and the storage model argument found that commodity prices have asymmetrical distributions and based on similar data Pfaffenzeller, Newbold, & Rayner (2007) concluded that annual rice prices have a negative kurtosis[13] coefficient and a positive skewness[14] coefficient. For policy makers it is imperative to understand why and how to curb the price volatility in commodity markets.

[13] Kurtosis measures if the data points are peaked or flat when compared to a normal distribution.
[14]Skewness measures symmetry of a particular distribution.

1.51 Measures of Volatility and Trends

There are different measures of volatility and trends. The empirical measure of price volatility is the standard deviation of a price or the coefficient of variation. To elaborate Moledina, Roe, & Shane (2004) used standard deviation, deviation from trend, unconditional standard deviation, and conditional standard deviation to assess commodity price volatility.

Table 1.4 Measures of Price Volatility and their Definitions

Measure of Volatility	Definition
Standard Deviation (SD)	Variation from the average or mean
Standard Deviation from Trend (SDT)	Variation from the average or mean from the trend
Unconditional Standard Deviation (USD)	Variation from the average or mean for a given time period does not take into account predictable and unpredictable elements of change
Conditional Standard Deviation (CSD)	Variation from the average or mean for a given time period taking into account predictable (seasonality) and unpredictable elements of change
Source: Moledina et al., 2004	

The objective of Moledina et al. (2004) study was to identify different measure of volatility and quantify welfare of government price stabilization programs that addressed price volatility. Irrespective of how we measure agricultural price volatility it is quite interesting to see that price spike events have happened in the past and represent a similar pattern of instant rise in prices for few months followed by gradual fall in prices. Moledina et al., (2004) using standard deviation as a measure of volatility, found that oil markets were the most volatile of all commodities. However, if the conditional standard deviation measure was used then rice prices in Thailand are the most volatile of all the commodities. The prices are more volatile when evaluated on the month to month basis rather than on yearly basis as presented in appendix figures 1.0, 2.0, and 3.0. Based on a study by Headey and Fan (2008) the price level (in real terms) of agricultural commodities during 2008 was as high as the pervious price spike of 1973 or late 1980s and in case of the rice the percent change in price from 1970 to 1974 and from 2004 to 2008 was 200 and 255 percent respectively. Furthermore, price movements during both of these time periods were sudden therefore the use of the term “volatile” is appropriate to represent the phenomenon.

1.6 Impact of Volatile Agricultural Prices

The impact of highly volatile prices is at two levels; at the microeconomic (household or individual) level there is an increase in the uncertain cost of living for a poor household which spends a major share of his household income on food. At the macroeconomic level there is a huge economic cost to governments that address volatile price via costly state intervention programs (Headey & Fan, 2008). To understand the impact of high volatile prices the impact must be disaggregated at different levels of the economy as summarized in Food Agriculture Organization (FAO)[15], (2011) comprehensive report.

1.61 Impact of Price Volatility on Exporting and Importing Countries

In the case of an exporting country (developing or emerging economy) if there is sudden drop in the prices of agricultural commodities there will be loss of revenues and decline in future investment in agriculture that will ultimately jeopardize long term growth of the agriculture sector. Based of Yu, Tokgoz, Wailes, and Chavez (2011) estimates in 2007-2008 international reference price of rice increased by 88 USD per Mt (24 percent), and net trade declined by 1.6 million Mt (5 percent). They argue that rice export bans in 2007 and 2008 by China, India, Vietnam, Pakistan and Egypt resulted in significant loss to exporters in respective countries, however a positive external impact was realized by exporters who did not limit their exports (such as the United States). On the other hand, extremely higher prices drain valuable foreign exchange and deteriorate public finances of a food deficit developing country that is reliant on imports to meet its food security needs (FAO et al., 2011). In 2007 and 2008, developing countries experienced overall increase in weighted average price of rice by 7.9 percent with price increases of 23.2 percent in countries with no policy intervention (Yu et al., 2011). In case of low income countries, inflation in food prices leads to more exports of basic raw materials (mineral resources often low in value) in order to finance costly food imports there by creating budget deficits (FAO et al., 2011). Such deficits lead to the depreciation of a country's currency. Furthermore as an importing country decreases tariffs to reduce the costs of imports and stabilize prices there is considerable loss of government revenue from tariffs and taxes on foods which cumulatively increases government borrowing.

[15] Other organizations that contributed to the comprehensive report are International Fund for Agricultural Development (IFAD), International Monetary Fund (IMF), Organization for Economic Co-operation and Development (OECD), United Nations Conference on Trade and Development (UNCTAD), World Food Program (WFP), the World Bank (WB), the World Trade Organization (WTO), International Food Policy Research Institute (IFPRI) and the United Nations High Level Task Force (UN HLTF)

Based on an International Monetary Fund (IMF) (2008) analysis in general whenever government public finances are used to address rising food prices by eliminating taxes and subsidies there is one percent increase in budget deficit.

1.62 Impact on Demand Side

According to Von Braun (2008) poor people spend about half to three fourths of their income on food. An event like a sudden spike in food prices as witnessed in 2008 has led millions into starvation in the short term and in the long term absence of nutritious foods leads to stunted growth in children and lack of mental development in the fetuses of pregnant women (FAO et al., 2011). The socio economic impact according to FAO et al., (2011) due to lack of food for children, is loss of a generation as children are forced to work rather than attend school. The impact of rising food prices has different impacts for different countries and is largely seen in low income households of every society. Developing countries in Asia Pacific, at the poorest household level spend about 60 to 70 percent[16] of their total budget on food items (Anderson, Jha, Nelgen, & Strutt, 2012). In case of rice, rural[17] and urban poor household expenditures on rice alone is about 25 to 40 percent (Dawe 2000; Timmer, Block, & Dawe, 2010; Dawe & Timmer, 2012). These impacts of volatile prices are not only limited to low income countries but also extend to middle income[18] countries where the poorer consumers spend about half of their income on food and thereby experience food price inflation. Similarly, low income[19] individuals in the developed countries suffer economic hardship where a large portion of their income is spent on food items. Based on FAO estimates over the period from 2007 to 2009 the number of hungry people worldwide increased from 820 million to one billion (FAO et al., 2011). In APT countries the 2011 status of the food security is explained with use of the concept of the Global Hunger Index (GHI). Table 1.5 lists selected APT countries with respect to the Global Hunger Index (GHI)[20]. The GHI is stated in percentage, and is an

[16] Household per capita consumption per day calculated on $1.25 at 2005 Purchasing Power Parity.
[17] Rural household expenditure on rice that grows other crops than rice is about 25 to 40 percent.
[18]See appendix table 1.0
[19] Middle Income Country ($1026 to $12,475) See appendix table 1.0 APT Classification based on World Bank Report, 2011.
[20] Index Interpretation GHI: 0 to 4.9 is low, 5 to 9.9 is moderate, 10 to 19.9 is serious, 20.0 to 29.9 is alarming, above 30 is extremely alarming

equal composite of three indicators; the proportion of undernourished in the population, the prevalence of underweight children under the age of five years, and the mortality rate of children under five years.

Table 1.5 Global Hunger Index from 1990 to 2012 for selected APT Countries.

Country	1990	1996	2001	2011	2012
Cambodia	31.8	31.5	26.0	19.9	19.6
Indonesia	18.5	15.4	14.2	12.2	12.0
Lao PDR	28.6	25.2	23.6	20.2	19.7
Malaysia	9.0	6.7	6.6	<5	5.2
Myanmar	NA	NA	NA	16.3	NA
Philippines	19.9	17.6	14.2	11.5	12.2
Thailand	15.1	11.8	9.2	8.1	8.1
Vietnam	25.6	21.4	15.5	11.2	11.2
China	11.8	8.9	6.7	5.5	5.1
Source: Von Grebmer et al. 2011, 2012.					

In a majority of the ASEAN countries like Cambodia, Indonesia, Lao PDR, Myanmar, Philippines and Vietnam the GHI is are above 10 percent. The ADB (2012) estimated[21] that there would more than 64 million people in poverty due to 10 percent increase in domestic food price. The food price volatility have detrimental impacts on small farmers who often are net buyers of food as they consume more that they produce (FAO 2010, ADB 2012). In case of small farmers volatile prices can reduce their disposable income and in worst case may lead to selling off their assets or children dropping out of school in the short term and would be pushed into poverty in long term (ADB, 2012).

1.63 Impact on Supply Side

Based on a study by FAO et al., (2011) the impact of increases of food prices on the supply side are summarized as follows. Increases in food prices definitely benefits producers but it increases costs of feed and feedstock for the producers of livestock and biofuel sectors. If these sectors are unable to pass the price pressures on to consumers they are likely to go bankrupt, the consequences of such events are detrimental to the long term growth of livestock, dairy and bio-fuel industries. On the other hand, low and volatile prices impact farmers and other supply chain intermediaries where farmers' expected return on investment are not recovered. Small farmers in developing countries are unable to cope with low and volatile prices and find it hard to stay in business as there is no easy availability of credit for future planting. Most small farmers in Asia use income from one season to finance the agricultural operations for

[21] Estimated on $1.25 per person per day poverty line at 2005 Purchasing Power Parity (PPP).

the next season. The ultimate result of the excessive price volatility on the farming community is that the overall welfare of the family and the economic viability of farm is in danger. In developing countries, in some cases where markets are already malfunctioning, price volatility make farmers risk averse and creates an environment in which there is lack of productive investment in agriculture (ADB, 2012). Price volatility has a significant impact on productivity and human development; volatile prices create uncertainty in the food supply chain as a result of which both producers and consumers do not invest in assets for the long term and tend to have savings in more liquid assets (Timmer 1997, ADB 2012).

1.7 Causes of Price Volatility

In general agricultural commodities are volatile due to three different market fundamentals as summarized by FAO et al., (2011): first, agricultural output varies and is dependent on weather and pests. Second, when stocks are low, the elasticity of demand with respect to price as well as supply elasticities are low so there is a time lapse to get supply to respond to the persistent demand and therefore prices adjust to ration limited supplies. Third, there is always a lag period between supply and change in price in the short term that further contributes to increased volatility in the markets. The macro and micro components of the price volatility in agricultural commodities are summarized in table 1.6. Some of the identified causes of the price volatility are as follow.

Table 1.6 Endogenous and Exogenous Components of Price Volatility

	Endogenous Agents	Exogenous Agents
Increased Price Volatility	1.Trade barrier (export restrictions and ban on imports) 2.Exchange rate (currency depreciation/appreciation)	Weather Derived demand
Decreased Price Volatility	1.Government Intervention in commodity market 2.No restriction on imports	Imperfect competition and institutions to hedge price risk (incomplete markets)
Source: Adapted from Moledina et al. 2004 p.3		

Based on Timmer's (2010a) argument rice prices in most Asian countries are volatile due the structure of rice production, marketing and consumption. The structure of Asian rice market as stated by Timmer (2010b) has millions of small farmers, supply chain intermediaries and billions of consumers and traders, processors and retailers that store and handle rice. He argues that it is difficult to gather data on price expectation of all these market participants making rice market information highly incomplete and imperfect with respect to short run supply and demand.

1.71 Commodity Speculation

The organized commodity exchanges provide a market for trading of commodities where participants such as hedgers seek to manage risk and speculators seek to profit from risk taking. However based on Gilbert's (2009) assessment there is a weak link to establish if the commodity markets have caused commodity prices to be more volatile. The price spike in rice markets is not new, in past 40 years there were four such events, but only the price spike of 1973 - 1975 is close in magnitude to the 2008 price spike (Sarris, 2010). As rice is not traded much on the commodity market, rice futures are not the likely cause of 2008 sudden rise in the rice prices (Sarris, 2010). In response to the extreme price volatility of 2008 policy makers are exploring different policy options in ASEAN countries. The use of futures market at the regional level is one of the options suggested by some organizations like IRRI and Asia Society (Mohanty, 2012; Asia Society, 2010). However, McKenzie (2012) and Hamilton (2012) conclude that, rice futures in ASEAN are not the solution for addressing price volatility. As hoarding tendencies of traders and middlemen, and antitrade policies adopted by the governments have definitely contributed to the rise in rice prices (Dawe, 2010). The trigger for the price spike of rice in 2007 -2008 was individualistic behavior of governments in India, Vietnam, and Egypt that banned exports and created a panic in the rice markets within a limited period of time (Sarris, 2010). Therefore, commodity speculation by rice market participants such as traders, middlemen and governments in developing countries has contributed to immediate rise in rice prices in 2007-2008.

1.72 Exchange Rate

The majority of international transactions in agricultural commodities are executed in terms of the US dollars. The role of the US dollar in the international rice trade had contributed to the price spike of 2007-2008. As per the FAO estimate an increase of 3.5 percent in the global prices of a commodity is expected with 10 percent depreciation of the US dollar against all currencies holding all other things constant (Sarris, 2010). Also, Headey and Fan (2008) confirmed that depreciation of the US dollar led to increase in nominal price of the key staples (dollar denominated food prices) by about 25 percent if measured in euros, pounds and yen. Therefore, the volatility of the US exchange rate can contribute to the volatility of commodity market.

1.73 Demand for Bio-fuel Production and increase in International Oil Price

Rice is not an important biofuel stock. So there is no direct impact of biofuel production on rice prices however, there are indirect impacts on its prices via demand substitution effects (Sarris, 2010).There is a close link between the price of oil and agricultural commodities. Based on Natanelov, V., Alam, M. J., McKenzie, A. M., & Van Huylenbroeck, G. (2011) analysis there is co-movement of well-established, mature commodity futures market and oil prices in long term. In ASEAN countries increases in the price of oil results in increases in the cost of fertilizer and energy needed for the rice production. According to Cudao and Gracias (2005) the impact of a change in oil price on the ASEAN countries was concluded that oil price shocks have a significant impact on inflation and the overall economy of all ASEAN countries when estimated in local currency units. Based on Rosegrant's (2008) assessment different factors have contributed to the rapid rise in the price of commodities in international grain markets, and the mandate on the use of biofuels in the US and EU is one of them. A majority of analysts (Boonekamp, 2008; Collins, 2008; Yacobucci & Schnepf 2007;) have concluded that increased biofuel production was the major cause for the rise in price of major commodities. In the case of rice Rosegrant's (2008) IFPRI study on biofuels concluded that about 21 percent of the total price rise in rice was indirectly due to biofuels. Although, rice is not the primary feedstock in production of biofuels but increases in the price of other commodities have contributed to the increase in price of rice (de Gorter, 2008). Based on Elliot's (2008) comprehensive assessment the immediate rise in rice prices in 2008 cannot be easily identified as the linkage to biofuel demand for several reasons, first agro climatic condition where rice is grown is not suitable for production of corn therefore there is no change in acreage from rice to corn production with exception of southern US and China. Second, there is no large change in consumption of other grains when compared to rice (except in India[22] and Africa). Third, rice consumption as a percent of daily calories consumed in Asia, Sub-Saharan Africa and Latin America is about 84, 8, and 9 percent respectively and corn consumption in Asia and combined Latin America and Africa is about 7 and 15 percent respectively. Therefore, role of corn in biofuels production and its impact on rice supply is not that large.

[22] In India rice and wheat are substitutes for each other.

1.74 Farm Productivity and Investment in Agricultural Research

There has been a decrease in the rate of investment in agricultural research at public agricultural institutes that have historically contributed to increased agricultural production. As agricultural research funding has been reduced, there has been a decrease in agricultural productivity in Asia from the early 1990-1999 to 2000-2006 (Sarris, 2010). There is clear evidence from GRiSP (2013) that as investment in funding agricultural research increases at the institutional level there is a decrease in poverty and an increase in the affordability of rice. In response to global higher food prices of 2007-2008 there is an ongoing discussion among the donor communities about how, when and for what purposes there is going to be future expansion of public funding for research (Asia Society, 2010).

1.8 Food Policy Options

Based on FAO estimates in the period from 2007 to 2009 the number people hungry worldwide increased from 820 million to one billion primarily as a result of higher food prices (FAO et al., 2011). To address the food price spike of 2007-2008 collaborative efforts among nations are being pursued at national and international levels. International institutes, intergovernmental and national governments have outlined some options to address price volatility in the near future. A series of policy instruments can be deployed at the national and the international levels either as a direct intervention through trade policy reforms and risk management institutions with intergovernmental stocks or indirect intervention with "virtual stocks[23]" at organized commodity exchanges (Sarris, 2010). As per Wiggins and Keats (2010) a list of eleven current proposals that have been put forward are grouped as follow:

A. Grain Reserves

1. Emergency Reserve
2. International Grain Reserve
3. Regional Grain Reserves and National Grain Reserves

B. Virtual and Para Reserves

1. Virtual Reserve

[23] Virtual stocks are commitment of financial resources by a group of countries to address speculation in commodity futures market.

2. Ban on food grains used in livestock or biofuel production

C. Information System Development and Coordination

1. Information system on storage

2. International coordination of information on food security

D. Trade Policy Response

1. International Grain Clearance

2. Prevention of export ban

3. Financing of food imports

E. Production Reserves

Price volatility is not new to agricultural markets and neither are the solutions, many of the policy solution recommendations to 2007-2008 price spike are not new and there is a prior knowledge of which policy solutions work (Tangermann, 2011). Some of the most widely discussed policy solutions that can be explored again are discussed below.

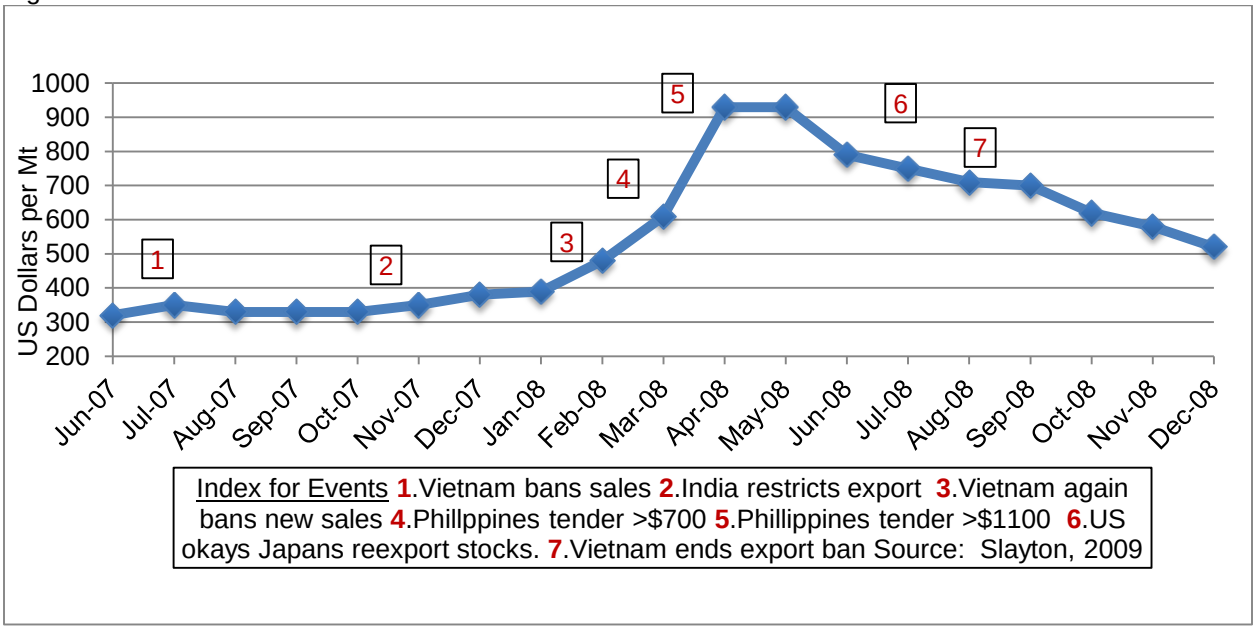
1.81 Trade Policy

In Asia there is a wide contrast in the ASEAN region with respect to supply and demand of rice; Thailand and Vietnam are the largest exporters of rice, while Philippines and Indonesia are the largest importers of rice (Asia Society, 2010) (table 1.7) In order to equate or balance supply and demand there should be enhanced trade among these countries within the ASEAN region. ASEAN countries are better equipped to meet their food security needs than any other group of countries as the ASEAN regional trade agreement incorporates both the worlds' largest exporters as well as importers within the region (appendix table 2.0). A recent study by Bello (2005) on ASEAN regional integration indicated that there is adequate rice for consumption in ASEAN countries to meet its food security needs if there is free trade among ASEAN countries. The biggest challenge in addressing food security in an event of another 2008 price spike situation is should member countries in an economic union think of national autonomy or commitment to the regional trade agreement. In general, developing countries want to achieve food self-sufficiency that enhances their autonomy. So achieving food security is of prime importance in national policy planning. However in order to achieve the national objective of food security, developing countries often trade food self-sufficiency for agricultural trade. Many regional trade agreements are undertaken to

integrate countries via trade at the regional level with little to no barriers to internal trade. The extent of regional integration in the above agreements varies and depends on the extent to which the economies of these countries are dependent on each other. The economic integration achieved by APT countries is quite noteworthy when compared to other economic integrations (unions) worldwide. However, integration of agricultural trade to address food security is one of the most contentious issues for all the economic unions worldwide. As per Matthews (2003) agriculture in most of the countries in an economic union have different levels of domestic supports, and tariffs, therefore, harmonizing or developing a common consensus on common agricultural policy is challenging as to which country or countries have to take the economic burden of the trade reforms. In the case of developing countries there is a strong preference to achieve food security by making necessary market interventions such as providing input subsidies to domestic agriculture to increase production and placing import tariffs to protect domestic producers. In developed countries, members of an economic union that have high cost of agricultural production protect its producers by using tariffs therefore achieving a common agricultural policy between developed and developing members in a regional trade agreement is challenging (Matthews, 2003). However, regionalism can promote food security if there is harmonization of national agricultural policies, elimination of barriers to trade (phyto-sanitary measures) and supportive investment in agriculture at the national level that helps member countries to achieve their food security objectives (Matthews, 2003). As mentioned earlier on one hand the international rice market is unreliable as witnessed in 2008 price spike, but at same time reliance in international trade provides economic welfare to rice importing countries with low domestic prices. Therefore, use of the trade policy option to address price volatility and food security in the APT is debatable. According to Murphy (2009) addressing food security using trade as an policy option from an economic perspective often leads to the most efficient policy, but such policies are politically infeasible and administratively complicated (Murphy, 2009).On the contrary Anderson et al., (2012) argues that enhancing agricultural productivity by using domestic policy measures such as increased investment in agricultural research and development is ideal to achieve stable prices. They, reiterate that trade policy can address both short term and long term food security concerns. Over the longer term, based on scenario analysis of trade policies, both importing and exporting countries increase their economic welfare and the food importing country that has a protectionist trade policy has severe

impact on net food buyers and non-food producing households. In the short term, trade barriers imposed by both importing and exporting countries to address international price spikes exacerbate each other leading to an increased spike in international price and unproductive market stabilizing efforts.

Figure 1.4 Thai 100% B Price from June 2007 to December 2008



The disruption of international trade in agricultural commodities has resulted in volatile food prices (Anderson et al., 2012). Based on theory of comparative advantage a country that is endowed in a particular resource e.g labor, is supposed to specialize in labor intensive products and rely on international trade for products intensively using other resources for which it does not have comparative advantage. The advantage of international trade in agriculture is explained by an example of changes in the rice economy of Philippines. In early 1960s Philippines was a net rice exporter however today it is one of the largest importers of rice. Philippines exploited its comparative advantage and focused on electronics and services exports rather than on rice production at the same time countries like Thailand and Myanmar exploited their comparative advantage in rice production (i.e. flat level land easily irrigated) and have become the world's leading exporters (Dawe, Moya,& Casiwan, 2006; Anderson et al., 2012). However, can we rely on international trade when major rice exporters have natural disasters or ban exports to protect their domestic market?

The series of events that culminated into 2007-2008 price spike of rice as depicted in figure 1.4. The events that led to rise in the price of maize and wheat is defended by mandate on biofuels (increased

demand) and bad weather (that constrained supply) respectively, but the sudden rise in the price of rice is difficult to defend using market fundamentals of supply and demand (Dawe &.Slayton, 2010). The following explanation is based on Dawe and Slayton (2010) study of the world rice market crises of 2007-2008. In October 2007, Indian ban on exports of non-basmati rice led to increase in price of Thai 100 percent B by 43 percent (from 335 USD to 481 USD) in a period of four months. The decision to ban rice exports by Government of India was to compensate for the loss of 2006 wheat crop due bad weather and replace expensive imported wheat by reducing rice export. In Vietnam, the government regulates the quantity of rice exports using an export sales quota. In late July of 2007, Vietnam had reached its export sales quota and there was a ban on new exports sales so the international rice market anticipated the ban and there was no uncertainty in the market. But in 2008 there was another ban on rice exports in Vietnam placed due to unfavorable weather (although new exports were allowed for just two and half weeks). Vietnam had banned rice exports from April to June 2008 until Government to Government sales were approved to the Philippines. In spite of the ban on exports in Vietnam, Vinafood 2 (state trading enterprise) was permitted to participate in Philippines' National Food Authority (state trading enterprise) tender of 700,000 Mt of which only 320,000 Mt was delivered in the first quarter due to a late harvest in Vietnam. The Philippines had increased the procurement price of rice by $70 USD per metric ton in January for Vietnamese rice (in spite of low local Thai and Vietnamese prices) to secure supplies and replenish low government stocks. In April-May of 2008, the Philippines request another tender for 1,100 USD per metric ton that marked the peak of the price spike in 2008. In late May 2008, the Philippines withdrew the tender as a commercial buyer with no specifics on why the Philippines had such a large tender. A week later the US announced its permission that Japan could re-export all imported rice stocks of 1.5 Mmt and later in July Vietnam ended its ban bringing the price of Thai 100 Percent B down to 515 USD per Mt (Slayton, 2009). According to Slayton (2009) it is not trade but rather transparency in the international rice market that contributed to the panic in rice market. But, Anderson et al. (2012) provides evidence that there is a strong incentive for countries involved in rice trade not to be protectionist as there are few exporters and importers so building a consensus is easy and adoption of policies that reduce price fluctuations in the international rice market is feasible by agreeing not to place quantitative restrictions.

Table 1.7 Rice Production, Consumption, Imports and Exports in APT Countries for Year 2012

ASEAN Countries	Production	Consumption	Imports	Exports
	(1000 Mt)			
Brunei Darussalam	1	46	45	
Cambodia	4,600	3,615	5	975
Indonesia	37,500	40,000	800	
Laos PDR	1,475	1,500	30	*
Malaysia	1,700	2,819	1,050	*
Myanmar (Burma)	10,750	10,300	*	750
Philippines	11,350	12,925	1,500	*
Singapore		350	350	*
Thailand	20,200	10,500	600	8,000
Vietnam	27,650	20,100	100	7,400
PLUS THREE Countries				
China	143,000	144,000	2,400	300
Japan	7,756	8,250	700	200
South Korea	4,006	4,612	600	2
Source: USDA, PS&D 2012. *NR (Not Reported)				

1.82 Futures Market

In developed countries, commodity futures markets are used to hedge price risks. However, in most developing countries there is an absence or underdeveloped commodity futures market. Furthermore, even if they existed, the association of farmers and cooperatives would have a difficult time accessing future markets given the excessive costs associated with it (Dana & Gilbert, 2008; Gilbert 2011). Technically, futures markets have economic benefits of price discovery,[24] price risk management and make the market transparent. Investment in transportation, storage, quality control and better integration of rice supply chain from farmers to consumers is a perquisite for a well-functioning futures market. However, in most ASEAN countries there is a high level of government intervention into the rice market also, there is lack of infrastructure and political environment that can be conducive for successful operation of the futures market (McKenzie, 2012). Therefore, expecting a fully functioning futures market like the Chicago Board of Trade (CBOT) is not a feasible currently. In the ASEAN region, importers and exporters from the private sector and government can use the futures market for hedging and to address food security only if there is free movement of rice across borders (McKenzie, 2012). To conclude “If the politics could be taken out of Asian rice markets, and government intervention reduced over time, a rice

[24]Price discovery is a mechanism where in buyer and sellers interact in a marketplace to determine price of a particular asset.

futures market could play an important role in helping food security through greater economic growth of course, that is a big if " (McKenzie, 2012, p 45).

1.83 Food Aid

Food aid has been an important option to address price volatility in the rice markets. In the ongoing discussion on the Doha Development Round (DDR) many countries have argued that food aid from the developed countries (using export subsidies) have seriously undermined local producers in Least Developed Countries (LDC) and Net Food Importing Countries (NFIDC) (Clay,2012). It is important to know that in recent years the food aid donations in the form of commodities shipped from the developed world has been marginalized due to local sourcing of grains. The cereal imports in LDCs have decreased from 30 percent in 1990 to 8 percent in 2010 (Konandreas, 2012). In 2009 - 2010 almost half of the food aid was locally procured due to two important reasons. First, it takes about four to six months of time for the aid as a commodity from the donor to reach the recipient. Second the aid is more expensive by 30 to 50 percent when procured from the donor country (OECD, 2005). The major focus of food aid is to address emergencies due to natural disasters and humanitarian crises. The food aid programs are not intended for addressing food security in the long term and there is a decline in the distribution of food aid in kind (Clay, 2012). The food aid is procyclic[25] and is expected to diminish in a situation when the donor countries have depleted stocks and higher global prices (Clay, 2012). Slayton and Timmer (2008) insist that even in an emergency situation as witnessed in 2008 food aid was inadequate to meet needs of poor consumers globally as there are limited financial, logistical and political resources to make food aid effective in saving lives. In general the resources of World Food Program (WFP) are constrained when the global food price are higher. Based on Hussain (2012) an estimate of about 200 million USD are required additionally for a 10 percent increase in the price of a WFP food basket. In 2008, an additional 775 million USD were spent to manage the rising costs of food prices and in 2010 the quantity of food purchased was 25 percent less than the previous year for the same amount of money (Hussain, 2012).

Therefore, based on the above argument it is clear that there is a role for food aid in case of emergency situations such as natural disasters. But it is not sufficient to meet the national food security

[25] The quantity of food aid (economic quantity) is correlated with the overall status of economy of the countries.

objectives of the LDC and the NFIDC nations (Clay, 2012). Over the long term food aid is ineffective based on Barrett (2006) as there are numerous long term unintended consequences of food aid. First, in the long term identifying the intended beneficiaries of food aid is difficult due to lack of information on who needs food aid and who does not. Second food aid creates dependency and creates disincentive to work both in developing and developed countries[26]. Third, food aid is necessary to act as a safety net during the period of crises, but one of the unintended consequences of food aid is that it can crowd out or replace the conventional (either formal or informal) ways of insurance that existed in the system such as borrowing of money for food, provide household labor in exchange for food and other government relief efforts. Fourth, food aid can create dependency and lead to disinvestment in local production systems as there is no pay off in investing in local system that can produce food and may create demand for complementary food items when the recipient sells food aid to buy complementary items. Fifth, in situations when the domestic prices fall below the import price of a commodity, imports become unviable and sustainability of intermediaries in import supply chain and prospect for future trade are jeopardized. Finally, food aid can create incentives for the recipient countries to postpone much needed policy reform that can address food security with domestic agricultural production on a long term basis. Other long term consequences of food aid are failure to develop transparency (Harvey & Lind, 2005) and the quantity of food aid distributed is often small and recipients cannot rely on it (Barrett & Maxwell, 2005; Little, 2005; Lentz & Barrett, 2005).

1.84 Grain Reserves

The best way to increase confidence in a particular commodity market system is to have a reserve just like we have international institutes like International Monetary Fund (IMF) for financial sector (Sarris, 2010). The previous attempts to have grain reserves have failed , because once the prices are low with adequate supplies policymakers divert all the resources (financial) that are planned for having a reserve system to other important sectors of the economy (Sarris, 2010). To argue in favor of grain reserves it is important to understand the policy response of governments during previous food crises. Food crises have a devastating impact on the poorest of the poor and on average three food crises happen globally

[26]Results from Europe and North America concludes that long term food aid (in any form) creates a disincentive to work (Barrett, 2006)

for every century (Timmer, 2010a). There have been policy reforms in the past to address food security concerns in the APT region. The most recent food security policy response to the world food crises of 1974 by the ASEAN countries was addressed through stockholding of basic commodities (Hangpongpandh, 1982). The proposed program of stockholding was not operational due to lack of political and economic commitment by ASEAN countries. Furthermore, the subsequent events in Asia such as rapid economic development as well as increased rice production and gradual liberalization of agricultural trade have eroded the perceived need for any policy intervention. The probability of decline in food production in developing countries in 1960 and 1970 was countered by the green revolution and prices since then remained almost stable for a long duration of time (ADB, 2012). Over the past decade APT countries have undergone rapid trade liberalization and achieved economic integration where current policy responses to address food security are inadequate. In addition increased population, decreases in agriculture productivity, and the climate change threat have added to the urgent need for a collective policy response. There was lack of regional policy response in the spirit of an economic union from governments of APT countries to address food security. Events that lead to the 2008 food crises (see figure 1.4) is a testimony of national governments acting in their self-interest by going antitrade (Slayton, 2009). Figure 1.4 revealed that the 2008 price spike was not due to any natural disaster, but rather due to the sequential self-interested policy decisions causing panic in major rice trading countries that made price spike worse. Although, speculation among rice traders may be another reason for the price spike, nevertheless, given the political nature of rice it was governments in respective importing and exporting countries that exacerbated the price spike problem.

According to ADB (2012) although use of grain reserves is a pragmatic strategy to address price volatility, the role of government in storage of agricultural commodities creates more uncertainty in the market as decision making of government parastatal agencies is sporadic and politically driven. Therefore, Wright (2011) argues that the collective action problem of grain storage can be addressed if all governments are not involved in the storage business as the private sector can provide a price floor when prices are lower and sell stocks at a profit when prices are higher. If there is a situation when there are low stocks due to a

crop failure, large scale governments may counter such a situation by a joint stock holding[27] program with well-established rules of buying and selling (ADB, 2012). However, based on Gilbert (2010) the commitment of governments on international commodity agreement has resulted in disappointing results. During the last price spike of 1973-1974 at international level there was an agreement to establish a global stock to address future price spikes but lack of commitment on ways and means to finance and manage any such agreement was never finalized (Gilbert, 2010; Wiggins & Keats, 2010). In Asia, regional food security has become a major focus of the APT nations based on explanations provided in earlier sections of the chapter. Based on Wailes and Chavez (2012) analysis ASEAN nations will account for are expected to play a major role in the global rice market in next decade by accounting for 53% and 14 % of net exports and imports respectively, while total production and total rice consumption will account for 25% and 22% respectively in the global rice economy. The main objective of this research is to analyze the policy option of regional grain reserves in addressing price volatility in ASEAN countries.

1.85 Objectives

The objectives of this dissertation are to 1) assess the economic impact of the regional grain reserve (APTERR) on the APT rice markets as well as its spillover effect on the domestic APT rice economy under alternative production shortfalls and the release of APTERR stocks scenarios; 2) assess the political impact of the regional grain reserves and the challenges and constraints in formulating and developing operational rules that will facilitate its success; and 3) evaluate the food security objective in the wider set of issues that makes the ASEAN organization relevant and important from a regional governance perspective. The remainder of this study is organized as follows. In chapter 2, a review of the relevant literature on grain reserves is presented and discussed. Chapter 3 will discuss the methodology for empirical analysis while, chapters 4 and 5 will discuss results and conclude the finding of the study respectively.

[27] Joint Stock holding Agreement (See International Commodity Agreement (ICA) by Gilbert (2010)

Chapter 2 LITERATURE REVIEW

2.1 International Grain Reserves

The major source for volatility in food prices is speculation, hoarding, and rising expectations of higher returns in commodity markets (Von Braun & Torero, 2009a). The idea of having a regional grain reserve has been on the agenda of regional economic organizations whenever the supply of grains is constrained due to natural disasters or when food prices spike in the international grain markets. The concept of a regional grain reserve is an ideal strategic tool to mitigate food crisis situations like that of 2008. The idea of a regional grain reserve has been on the agenda of policymakers for decades, but, there is a lack of political and economic will to have an operational grain reserve. In the following section we will explore classification of grain reserves, some of opportunities and challenges of regional grain reserves, the conceptual and empirical framework, and previous experiences with operational grain reserves. The chapter will conclude with a review of the ASEAN Plus Three Emergency Grain Reserves (APTERR), its basic design and pose questions regarding challenges and opportunities.

2.11 Classification of Grain Reserves

Based on the geographic area of operation grain reserves are classified into three categories

1. National Grain Reserves: These reserves are generally held by state parastatals who are largely responsible for the national food security mission. In ASEAN countries some of the well known national grain reserves are Badan Urusan Logistik (BULOG) in Indonesia, National Food Authority (NFA) in Philippines and Padiberas Nasional Berhad (BERNAS) in Malaysia,

2. Regional Grain Reserves: There are very few regional grain reserves where the scope of their operation is based on agreement between a group of countries. The majority grain reserve schemes are restricted to a particular geographical area. Some of the notable regional grain reserves that are widely discussed in academic literature are ASEAN Plus Three Emergency Rice Reserves (APTERR) in south east Asia, Latin America & Caribbean Emergency Response Network (LACERN) in central and south America, RESOGEST (Regional Food Reserve in West Africa) in west Africa, Southern African

Development Community (SADC) and South Asian Association for Regional Cooperation (SAARC) Food Bank in South Asia.

3. International Grain Reserve: An international grain reserve is a multinational agreement among a group of countries that commits their grain and financial resources to address global food security. In the past as well as at present there are various proposals to have an operational international grain reserves but there has been no operational international grain reserve unless one considers the World Food Program (WFP) as an international grain reserve. The WFP functions with five different partners; National government, Non-Government Organizations (NGO), FAO and International Fund for Agricultural Development (IFAD), other UN agencies and corporate partners (wfp.org).The Food Security Monitoring Systems (FSMS) of the WFP collects household data on food consumption and income, monitors market prices and rainfall patterns, and outlines strategies to address food insecurity. The WFP's officials from Food Aid Monitor, Vulnerability Analysis and Mapping (VAM), and Strengthening Emergency Needs Assessment Capacity (SENAC) assist in food procurement balancing food markets and emergency situations (WFP, 2012b). In 2012, the WFP distributed a total of 3.5 million Mt of food globally (WFP, 2012a). The WFP procures large quantity of food locally to save time and money, but as WFP operations are largely to address emergency situations therefore procurement is based on needs of the emergency situation as well as availability of funding (WFP, 2012b). In 2012, the WFP purchased 2.1 million metric tons of food, about 77 percent (in terms of value in USD) of total food procured was from developing countries. There is another dimension of characterizing grain reserves e.g a national, regional or global grain reserve could be a physical, virtual or both. The former is a traditional grain reserve where there is actual physical stock. While the latter is a commitment by countries to contribute to a pool of grain reserves in form of financial support to buy grains on the international market or supply buffer stocks in case of a natural calamity. The virtual grain reserves are a commitment of resources to the organization's objective.

2.12 Regional Grain Reserves

A brief overview of regional grain reserves that are operational or have plans to be operational is provided below.

1. SAARC (South Asian Association for Regional Cooperation) Food Bank

The SAARC is a regional grain reserve in South Asia, its members are Afghanistan, Bangladesh, Bhutan, India, the Maldives, Nepal, Pakistan and Sri Lanka. The organization is not fully operational and decision making in the organization is delegated to an oversight board. The SAARC members have commitment of 243,000 Mt of rice and wheat stocks and they have plans to increase the total reserve commitment to 400,000 Mt to one million tons (CDI, 2011). According to the Government of India (GOI), India has agreed to contribute 306,400 Mt out of a total share of 486,000 Mt to SAARC food bank (GOI, 2013).

2. RESOGEST

The RESOGEST is a regional grain reserve in West Africa formed by members of the Sahel region in Africa. RESOGEST members are Benin, Burkina Faso, Cape Verde, Chad, the Gambia, Guinea Bissau, Mali, Mauritania, Niger and Senegal. The regional grain reserve is in its early stage of development where member states have made a minimum commitment[28] of 5% of national food stocks to this regional grain reserve (CILSS, 2012). The reserves are a combination of grain stocks, monetary funds and an early warning system to inform about future food crises.

3. Latin America & Caribbean Emergency Response Network (LACERN)

Countries in Latin America and the Caribbean have teamed up with WFP to form an emergency response unit to address natural disasters in Caribbean and Latin America called LACERN (Action Aid International, 2011). The regional headquarter of LACERN is located in Panama City and sub-regional offices for Central America, South America and the Caribbean are in El Salvador, Ecuador and Barbados respectively (OECD, 2010). The LACERN is not a typical grain reserve but a food reserve that is stocked with 450 tons of High Energy Biscuits (HEB) with support from individual governments in form of warehouse for storage of the food stocks (OECD, 2010).

[28] In form of loans or gifts

2.13 Governance of Grain Reserves

The State Trading Enterprises (STE) instituted by developing countries to address food security have their own approach to address using grain reserves, irrespective of their approach, the STE are supposed to operate a grain reserves as a commercial enterprise under the WTO regime. However, STEs operate typically under a price band that places a supply control mechanism on the domestic market by using tiered tariffs (Murphy, 2012a). The status of regional grain reserves in the WTO is not clear. Unlike STEs which are supposed to operate as a commercial enterprise the regional grain reserves currently do not have any such status in WTO and are largely governed by representatives from member countries contributing to the grain reserves. The WTO Article XVIII on the STE states the operation of a STE should be on transparent and operate on commercial basis, and there should be no quantitative restriction as well as subsidies for STE that would distort trade (WTO, 2014)

The efficient management of grain reserve is a prerequisite for a sustainable grain reserve system. The management aspect such as rotation of grain stocks is essential to make grain reserves appealing to relevant stakeholders such as sponsors and recipients of grain reserves. However, management of grain reserves stocks is typically clumsy and lacks efficiency unlike the private market (Murphy, 2012a). Private grain companies hold grain reserves to make profit whereas public grain reserves are financed by public funds to address food security. So, use of public funds to finance grain reserves with lack of transparency can be trade distorting under the WTO's Agreement on Agriculture (AoA) (Murphy 2012b). Regional grain reserves can be operated by multistate agency or by an independent regional authority. Some of the advantages of regional grain reserves are as follows (Crola, 2011). First, regional grain reserves can smooth supply and demand over a wide area by addressing supply constraint with surpluses from the same region. Second, regional grain reserves can offer economies of scale in supply and distribution. Third, there would be no meddling of individual governments to gain political advantage as monitoring of the regional grain reserve would be at a supra national level (Flament, 2010). Fourth, regional grain reserves have the potential to boost regional integration and cooperation (International Action Aid, 2011).

2.14. Opportunities of a Regional Grain Reserves

Regional grain reserves correct for a market failure in an event when producers are unable to supply the grains at normal or socially desirable prices. The intervention via regional grain reserves brings the prices down to an affordable level where consumers can be assured of food security. Grain reserves, from a policy perspective, smoothen and reduce the volatility in prices by balancing seasonal supply of production uniformly across the year (Murphy, 2009). The regional grain reserves offer economies of scale and are cost effective with respect to stabilizing prices (Flament, 2010). Grain reserves can aid an undercapitalized private market on one end while replacing a private market (monopolistic or oligopolistic) that adopts a predatory pricing strategy on the other end (Murphy, 2009). In Asia, demand for rice is constantly increasing and supply is unpredictable, therefore, regional grain reserves can be an ideal tool in mitigating such challenges of unstable supply to meet steady consumption growth. Reserves can maintain market confidence and reduce speculation in the aftermath of crises (Murphy, 2009). World rice markets are price volatile and rice is traded on a residual basis to meet national production deficits; therefore, sourcing from the international rice market is not ideal when there are enormous challenges in sourcing if the production shortfall is global causing overall rice prices to be high. The food crisis of 2008 is a testimony of price volatility in the international rice market. Realistically, maintaining the public's confidence via a safety net like regional or international grain reserves is essential (Wright, 2009). From a public policy perspective, the use of cash to buy food is an efficient way than to maintain costly grain reserves. However, according to Murphy (2009) use of cash to buy food from the international market may not be useful in developing countries for two main reasons; first, the local staples food grains they want may be not available in the international market. Second, even if it is available or close acceptable substitutes are available, there is the possibility that developing countries cannot afford to buy when that is only possible at much higher food prices (Murphy, 2009). Based on a proposal by International Food Policy Research Institute supported by Consultative Group on International Agricultural Research (IFPRI) an international grain reserve is proposed which would have the following features; first, it would include a small physical national reserve, second, there would be a global reserve reducing individual countries'

costs and inefficiency related to grain storage, and third, there would be virtual reserves[29] that guarantee market fundamentals of supply and demand in the grain market and be managed to avoid price spikes (Von Braun & Torero, 2009b).

2.15 Challenges in Regional Grain Reserves

Regional grain reserves fall under government supervision, which is not always competitive, timely, and as effective as private stock holding (Murphy, 2009). Regional grain reserves have their disadvantages such as high storage costs and slow transactions in managing huge grain reserves (Von Braun and Torero, 2009b). Grain reserves are often used to achieve multiple targets rather than just a specific one which leads to confusion in implementation (Murphy, 2009). The management of stocks in a regional grain reserves should be based on accurate information of carryover stocks where costs of obtaining accurate information can be challenging. The data on stocks is gathered from published statistical reports of FAO, United State Department of Agriculture (USDA), national reports, academic and professional reports, and International Grain Council (IGC) and most of the time information is subject to error (Wiggins and Keats, 2010). Grain reserves do not solve chronic hunger and are not structural solutions to the problem of food security (Wright, 2009). Grain reserves operated by the public sector often crowds out private stock holding and discourage private investment in storage and supply chain infrastructure (Anderson et al., 2012). The basic cause of food insecurity is the inability of developing countries to fund the long term investments needed to achieve productivity gains in food production. There is also the short run problem that the operational costs and supervision of grain reserve programs are costly (Murphy, 2009).Grain reserve stocks need rotation due to the perishable nature of grains and disposing of previously held stock is often controversial with respect to the selling price because old stocks tend to get dumped on the market causing price suppression (Murphy, 2009).

Regional grain reserves however are a good option to manage an unexpected and sudden rise in food prices. However, the unintended consequence of the existence of a grain reserve is disincentive to have private markets. Government intervention in the private markets when food prices are high by using

[29]Virtual reserves is a tool to reduce speculation in futures markets by taking short position in commodity markets to reduce the spot price using cash reserves (12-20 billion) from donor nations which reduces future speculation in commodity market.

grain reserves may be ideal to bring about price stability. However, there is a challenge in determination of the threshold or trigger price to activate government intervention into the market using grain reserves. Policy advocates from IFPRI, IMF, World Bank and other international institutes have criticized the concept of grain reserves, on the basis that markets are better indicators of consumer prices and quantities (Murphy, 2009). Additionally, there are large numbers of unknown factors that determine exactly when, where, and how much of grain reserves are needed in stocks. In Murphy's (2009) terms, it is just guess work on the amount of grains to be stored, determined less by economic analysis and more of by politics with respect to quantity of grain held in reserves. Likewise, there are other questions such as transparency, accountability, and efficiency in managing of grain reserves that need to be studied. Previous experiences with grain reserves had persistent problems of corruption, and politicians using it to achieve their vested interests such as distributing free food grains or subsidizing food grains for consumers before elections (Murphy, 2009). A lack of independence in management raises questions with the credibility of the regional grain reserves management to meet its public interest objective of addressing food security and price stability. Technically, grain reserves are not totally independent of private grain operators like Multinational Grain Companies (MGC).[30] MGCs have a vital role in public policy of grain reserve logistics as they are responsible for transportation of grain during major food aid operations (Murphy, 2009). Therefore, balancing the business interests of MGC (private organizations) which is profit driven and the humanitarian interests of regional or international grain reserves (public organizations) is often difficult. Finally, the international trade in agriculture commodities is very thin (percentage of total staple food production traded) when compared to manufactured products. Advocates of trade liberalization in agriculture are skeptical of regional or international grain reserves as they are not sure if grain reserves will be either operating independently or would be an integrated part of international markets (Murphy, 2009). National leaders and decision makers believe that it would be costly to operate regional grain reserves and members of a regional grain reserve may lose their independence over decision making of food reserves due to lack of a proper legal framework and commitment of other nations to follow a rule based system of the regional grain reserves (Flament, 2010). The general

[30]Cargill and Archer Daniels and Midland (ADM) account for 75 percent of global trade in cereals (Murphy, 2009).

argument made by Von Braun and Torero (2012) in favor of grain reserves is that reserves cannot stabilize prices, but they can prevent a sudden rise in prices of agricultural commodities. Action Aid International argues that international grain reserves lack financial support and political commitment at the highest level of the organization (Action Aid International, 2011).The proposal for establishing international grain reserve (that stores multiple commodities) is complicated as market structures of wheat, corn, or rice are different and any change in one market may impact another markets, e.g. as stock to use ratio of wheat is different from corn, therefore estimation of stock holding capacity for multiple commodities is difficult (McCreary, 2011). The concern just mentioned applies to regional grain reserves that have plans to store multi commodities.

2.2 Theoretical Framework of Grain Reserves

The studies on the theory of commodity price stabilization by Brandow (1976), Cochrane, Willard, and Danin (1976), and Schmitz, (1984), and the welfare theory of grain reserves by Eaton, (1980) are the seminal works. The more recent theoretical framework of grain reserves as elaborated by Basu (2011) and Wright (2009) is used to explain the objective and implementation of grain reserves. The theory of food market intervention is explain by Basu (2011) using a domestic grain reserves and the role of government in providing a price floor to producers as well as its role in price stabilization. The theoretical framework of a regional grain reserves is similar to national grain reserves. The theoretical works per se on the regional grain reserves and its impact on the food security in group of developing countries is elaborated by Wright and Cafiero (2009). The literature below outlines the theory of food market intervention (Basu, 2011).

2.21 Theory of Food Market Intervention

In the absence of government intervention the market price of rice is at equilibrium Pm, often called the market equilibrium price (figure 2.1). But, when the price reaches Ph due to a production shortfall in a basic food staple, there is a legitimate rationale for government intervention to address the food security concern of the consumers. Figure 2.2 demonstrates that a change in the supply of rice with and without production shortfall and effect of the grain reserves in a country. In the absence of government intervention and production shortfall a typical importing country will have supply Sb and price Ph (figure

2.2). In order to address the price spike or higher commodity price, the government of a food importing country would seek to intervene into the commodity market with a release of national or regional rice stocks onto the domestic market thereby driving the price to Pg and addressing the food security concern of a typical food deficit importing country. If a country has domestic production of rice, government provide a price floor for farmers which is little above the market price equilibrium and procures for national grain reserves to address future shortfall in rice production. However, the price floor argument is irrelevant in case of a regional grain reserve as the intervention into the domestic food market of a member country is based on the guidelines as outlined in the memorandum of understanding among members.

Figure 2.1 Food Market in absence of Government Intervention

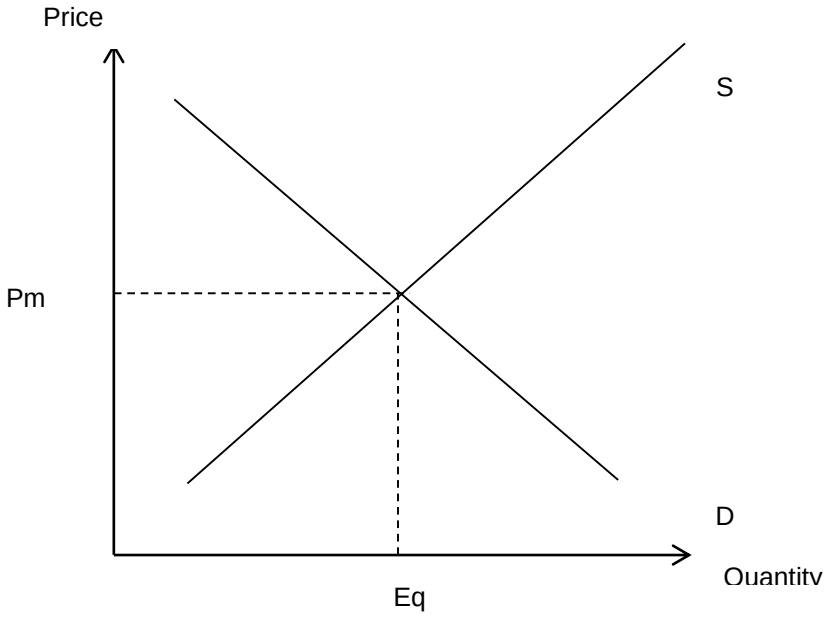
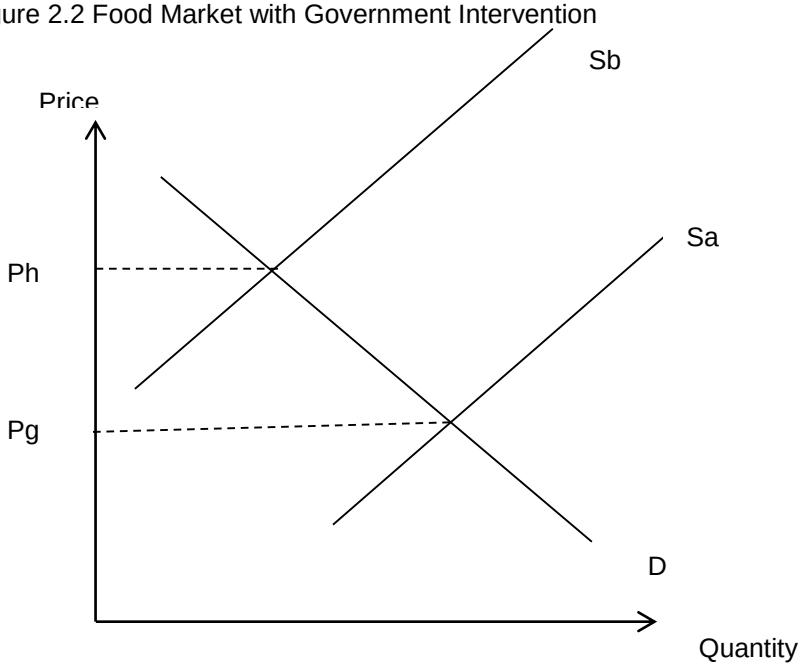


Figure 2.2 Food Market with Government Intervention



Source: Adapted Adapted from "India's foodgrain policy: An economic theory perspective" by K. Basu, 2011, *Economic & Political Weekly*, *46(5),* 37-45.

The intervention into the domestic market of a typical importing country using emergency grain reserve is based on the premise that an importing country has a genuine emergency

2.22 Economics of Grain Reserve

The annual grain harvest (Ht) accounts for abnormalities in weather conditions that can impact production. Ht is a random variable that represents current production. In figure 2.3 the demand curve A C is composed of two demands , first is current consumption C_t (represented as AB in Figure 2.3) at period t and second is demand for stocks (X_t) (future consumption) as (represented by BC in figure 2.3) at time $_{t+1}$. In case of grain reserves available supply is the sum of two supplies, the supply available at harvest (H_t) and the supply that is carried over from the previous year (X_{t-1}) carry over stock. A grain reserve which is commercially operated will account for the cost of storage as well as interest on the investment made in stocks.

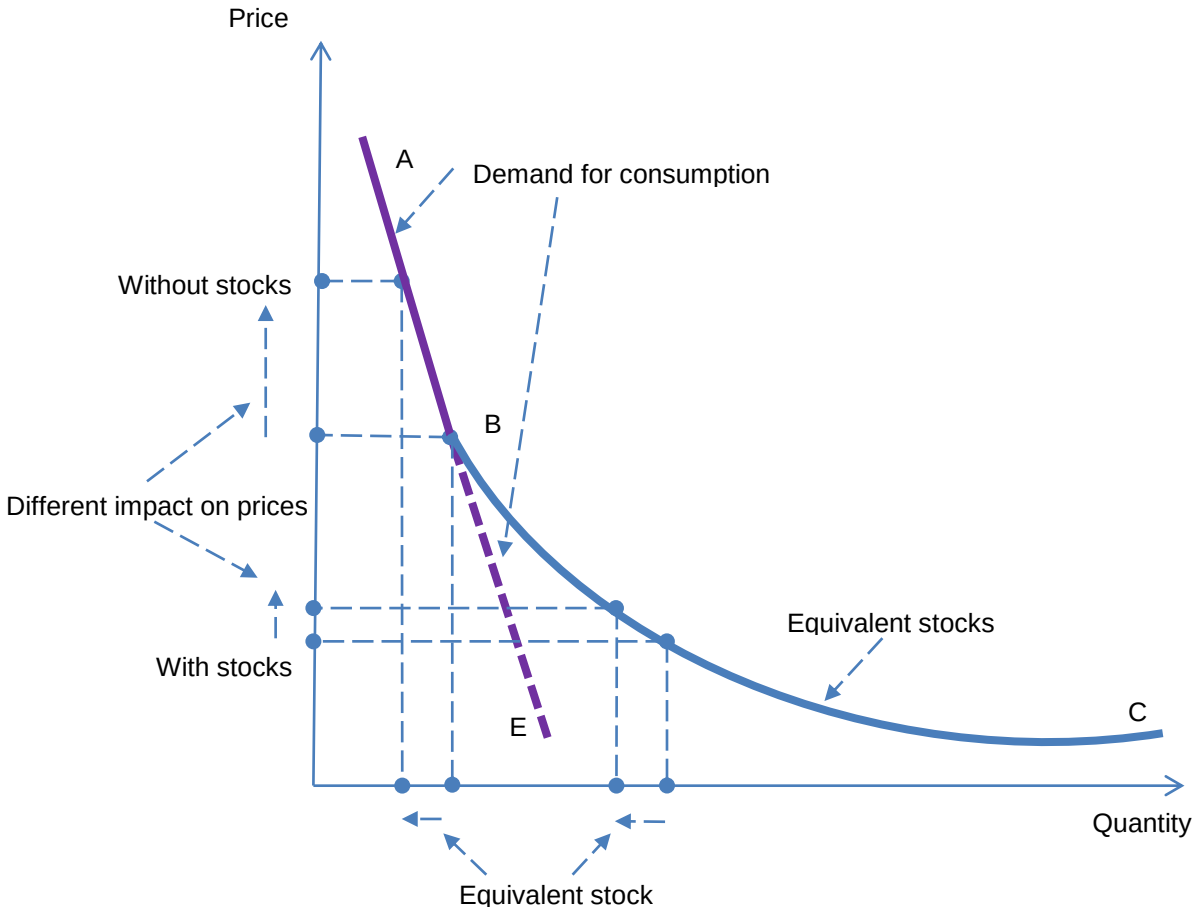
Total Demand = Current Consumption (C_t) + Demand for Future Consumption stored in stocks (X_t)

(Note: Stocks cannot be negative and the organization holding stocks can be any public or private and assume the price of stocks does not change due to deterioration, Wright, 2009). The current supply is represented as follows.

Supply = Current Harvest H_t + Stocks from previous year ($X_{t-1)}$ = Current Consumption (Ct) + Stocks (X_t)

Prices are very sensitive to supply shocks especially when stocks are low. On the demand side, consumption with and without stocks has a very different impact on price. When consumption is in the range of BC prices are low due presence of carryover stocks, on the contrary in absence of carryover stocks, consumption is represented by BE in figure 2.3 is less responsive (inelastic) to price changes. In such a situation consumers of a staple grain like rice have to sacrifice all expenses on education and healthcare to meet their food requirement. The situation in 1972-1973 food price crises was due to low stocks and high prices (Wright, 2009). Also, in a situation when current production is lower and there are no stocks annual prices can almost double. Therefore, stocks are critical in modulating price of food grains. The principle of grain reserves is, when prices are low a large quantity of stocks can be acquired and later used as an insurance policy against short supply in near future.

Figure 2.3 Economics of Grain Reserves



Source: Adapted from “International grain reserves and other instruments to address volatility in grain markets”, by B. Wright, 2009, Policy Research Working Paper Series 5028, The World Bank.

2. 3 Past Experiences of Grain Reserves

Some of the widely discussed regional grain reserves are maintained by regional organizations such as the G-20, South Asian Association for Regional Cooperation(SARRC), Southern African Development Community (SDAC[31]) and ASEAN Plus Three Emergency Rice Reserve (APTERR).The regional grain reserve in the G-20 proposal is designed to operate based on market principles that can be used to address emergency or humanitarian ends (Gilbert, 2011) .In 1987, members of the South Asian Association for Regional Cooperation (SAARC) established a regional grain reserve of 242,000 Mt to address food security in the South Asian region in case of an emergency (Briones, 2011). The SAARC

[31]Southern African Development Community (SADC) is a proposed regional grain reserve for SADC Economic Union.

members include Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, and Sri Lanka. There is limited documentation on the nature or implementation details of the SAARC regional grain reserve. However based on SWATEE working paper on Nepal and Bangladesh (2012) SAARC regional grain reserves seem to be largely non-operational due to several organizational challenges such as lack of financial, institutional and political commitment. In the proposed research APTERR Standard Operating Procedures (SOP) will be used to frame and evaluate the effectiveness of ASEAN Plus Three emergency regional grain reserve on the domestic market of a member country and its spillover into the regional rice market. In order to know the APTERR framework, its origin, and structure it is essential to understand the political economy of the APT countries. The next section of the chapter will discuss the political economy of the APT countries.

2.4 Political Economy of ASEAN Plus Three (APT) Countries

The Asia Europe Meeting (ASEM) was an intergovernmental political framework that lead to formation of APT. The ASEM was an attempt to organize East Asian countries that do not promote East Asian regionalism as observed in APEC (Asia Pacific Economic Cooperation) and EAEC (East Asian Economic Caucus) but as an cooperative framework of ASEAN , China, Japan and South Korea countries where government representatives have various meetings (Suzuki, 2004). The APT framework started with the ASEAN members meeting regularly with non ASEAN members at different summits and conferences with no formal institutional settings (Suzuki, 2004). As a majority of the relational management in the APT framework takes place at the meeting in conferences and summits, is the approach is called conference diplomacy[32]. The Malaysian argument was that the APT framework had excluded countries like New Zealand and Australia because they do not share Asian values like the APT members (Suzuki, 2004). Therefore the structure of APT is restricted to thirteen East Asian Countries that share Asian values.

According to Suzuki's (2004) assessment of the five important features of the APT framework are as follows

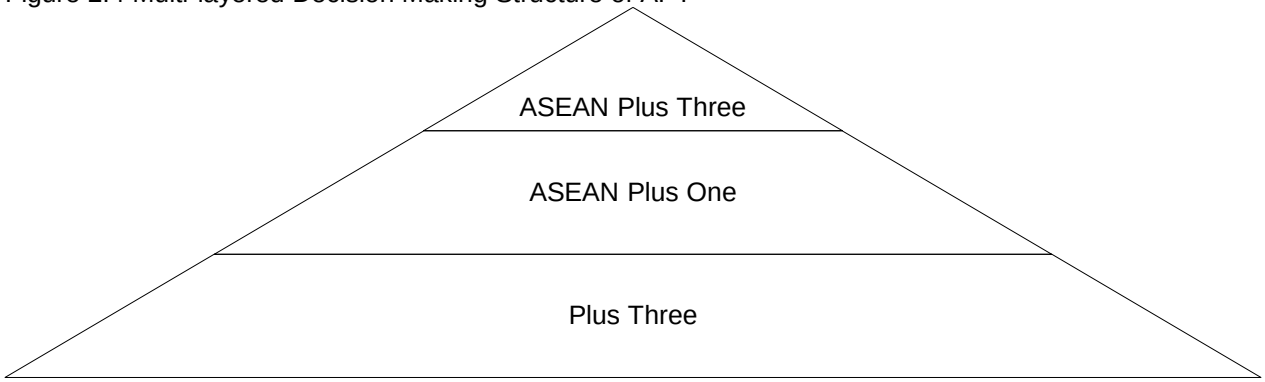
[32]As defined by Kaufmann (1996 p.7) Conference diplomacy is "part of the management of relations between governments and of relations between governments and international organizations that takes place in international conferences".

1. The APT framework is an association of ASEAN and Non ASEAN members, where the non-ASEAN members are China, Japan and South Korea.
2. A wide variety of issues (table 2.1) are discussed among ministers of APT countries. The number of issues discussed in the APT framework has increased over a period of time.
3. The APT is not a formal organization but has a multilayered decision-making structure with ASEAN Plus Three (APT) being at the top followed by ASEAN Plus One (any plus three member) and Plus Three (China, Japan and South Korea). The structure is presented in figure 2.4.
4. The decision making of APT framework is based on consensus building.
5. The issues covered under the three different ASEAN plus one frameworks (ASEAN Plus China, ASEAN Plus Japan and ASEAN Plus South Korea) were economic, social and political (ASEAN Japan, 1997; ASEAN China, 1997; ASEAN ROK, 1997).

Table 2.1 Different level of Co-operation in ASEAN Plus Three member (APT) Framework

Level of Cooperation	Issues
ASEAN Plus Three	APTERR, Asian Financial Cooperation
ASEAN Plus One	ASEAN free trade agreement, Transnational Crime (Piracy Terrorism
Plus Three	Air Pollution, Marine Pollution, ASEAN free trade agreement
Source: Author's Construct, from Suzuki, 2004	

Figure 2.4 Multi-layered Decision Making Structure of APT



Source: Author's construct from Suzuki, 2004

In the multi-layer structure of APT, ASEAN+1 is the most favored structure maintained by China and Japan in order to maintain their political advantage with ASEAN countries (Sukuzi, 2004). Likewise, ASEAN countries are comfortable in ASEAN+1 in order the limit influence of China (Takano, 2001; Yoshino, 2003; Suzuki, 2004). The final assessment of the APT framework is made by Suzuki (2004) who

concludes that irrespective of whether it is the ASEAN+1 or ASEAN+3 arrangement, ASEAN as an organization can use the APT framework to maintain its political leverage and reduce the economic and political impact of non ASEAN members on the ASEAN members and aid ASEAN countries to build a cordial relationship with non ASEAN countries. The APT framework was used by Japan to initiate the Asian Monetary Fund (AMF) in response to Asian financial crises of 1997. The US position on the AMF is that it is should be a complementary organization to the International Monetary Fund (IMF) and it should not undermine the effectiveness and credibility of the IMF, a global financial Institute (Kawai, 2009). Despite its initial challenges and above mentioned objections by the US, the Asian Monetary Fund has evolved into the Chiang Mai Initiative (CMI).The APT initiative that is responsible for the food security by using a regional grain reserves in Asia is the APTERR. The next section of the chapter will discuss the food security framework for APT countries.

2.5 APT Cooperation in Agriculture and Food Security

The first APT ministerial meeting on Agriculture was held in Medan, Indonesia in 2001 (Suzuki, 2004). The organization that was instituted for coordination of activities related to agricultural cooperation in APT framework was ASEAN Agricultural Ministerial Meeting (AMAF) and Senior Official Meeting (SOM) (AMAF+3, 2001). The cooperation of agriculture among APT countries pioneered establishment of APTERR. The APTERR pilot project started on a voluntary basis in 2003 and as of 2011 it is the official cooperation organization within member countries to address food security issues. The APTERR was promoted by Thailand and Japan and all meeting prior to 2003 were structured in ASEAN Plus One framework. Since 2003, China's Ministry of Agriculture has signed on to offer technical assistance to ASEAN countries by sending their experts to foster agricultural development in ASEAN countries (Takahara, 2003; ASEAN China, 2002). The cooperation among APT members in setting up free trade agreements between ASEAN and Plus Three countries was not a success. However, ASEAN Plus One structure of free trade agreement was pursued by Plus three members in absence of a comprehensive APT free trade agreement (Suzuki, 2004). Similarly, members within ASEAN countries have actively pursued FTA with Plus Three members on bilateral basis. The only case where there is cooperation both at the Plus Three level as well as at APT level is on environmental issues (Suzuki, 2004). The high level of cooperation exhibited among APT members is due to the environmental concerns such as air and

marine pollution that needed to be addressed by achieving cooperation among members given the transnational context of the problem.

The decision making in many of the international conferences is by consensus even when voting among members can be ideal to get an opinion from a group of members (Kaufmann 1996). Decision making in the APT framework is achieved by building consensus among members in meetings. Similarly, at all three levels of decision making (APT, ASEAN Plus One, and Plus Three) there is mutual understanding among members to accommodate preferences of member states (Suzuki, 2004). But when there is a decision among APT members that requires implementation on an agreement, members are strategic and choose one particular level that is in their best interest (Suzuki, 2004).

In summary the APT framework reflects the decision making structure of ASEAN which is the core of the entire framework (Suzuki, 2004).The major challenge in consensus-based decision making is that different members have different interpretations and understanding of documents. Therefore, instead of making concrete decision on the consensus building there is “pseudo consensus” (Kaufmann 1996, p. 29). Based on Suzuki’s (2004) assessment the APT framework is loose cooperation among members on different issues that takes place during conferences.

The APT framework does not have a secretariat and ASEAN members fear that setting up of another ASEAN like organization (APT) will undermine the political leverage of ASEAN (Suzuki, 2004). Based on Simon’s (2008) assessment neither ASEAN nor its extensions like ASEAN Plus One and ASEAN Plus Three (APT), have a central mechanism to either monitor or enforce members commitments. Likewise, the APEC, which competes for leadership of South East Asian regional governance, as an organization is focused more on trade liberalization and regional economic integration without any specifics on what is the regional definition of Asia Pacific (Besson, 2006,). Katsumata (2006) furthermore adds that First, APT as an East Asian forum is a web of bilateral and multilateral agreements. Second, the nature of APT meetings or agreements does not incorporate any established international organization standard for a treaty. Third, it is an arena where participants put forward their international initiatives and agendas for regional cooperation. Besson (2006) argues that status quo of economic integration in East Asian countries post 1997 is largely constrained by state intervention, non

transparency, protectionism, and an inability of east Asian countries to work effectively as a single entity responsible for regional economic development (p 189).

2.6 ASEAN Plus Three Emergency Rice Reserve (APTERR)

The APTERR started with the ASEAN Emergency Rice Reserve (AERR) in 1979 as an organizational response to the food crises of 1974. The AERR had a commitment 87,000 Mt of rice stocks and was not operationalized until 2003 (Table 2.2).The AERR was not operational or lacked success in addressing emergencies for past 25 years due to a lack of a trigger mechanism for release of reserves which were supposed to be available only for declared emergencies. (Dano & Peria, 2006; Trethewie, 2013). These restrictions in release of reserves were deliberately introduced in the AERR as officials responsible for AERR believed that countries would use reserves instead of normal trade to meet their production shortfall and distort normal rice trade (Trethewie, 2013).

In 2003 AERR was renamed the East Asia Emergency Rice Reserve (EAERR) when Plus Three countries (China, South Korea and Japan) joined the grain reserve program. The EAERR as an organization was developed with a mandate based on member's rice stocks commitment to the rice reserve program. The organization was officially established on October 7th, 2011, in Jakarta, Indonesia by an agreement signed by Ministers of Agriculture and Forestry representing 13 member APT countries (www.apterr.org). The current APTERR stocks are 787,000 Mt and country level commitments to stocks are detailed in table 2.2. The objective of the APTERR is to strengthen food security and reduce poverty in APT countries. To be specific APTERR is designed to meet immediate food security needs of the APT countries in two ways. First, to address food security needs of member countries in case of a natural disaster. Second, to prevent panic in the regional rice markets (reduce price volatility) in response to production shortfall in any member countries.

2.61 Management of the APTERR

The APTERR as an organization is under the ASEAN Ministerial Meeting on Agriculture and Forestry (AMAF). The Senior Officials Meeting (SOM)-AMAF is the apex ASEAN organization that addresses food security issues in consultation with the ASEAN Ministers on Agriculture and Forestry (AMAF) (www.aseansec.org). The decision making arm of APTERR consists of working groups, technical experts

and relevant institutes including the Asian Development Bank. The APTERR meetings are held regularly at different locations in ASEAN countries.

Table 2.2 ASEAN Plus Three Emergency Rice Reserves Stocks in APT Countries in metric tons.

Countries	Earmarked Stock	
ASEAN Countries	ASEAN Emergency Rice Reserve (1979)	APTERR
Brunei Darussalam	-	3,000
Cambodia	-	3,000
Indonesia	12,000	12,000
Lao PDR	-	3,000
Malaysia	6,000	6,000
Myanmar	-	14,000
Philippines	12,000	12,000
Singapore	5,000	5,000
Thailand	15,000	15,000
Viet Nam	-	14,000
Plus Three Countries		
China	-	300,000
Japan	-	250,000
Korea	-	150,000
Total	50,000	787,000
Source: Agreement on the ASEAN Plus Three Emergency Rice Reserve (2011)		

The day to day management of the APTERR is assigned to the Management Team of the East Asia Emergency Rice Reserve (MT- EAERR) at their office hosted by the Ministry of Agriculture and Cooperatives of Thailand (MOAC). The decision making in APTERR on the release of the stocks is made by having a consensus among the MT- EAERR or the APTERR Council and there are guidelines outlined in the agreement as to what constitutes an emergency for release of stocks. The details on APTERR standard operating procedures are developed for stakeholders by the ASEAN Secretariat and the Asian Development Bank (ADB), but specifics of the standard operating procedures are not available to the public (Trethewie, 2013). The APTERR reserves are classified into two categories: first, the stockpile reserves (tier 3) and second, the earmarked stocks (tier 2) (787,000 Mt).Table 2.3 elaborates in detail on the APTERR stocks and their intended purposes. The purpose of tier 1 and tier 2 stocks is to address shortfall in production of rice (non - emergency) by using commercial trade. The purpose of tier 3 stocks release is to address acute food shortage due to a natural disaster. The emergency food aid which is in form of donations are classified as a tier 3 stocks. The APTERR organization will review the request to release APTERR stocks based on a pre-negotiated contract between two countries (importer and exporter) in the case of a tier 1 release. The replenishment of APTERR stocks is on an annual basis and

releases under tiers 1 and 2 should not exceed the set commitment levels (apterr.org). The storage of stocks is the responsibility of the member country that has committed its stocks to the APTERR and there is no APTERR warehouse of the organization. The quality of rice committed to the grain reserves will be based on international food safety standards and should be fit for consumption (apterr.org). Figure 2.5 represents type of payment arrangements for different tiers

Table 2.3 Classification of the APTERR Tiers based on Purpose, Source and Beneficiary.

Tier	Common Name	Intended Purpose	Source of Reserves	Trade flow in APT countries
1	Pre-negotiated contract	Special Commercial Contract	Commercial Trade	Vietnam to Philippines (10,000 Mt)
2	Earmarked Reserve	Emergency Loan / Grant,		So far there has been no release of rice stocks under tier 2
3	Stockpiled Reserves	Acute emergency release of rice to disaster victims	Free food aid: donations in form of cash or physical rice	Largely financed by Japan and supported by Thailand
Source : Briones, 2011				

2.62 Challenges in having an Operational APTERR

The objective of a typical emergency rice reserve is to protect the poorest of the poor in an event of an extreme price spike as seen in 2008. There are six major challenges in the operation of APTERR. They are as follows.

First, as discussed earlier, an extreme price spike may be either due to manmade speculation or due to a natural calamity. But addressing a price spike using a regional emergency reserve like APTERR can be tricky as it can be a tool used by the state representative of a recipient country to avoid normal trade and make a country aid dependent. Therefore estimation of the optimal level of reserve release is a complex issue (Briones, 2011). In particular, the trigger mechanism for the release of APTERR stocks should be more specific as it is quite complex to define an emergency wherein there will be a release of APTERR reserves (Sarris, 2010).

Second, it is imperative to address the issues of cost in financing the APTERR as an organization. There is lack of permanent technical and financial assistance as well as institutional support in running day to day operations of the APTERR (Briones, 2011).Currently, there is temporary support from Thailand's Ministry of Agriculture and Japan's Ministry of Agriculture, Forestry and Fisheries to cover the administrative cost of APTERR. The financial system that assists in the operation of APTERR should

be funded by APT members to make it a self-financed organization. As far as technical assistance is concern there should be an initiative in the APT to develop a reliable information system that can assist APTERR with current and possible emergency situations in the APT countries.

Third hurdle in having a successful APTERR operation is to have uniformity or harmonization of rules, regulations and laws within APT countries with respect to release of stocks, payment and logistics (Briones, 2011).

Fourth, will the current level of APTERR reserve (787,000 Mt) be sufficient to stabilize prices in ASEAN or APT countries in case there is a large production shortfall (Sarris, 2010).

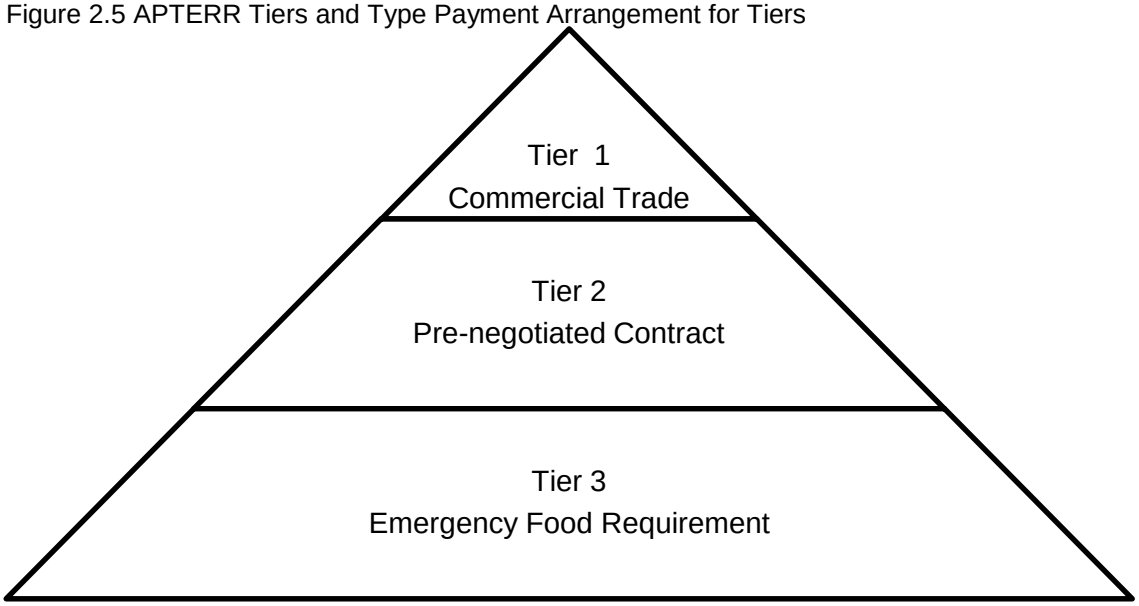
Fifth, critics like Bernabe (2010)[33] argues that there are no details on the APTERR such as how a country can have access and distribute reserves. Even if there is an easy access to grain reserves for a country is there any apparatus to know if the rice reserves are promoting food security or is it just dumping of rice into already functioning markets (Sampson, 2010).

Sixth, some of the other constraints that hampered the development of EAERR were inefficiency in the process of acceptance and delivery of emergency aid (Trethewie, 2013).There are no specifics on the time duration it will take for approval of food aid and its final delivery in the APTERR framework.

To summarize, the structure and management of APTERR should be explored to make it a permanent institute that is dynamic and adaptive to changing market and financial conditions (Briones, 2011).

[33]represents Asia Farmers Association for Sustainable Rural Development

Figure 2.5 APTERR Tiers and Type Payment Arrangement for Tiers



Source: Authors construct from APTERR, 2011

Chapter 3 EMPIRICAL FRAMEWORK

In this chapter the analytical framework used to evaluate the APTERR in deterministic and stochastic framework is presented. The discussion will elaborate on the deterministic and stochastic procedures used in generating results presented in chapter 4. There are five major structural global rice models namely: RICEFLOW, Arkansas Global Rice Model (AGRM), IRRI Global Rice Model (IGRM), AGLINK-COSIMO (OCED-FAO) and CCLS (USDA). These identified models that have been extensively used in the analysis of global rice policies with respect to trade, climate change and technology assessments. RICEFLOW, AGRM, and IGRM are partial econometric frameworks of the global rice economy with a few differences with respect to their structure, price equilibrium, and disaggregation of regions within countries. The major differences between AGRM, IGRM and the RICEFLOW models are presented in table 3.1.

The AGRM and IGRM models have less flexibility in modeling stocks whereas RICEFLOW model is the most flexible model to simulate the scenario of the research question posed in this dissertation. The flexibility offered by RICEFLOW model is that policy variables can be made endogenous or exogenous based on the user's specification. In order to assess the impact of grain reserves in addressing price volatility it is important to have the unique and important structure of the RICEFLOW framework that can evaluate changes in production, consumption, and trade flows among importing and exporting in ASEAN Plus Three countries. The spatial dimension of RICEFLOW evaluates the quantity of grain reserves required by an importing or recipient country to obtain a new market equilibrium in an event of a production shortfall. As discussed earlier, the RICEFLOW model is the most flexible model wherein variables of interest can be either endogenous or exogenous based on user's specification. Therefore modeling of stocks is easier in RICEFLOW when compared to other models. The RICEFLOW model is a spatial model that depicts the supply chain framework of global rice economy and therefore lends itself more conceptually designed to address the questions of this study.

Table 3.1 Salient Characteristics of the AGRM, IGRM and RICEFLOW Models.

Characteristics	AGRM	IGRM	RICEFLOW
Institutions responsible for development and maintenance	Department of Agricultural Economics and Agribusiness, University of Arkansas, USA	International Rice Research Institute, Los Banos, Laguna, Philippines	Department of Agricultural Economics and Agribusiness, University of Arkansas, USA
Research Life (Years)	20	1	10
Baseline Projections	10 -15	20 - 30	5 -10
Published Documentation	Yes (Online)	Internal Draft	Yes (Online)
Research Collaboration	FAPRI	IFPRI-IMPACT	AGRM
Modeling Update	Regular	Ongoing Development	Regular
Data[34]	USDA (PS&D, Attaché Report) Country reports	USDA (PS&D), FAO STAT, AFSIS, National Statistics	FAO, COMTRADE Arkansas Global Rice Model Country reports
No. of Countries/Regions	45	28	62+
Intra Regional Disaggregation	Partial	Yes	No
Data Cycle (Year)	Marketing	Marketing/Calendar	Marketing
Date Updates	Macro data is updated once a year while S&D can potentially be updated monthly	Need or project specific updates	Updates are subject to data availability and project needs. current data/AGRM update to 2008
Partial Equilibrium Model	Yes	Yes	Yes
Spatial or Non-Spatial Model	Non-Spatial	Non-Spatial	Spatial
Dynamic or Static	Dynamic	Dynamic	Dynamic/Static
Deterministic Estimates	Yes	Yes	Yes
Stochastic Capability	Yes	No	Yes
Production Theory	Profit maximization subject to production constraint (MR=MC)	Profit maximization subject to production constraint	Profit maximization subject to production constraint (Costs=Revenue)
Production Specification	Double log or Linear	Double log or Linear	Leontief, CD or CES
Production Estimates	Yield x Area Harvested	Yield x Area Harvested	Disaggregated by stage of processing
Consumer Level	Utility maximization subjected to budget constraints		
Trade Estimates	Net Trade & Total Trade	Net Trade	Bilateral and Total Trade
Source: AGRM, RICEFLOW and IRRI Model Documents			

[34]All three models have a common source of macro-economic data from Global Insight.

3.1 The RICEFLOW Model

The RICEFLOW[35] model is a partial equilibrium model that depicts the framework of the global rice economy. The software which is used to run the model simulation is GEMPACK (General Equilibrium Modeling Package). The model disaggregates rice trade into 9 distinct products based on type and degree of milling (table 3.2). The unique attribute of the RICEFLOW model is its ability to estimate bilateral trade flow impacts of regional and global trade agreements especially preferential trade agreements. Similarly the model can be used to study impacts of technological innovation, climate change, food security, and supply chain analysis. The RICEFLOW model is an annual model and all estimates of results are on an annual basis. The model uses data from FAO, COMTRADE, and USDA and other national trade databases (Thailand, India, and Vietnam) and the structural elasticity estimates from the Arkansas Global Rice Model (elasticities). The model is flexible in its scope and for this study covers 60[36] countries. The model is updated regularly and the output can be estimated deterministically as well as stochastically. The model can be used for dynamic analysis relying upon a recursive specification of the previous year's solution providing a forward feeding market solution. The model at the producer level is based on profit maximization subject to a zero profit production constraint (costs=revenues). While the functional form is flexible, for the analysis of this study, production has a specification as Leontief[37]. At the consumer level the utility maximization is subject to a budget constraint. The RICEFLOW model is updated to 2009 actual calendar year data.

Table 3.2 Product Distinction in RICEFLOW Model by Type and Degree of Milling

Rice Type	Long Grain	Medium Grain	Aromatic
Degree of Milling	Paddy	Paddy	Paddy
	Brown	Brown	Brown
	Milled	Milled	Milled
Source: Durand and Wailes, (2010)			

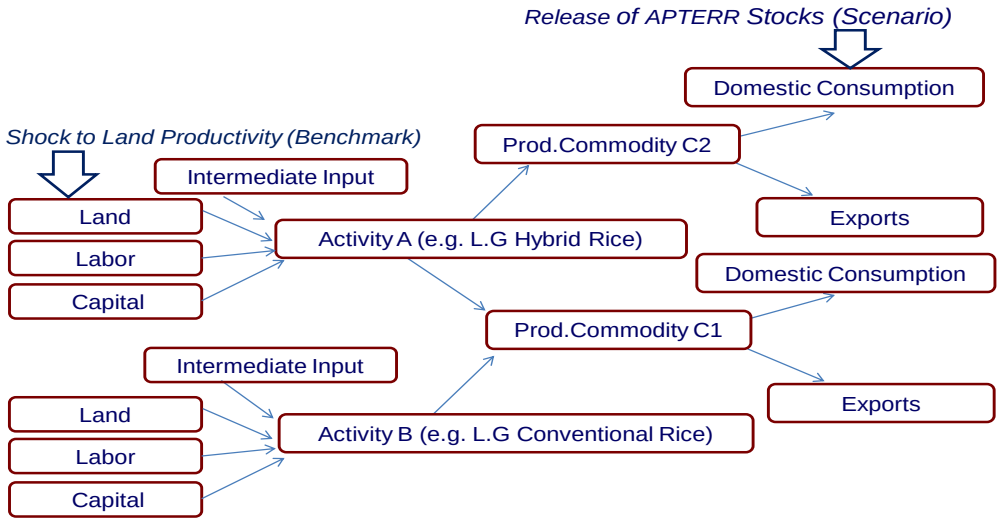
[35]The RICEFLOW model is developed by Alvaro Durand-Morat and Eric Wailes (2010). For more details see online documentation at http://ageconsearch.umn.edu/bitstream/92010/2/RICEFLOW%20model%20documentation%20SP%2003%202010.pdf

[36]List of 60 countries is presented in table 3.0 of the appendix.

[37]Leontief production function is an algebraic production function in which inputs are used in fixed proportions

The expected results (a priori) with release of stocks will result in a decrease in the retail price, and also decreases in consumption and imports. The schematics of the RICEFLOW model are presented in figure 3.1 which gives details where in the model, benchmark and scenario analysis is conducted.

Figure 3.1 RICEFLOW Model Schematics with Benchmark and Scenario



Source: Author

The results presented in chapter four are divided into two sections. The first section provides deterministic results followed by stochastic results in the second section. In order to simplify the results it is important to understand the RICEFLOW model with respect to interpretation of baseline, benchmark and scenario results.

3.2 Deterministic Analysis

The RICEFLOW baseline result is a disaggregated representation of APT rice economies as of 2009. The production, consumption and trade flows for every APT country are represented in equilibrium in the RICEFLOW model.

Benchmark: The benchmark results in the RICEFLOW simulation are generated by imposing a production shock to the 2009 baseline. There are two benchmarks based on how the production variable is shocked in the model. The distinction between a deterministic benchmark and a stochastic benchmark is that the

deterministic production shock is restricted to one country while the stochastic benchmark has stochastic production shocks (reflecting a more realistic representation of the market environment) to all APT countries based on estimates of historically correlated yields in APT countries. The stochastic benchmark has a production shock (on yields reflected as land efficiency (output per unit of land) of member countries) imposed on the baseline to generate a climatic event for policy analysis of the APTERR. The different levels of production shock (shortfalls in output per unit of land) in the RICEFLOW model in the deterministic benchmark are set at 2, 4, 6, 8, and 10 percent. The deterministic benchmark production shocks capture the effectiveness of APTERR to generate estimates of rising rice prices in a country where there is a range of production shortfalls from 2 to 10 percent. The purpose of the benchmark results are to portray the market outcomes with the APTERR.

Scenarios: The scenario results introduce the APTERR framework which is then evaluated relative to the benchmark results with regard to price stabilization and welfare of the consumers.

3.3 Stochastic Analysis

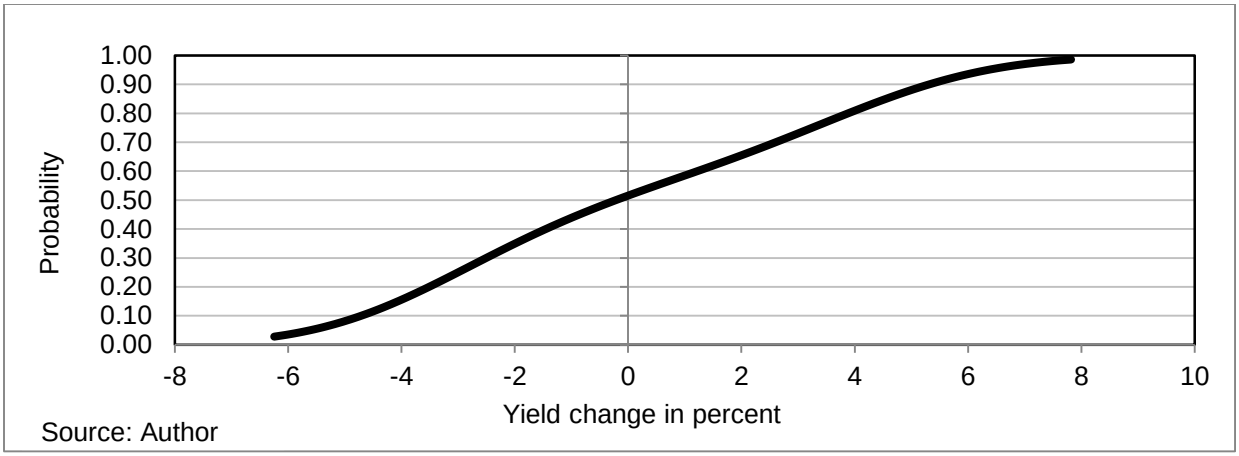
The policy and market analysis in the RICEFLOW model is conducted in a comparative static (equilibrium displacement) framework in which policies and other constraints are relaxed at same time or in series depending on the research objective. As mentioned earlier the baseline projection incorporates current macroeconomic policy variables and average weather conditions as explained in the stochastic benchmark section below.

3.31 Stochastic Benchmark

The stochastic benchmark in RICEFLOW is based on an empirical distribution of stochastic means of yields. The benchmark of the RICEFLOW model is generated by changes in yield (output per unit of land) where differences between actual mean and stochastic mean are expressed in percentage terms (figure 3.2). The stochastic benchmark is developed based on the random draws from an empirical probability distribution function using historical yield data for the Philippines that captures the variability in land productivity. The stochastic yields are used to represent changes in the agro climatic conditions which are different for every individual year and country. The stochastic analysis provides a range of values

associated with risks and uncertainties in rice production, which is a fundamental element in addressing food security in ASEAN countries. A correlated empirical distribution is developed for historical yields (1979 – 2009) of the APT countries based on deviations from the 2009 yield. The empirical distributions and random draws are developed using a SIMETAR (Simulation & Econometrics to Analyze Risk), developed by Richardson, James, Schumann, and Feldman (2008). Finally, the RICEFLOW model is simulated for each 100 random draws of yields to develop a benchmark and later a proposed policy scenario (developed in the following section) to compare against the benchmark results. The stochastic output of the RICEFLOW model has its own advantages as it gives probability estimates rather than point estimates.

Figure 3.2 CDF of Stochastic Input for Philippines rice yield output based on differences between actual and stochastic means



Source: Author

3.4 Policy Scenario

The policy scenario under consideration assumes actual trade flows of 2009 where in the APTERR rice stocks are released from Philippines mimicking the effect of APTERR stocks release in response to a production shortfall.

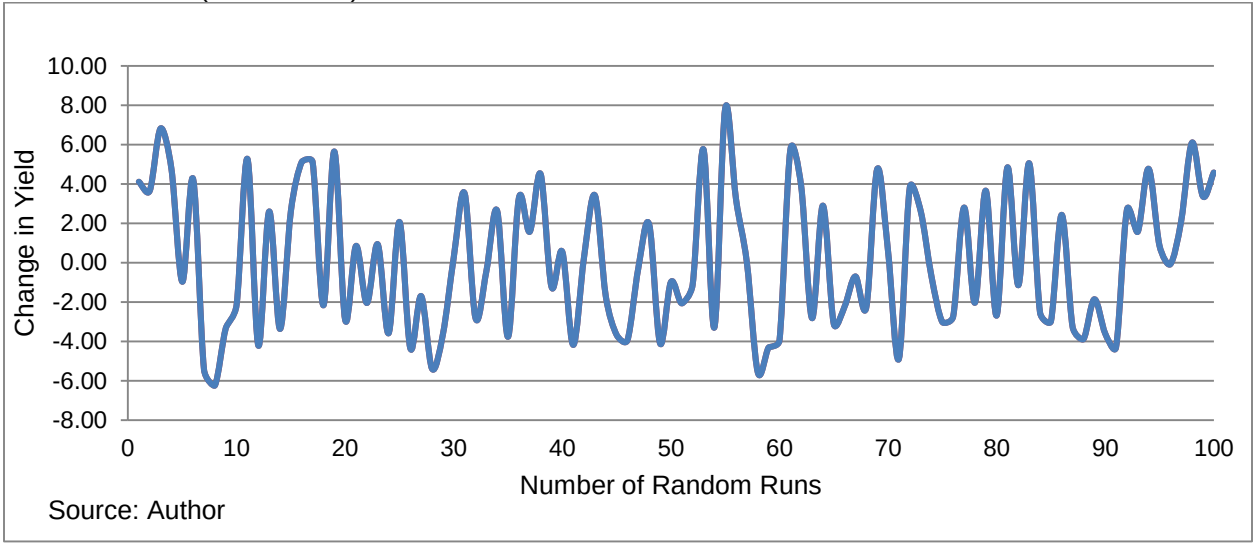
3.41 Deterministic Scenario

The policy scenario in RICEFLOW model is simulated by a release of APTERR stocks at 25, 50, 75 and 100 percent[38] of the total APTERR stocks commitment to address deterministic production shortfalls of 2,

[38] APTERR stocks at 100 percent equals to 787,000 Mt

4, 6, 8,and 10 percent. The objective of the stated policy scenario is to evaluate the impact of APTERR in addressing price volatility in a country where APTERR stocks are released in different quantities at the different production shortfall percentages. The results in the deterministic scenario are restricted to the Philippines. The benchmark historical data of rice production (with yield being stochastic[39]) in the Philippines demonstrate that the probability of rice production shortfall in the Philippines greater than 6 percent has not occurred from year 1979 to 2009 (Figure 3.2 and Figure 3.3). Therefore production shocks in the model for deterministic scenario are restricted to 2, 4, 6, 8, and 10 percent respectively to incorporate values below and above 6 percent of production shortfall. The higher production shock of 8 and 10 percent in the model are used to estimate the impact on regional supply and demand of rice under extreme conditions.

Figure 3.3 Benchmark variability of Paddy yield in the Philippines based on 100 Correlated Stochastic Yield Difference (1979 - 2009)



Source: Author

3.42 Stochastic Scenario

All stochastic results are based on the 100% (i.e 787,000 Mt) release of APTERR stocks in the Philippines in response to stochastic production shock in all the APT countries. In order to evaluate the impact of APTERR on food security the results are restricted to major rice importing and exporting countries in ASEAN. The major rice importers and exporters listed in the results are the Philippines,

39 The area harvested was not stochastic as majority of APT countries had a wide variation in area harvested on year to year basis.

Indonesia, and Malaysia as importers and Thailand and Vietnam as exporters. The results have a major emphasis on the Philippines as it is the largest importer of rice among ASEAN countries followed by Malaysia, and Indonesia (USDA, 2012). Philippines, Malaysia and Indonesia account for about 75 percent of total rice imports among ASEAN countries (USDA, 2012). Therefore, this study has the case of the Philippines where APTERR stocks are released at different levels in response to deterministic and stochastic production shocks. The results incorporate the spillover effect of APTERR release in the Philippines and its impacts on major rice importing and exporting countries in the regional rice market. The task of APTERR is to address volatility in rice prices in ASEAN countries. Therefore, to assess the impact of APTERR on the ASEAN rice market it is important to know variables like change in volume of imports in an importing country, change in retail prices of exporting and importing countries, and changes in demand for consumption. The quantity of stocks shocked in the scenario represents the actual size of the APTERR earmarked stocks. The discussions of results are restricted to four important food security variables: retail prices, level of production, volume of consumption by type of rice, and trade flows in APT countries.

The price volatility is measured in terms of Standard Deviation of prices (SD) or Coefficient of Variation (CV). A literature review of previous studies that used standard deviation as a measure of price volatility is discussed below. Based on Blandford's (1983) study on measures of volatility from 1971-1981 it was concluded that times series data for wheat and coarse grain within one standard deviation wheat and coarse grain prices fluctuated 27 percent and 17.6 percent, respectively. Similarly, using the standard deviation for the rate of change in real prices Kinoshita (1994) concluded that price variability for grains and soybeans remained below 10 percent in the 1950s and 1960s but increased to 20 percent in 1980s and 1990s. Based on analysis by Moledina et al. (2004) of the time series data from 1957 to 2001 oil is the most price volatile commodity followed by sugar. The study uses standard deviation as a measure of volatility to analyze role of APTERR in reducing price volatility at different level of production shortfall in the Philippines. A study by Briones, Durand, Wailes, and Chavez (2012) which evaluated the impact of the APTERR on a monthly basis concluded that the wholesale price in China and retail price in Indonesia of long grain white rice decrease within the month of the production shock by 7 and 10.5 percent with 500,000 Mt and 700,000 Mt releases of APTERR stocks respectively at a simultaneous production

shortfall of 5 percent in both countries. The same study concluded that a production shortfall of 5 percent in China and Indonesia there is a decrease in the volume of consumption of long grain white rice by 3.8 Mmt (3.2 percent) and 1.6 Mmt (3.8 percent) respectively. The Briones et al., (2012) study using RICEFLOW estimated that imports due to 5 percent shortfall of production will increase imports in Indonesia and China by 241.6 percent and 508.3 percent respectively.

Chapter 4 RESULTS AND DISCUSSION

The results presented in chapter 4 are divided into two major sections; deterministic and stochastic. The results are further subdivided into baseline, benchmark and scenarios. The baseline results are in metric tons for quantity and local currency for prices. In deterministic analysis the results for benchmark and scenarios are represented in percentage changes from baseline levels. In stochastic analysis the results are compared between benchmark baseline and scenario. The results and discussion focus on four important variables: retail prices, production, consumption, and imports in Philippines and selected ASEAN countries. These variables are relevant indicators for assessing price volatility and management of grain reserves.

4.1 Deterministic Results

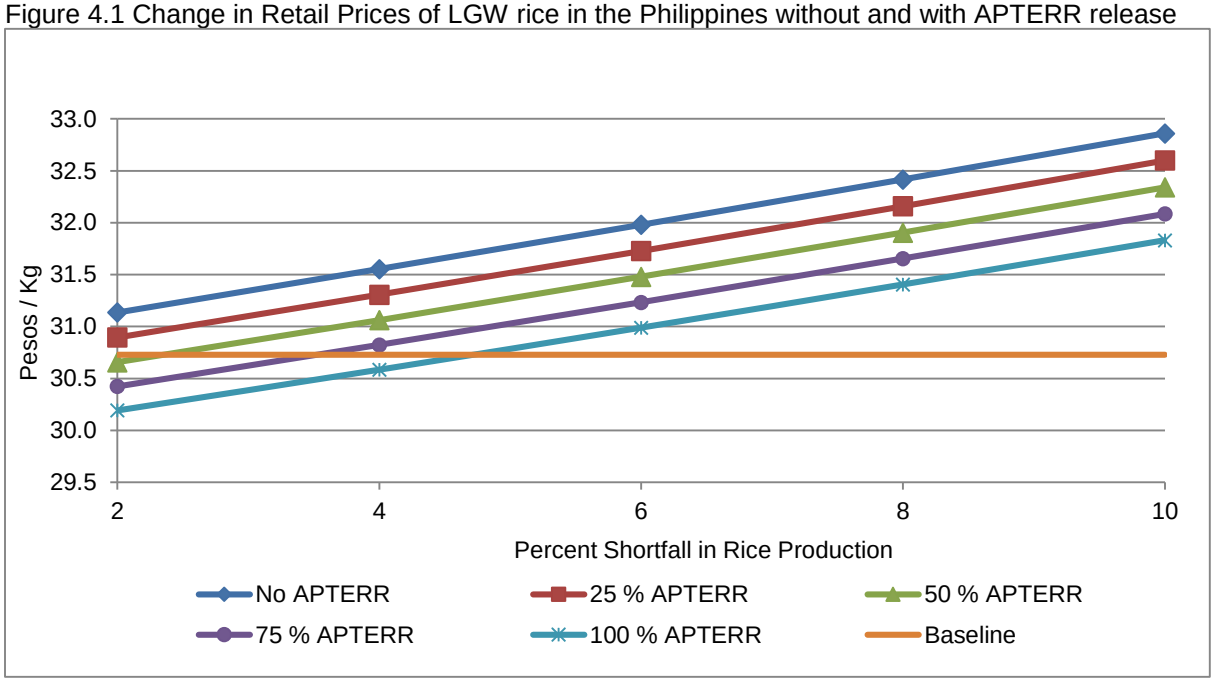
The baseline in the deterministic analysis has no production shock to any variable in the RICEFLOW model. The benchmark in the deterministic analysis is change in rice production (production shock) in the Philippines and scenario analysis is release of APTERR stocks in the Philippines to compensate for production shortfall. The difference between benchmark and scenario is assessing the impact of APTERR release. The deterministic results of the benchmark and APTERR release scenarios give the point estimates and are expressed in percentages. In order to summarize results at different production shortfall (2, 4, 6, 8, and 10 percent) we restrict our discussion to 6 percent production shortfall and assess its impact on retail prices, consumption, and imports in the Philippines with different quantity of APTERR release. Similarly, spillover effects of APTERR on selected ASEAN countries with respect to change in retail prices, consumption and imports are discussed with respect to 6 percent production shortfall in the Philippines and 100 percent release of APTERR in Philippines.

4.11 Impact on Retail Price in Philippines

In 2009, the retail price of long grain white rice (LGW) in the Philippines was 30.73 peso per kg (FAO, 2009). A production shock of 6 percent in the Philippines increases the retail price of rice to 31.98 peso per kg (4.07 percent), In order to address increase in retail price of rice a 100 percent release of APTERR stocks (787,000 Mt) will restrict increase in retail price of rice to 30.99 peso per kg (0.85 percent). The results of change in retail price of LGW rice at different levels of production shortfall without (benchmark)

and with (scenario) release of APTERR are represented in figure 4.1. The APTERR stocks are effective to decrease the retail price below the baseline at 2 percent of production shortfall with 50, 75, and 100 percent release of APTERR stocks. At 4 percent production shortfall only 100 percent release of APTERR stock will decrease the retail price below the baseline. The percent change in retail price of Long Grain White (LGW) rice on annual basis is summarized in appendix table 4.0.

Figure 4.1 Change in Retail Prices of LGW rice in the Philippines without and with APTERR release



The rise in retail price in the Philippines at different production shortfall and release of APTERR stocks in curbing the price rise when evaluated using an annual price framework has a huge implication for food security based on two important facts. First, rice consumption in Philippines in 2009 was 123 kg per person, one of the highest among all rice consuming countries in the world[40]. Second, consumers in the Philippines spend a large share of their income on rice when compared to other food items (BAS, 2011). Therefore, based on per capita rice consumption and income spend on purchasing rice by consumers in the Philippines a marginal impact on retail price in Philippines of the APTERR as seen in the empirical analysis has a significant role to address hunger in low income households. According to Bureau of Agriculture Statistics (BAS) low income households depend on rice as a sole source of dietary source

[40] IRRI World Rice Statistics, 2013

(BAS, 2011). The optimal management of APTERR stocks can be based on the following estimate that annual retail price in Philippines increases by 0.25 peso per kg for every 2 percent decrease in production and the release of different levels of APTERR stocks results in an annual price reduction of 0.8%.

4.12 Impact on Retail Prices in other ASEAN Countries

The results from table 4.1 indicate that a production short fall of 6 percent in Philippines would increase retail prices in Vietnam and Malaysia by 1.31 and 0.93 percent respectively. However, 100 percent release of APTERR would suppress retail price in both countries. There is a marginal impact on other countries like Indonesia and Thailand which means that APTERR has little spillover effect on other countries. Based on these results it can be argued that the APTERR stocks have a marginal stabilizing effect on retail prices in other ASEAN countries. The retail price in Vietnam increases as Philippines is the largest importer of Vietnamese rice. Therefore in absence of APTERR stock release, the Philippines will compensate for its production shortfall by increasing imports from Vietnam that will result in an increase in the retail price in Vietnam.

Table 4.1 Impact on Long Grain Retail Prices in selected ASEAN countries

Country	Baseline	Benchmark	Scenario (Change from Benchmark)
	Local Currency (LC)/Mt	Change in Percent	
Exporters			
Thailand	16,894*	0.42	0.08
Vietnam	8,792,000	1.31	0.26
Importers			
Indonesia	6,668,730	0.04	0.01
Malaysia	850*	0.93	0.19
Philippines	30,730	4.07	0.85
*Wholesale price is a proxy for retail prices in Thailand and Malaysia.			

4.13 Impact on Long Grain Rice Production in Member ASEAN Countries

The results in this section are restricted to other member ASEAN countries as we evaluate the impact of the 6 percent production shock in the Philippines on other ASEAN countries. The results indicate there is an increase of 0.33% and 0.11%, in long grain rice production in Vietnam and Thailand, respectively, in order to meet the import demand of Philippines when there is a production shortfall of 6 percent in the benchmark result. However, under the scenario of a 100 percent release of APTERR stocks there is only a 0.07 percent increase in rice production of Vietnam and 0.02 percent increase in Thailand (table 4.2).

Because of the higher prices, producers in other rice importing nations such as Indonesia and Malaysia also increase their domestic rice production, very slightly by 0.01 percent in Indonesia and by 0.19 percent in Malaysia. With domestic prices stabilizing as APTERR stocks are released at 100 percent, production in Indonesia returns to baseline levels and slightly higher at 0.04 percent than baseline in Malaysia.

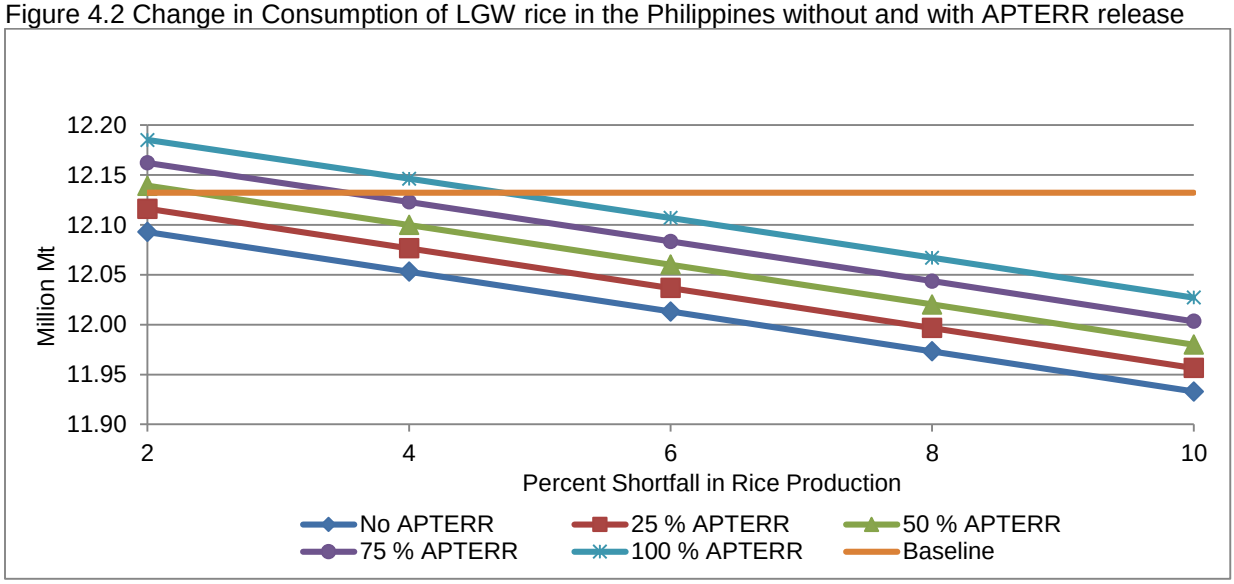
Table 4.2 Impact on Long Grain Rice Production in selected ASEAN countries

Country	Baseline	Benchmark	Scenario (Change from Benchmark)
	1000 Metric tons	Percent change	
Exporters			
Thailand	21,421	0.11	0.02
Vietnam	25,943	0.33	0.07
Importers			
Indonesia	42,954	0.01	0.00
Malaysia	1,675	0.19	0.04

4.14 Impact on Long Grain White Consumption in the Philippines

Based on the 2009 baseline data, the annual consumption of rice in the Philippines was 12.13 Mmt. In the benchmark results the annual domestic consumption will decrease to 12.01 Mmt with 6 percent production shortfall. However with the 100 percent release of APTERR the consumption levels of rice at 6 percent production shortfall will be 12.10 Mmt (See figure 4.2). The percent change in the Philippines consumption of long grain white rice on an annual basis in the benchmark and in the scenarios of alternative release percentages of APTERR stock release at various production shortfall levels is reported in appendix table 5.0

Figure 4.2 Change in Consumption of LGW rice in the Philippines without and with APTERR release



4.15 Impact on Long Grain White Rice Consumption in selected ASEAN Countries.

Consumption of long grain white rice decreases in all of the ASEAN countries reported in Table 4.3 for the benchmark as a spillover result of higher domestic retail prices. However, with the release of APTERR stocks there is little or no change in consumption for these other ASEAN countries.

Table 4.3 Impact on Long Grain Rice Consumption in selected ASEAN countries

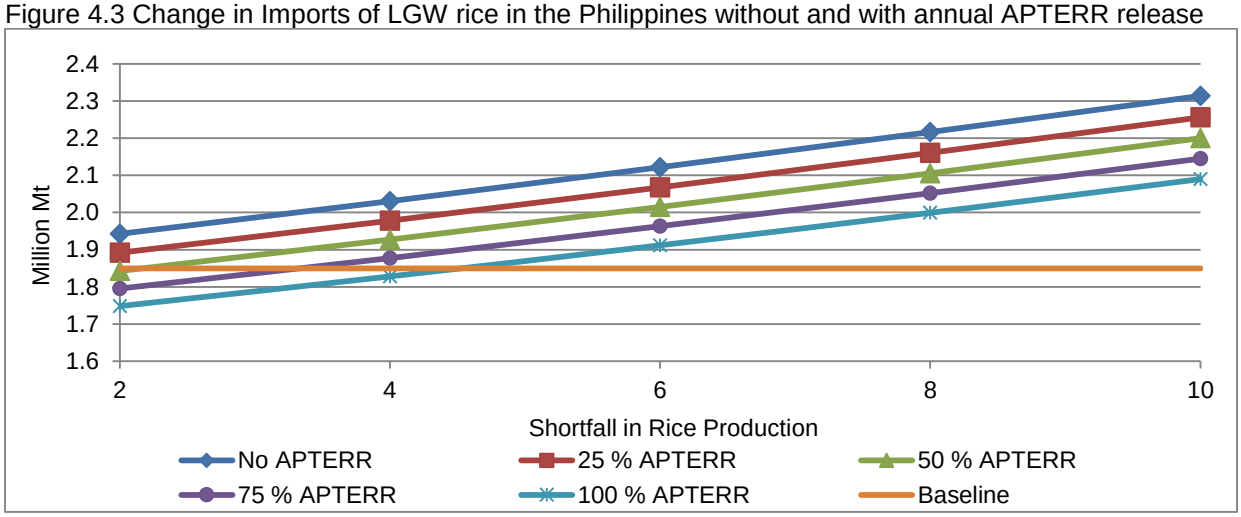
Country	Baseline	Benchmark	Scenario (Change from Benchmark)
	1000 Metric Tons	Change in percent	
Exporters			
Thailand	12,965	-0.02	0.00
Vietnam	19,934	-0.26	-0.05
Importers			
Indonesia	42,183	-0.01	0.00
Malaysia	2,201	-0.27	-0.05
Philippines	12,132	-0.98	-0.21

4.16 Impact on Imports of Long Grain White Rice in the Philippines

In 2009, total rice imports in the Philippines were 1.86 Mmt (accounting for 15 percent of total domestic rice consumption). Any increased import of rice at higher prices in the Philippines to address food security as seen in 2008 has impact on the national economy as value foreign exchange is involved in purchase of rice from the International market. The loss of valuable foreign exchange results in lack government investment in other productive sectors of the economy. In the benchmark analysis, long grain white rice imports by the Philippines increase to 2.12 Mmt when rice production decreases by 6 percent. However,

with the 100 percent release of APTERR stocks imports are restricted to 1.91 Mmt. The decreases in imports in percentages from the benchmark level are presented in appendix table 6.0. In general there is a decrease in imports of rice with the release of APTERR. However the APTERR stocks are not adequate to meet the decrease in production above 6 percent on an annual basis.

Figure 4.3 Change in Imports of LGW rice in the Philippines without and with annual APTERR release



4.17 Impact on Long Grain White Rice Imports on selected ASEAN Countries

A production shortfall of 6 percent in Philippines results in increased imports of 5.71 percent in Malaysia in absence of APTERR but release of APTERR stocks results in only 1.12 percent increase in imports. Philippines and Malaysia are major importers of long grain white rice from Vietnam and Thailand. Therefore a production shortfall of 6 percent in Philippines will increase imports of white rice in Malaysia from Vietnam and Thailand to secure imports as Philippines will increase imports by 25 percent in absence of APTERR. However, imports in Indonesia decrease by 1.58 percent in absence of APTERR while imports are restricted to 0.32 percent with APTERR stocks. The imports in Philippines increase by 25 percent with production shortfall of 6 percent but the 100 percent release of APTERR stocks restrict the increased imports to 5 percent.

Table 4.4 Change in Import of Long Grain White Rice in selected ASEAN countries

Country	Baseline	Benchmark	Scenario (Change from Benchmark)
Importers	1000 Metric Tons	Change in percent	
Indonesia	259	-1.58	-0.32
Malaysia	256	5.71	1.12
Philippines	1858	25.23	4.88

4.2 Stochastic Results

In the following section a discussion on the impact of APTERR stocks on retail prices, consumption and imports in Philippines and other ASEAN countries using a stochastic framework is presented. The stochastic benchmark baseline has a production shock above 2 percent in the Philippines. The scenario has 100 percent release of APTERR stocks in the Philippines (787,000 Mt). The difference between benchmark baseline and scenario is the net impact of APTERR stocks.

4.21 Impact on Retail Prices

Retail price variability is an important indicator of food security. The stochastic simulation generates the likelihood of production shortfall based on historic variability in yields and consequently the distribution of prices. The stochastic simulation results in table 4.5 represents percentage changes in the retail prices of long grain white rice with the release of the APTERR stocks in the Philippines. The overall results indicate that the largest decrease in the mean retail price of rice is in Philippines by 3.11 percent followed by Vietnam 0.92 percent, Malaysia 0.48 and Thailand 0.23 percent

Table 4.5 Percent change in Retail Price of Long Grain White Rice for selected ASEAN countries

Country	Benchmark		Percentile		Scenario		Percentile		Change	
	Mean	SD	10th	90th	Mean	SD	10th	90th	Mean	SD
Indonesia	2.40	9.10	-7.04	18.37	2.37	9.09	-7.06	18.30	-0.03	-0.01
Malaysia	0.96	3.44	-2.55	5.19	0.49	3.08	-2.58	4.24	-0.48	-0.36
Philippines	3.16	3.34	-0.48	7.84	0.05	3.00	-3.30	4.25	-3.11	-0.34
Thailand	1.19	3.69	-3.59	6.55	0.96	3.73	-3.81	6.61	-0.23	0.04
Vietnam	1.41	4.36	-3.19	7.06	0.49	4.15	-3.95	5.86	-0.92	-0.21

In general the decrease in the retail price in countries other than Philippines is due to the trade flow which is endogenous in the model. The trade flows among major ASEAN countries is presented in appendix table 2.0. Vietnam and Thailand are major exporters of long grain white rice to Philippines. Vietnam is the largest exporter of long grain white rice to the Philippines. In 2009, Vietnam exported 1.7 Mmt of long grain white rice to Philippines. Therefore with the release of 787,000 mt of rice in the Philippines imports from Vietnam will be reduced causing a decrease in the retail price of rice in Vietnam. In the case of Malaysia, larger exports from Vietnam and Thailand will decrease the retail price of rice in Malaysia as APTERR stocks reduce imports in Philippines. In general, release of 787,000 mt of rice stocks in the Philippines decreases imports by Philippines from member ASEAN countries which eventually reduces

retail prices in most of the ASEAN countries. The retail prices of the LGW rice in the Philippines increases by 3.16 percent in response to the stochastic production shock in all the APT countries presented in table 4.5. But, with the release of APTERR stocks in the Philippines the average retail price of LGW rice decreases by 3.11 percent. About 10 percent of the time the price will be lower than 3.30 percent of the benchmark price and 10 percent of the time the retail price will be higher by 4.25 percent. As far as addressing price volatility using APTERR is concerned the SD as reported in the baseline and scenario will decrease from 3.34 to 3.00 with 100 percent release of APTERR stocks thereby reducing volatility of prices.

The appendix table 7.0 represent change in retail price of rice in the Philippines due to a stochastic production shock and its associated standard deviation with release of APTERR stocks in the Philippines. The results indicate that higher standard deviation is observed at higher prices in absence of APTERR stocks but with the release of APTERR stocks there is marginal decrease in prices and its associated standard deviation.

The RICEFLOW model as mentioned earlier disaggregates countries into the medium, long grain and fragrant rice producing countries. The table 8.0 in appendix outlines the change in the retail price of medium grain and fragrant rice in selected ASEAN countries. The release of APTERR reserves would have negligible to no impact in the medium grain rice markets of the APT countries. Japan is the only country that has a marginal increase in the retail price of medium grain rice in response to the APTERR release in the Philippines. In case of the medium grain rice market the baseline retail price in the Philippines on average increases by 0.03 percent and about 10 percent of times the prices will be lower 1.42 percent and 10 percent of times the prices will be higher by 2.20 percent. However with release of APTERR there is little change in the average retail price of medium grain rice.

The retail price of fragrant rice in the selected APT countries remains unchanged due to following reasons. First, there is very little consumption of fragrant rice in the Philippines. Second, the total export of fragrant from Thailand to Philippines in 2009 was only 8,471 Mt. Therefore releases of APTERR reserves in the Philippines have no measurable impact on fragrant rice market.

4.22 Impact on Volume of Consumption

The consumption of the LGW rice in the Philippines will increase by 0.76 percent with release of APTERR stocks in Philippines. There is an increase in consumption of rice for all major long grain consuming countries like Vietnam, Malaysia and Thailand with the release of APTERR in the Philippines. As far as medium grain and fragrant rice consumption is concerned there is either marginal decrease or no change in consumption. To summarize the overall consumption results demonstrate a minimal change in consumption of ASEAN countries with the release of APTERR.

Table 4.6 Percent change in Long Grain, White Rice Consumption for selected ASEAN countries

Country	Benchmark		Percentile		Scenario		Percentile		Change	
	Mean	SD	10^{th}	90^{th}	Mean	SD	10^{th}	90^{th}	Mean	SD
Indonesia	-0.27	1.20	-2.33	1.03	-0.27	1.20	-2.33	1.03	0.00	0.00
Malaysia	-0.14	0.78	-0.91	0.78	-0.01	0.63	-0.68	0.73	0.14	-0.15
Philippines	-0.65	0.51	-1.44	0.08	0.11	0.46	-0.64	0.73	0.76	-0.05
Thailand	-0.03	0.09	-0.15	0.08	-0.02	0.09	-0.13	0.08	0.01	0.00
Vietnam	-0.26	0.85	-1.36	0.65	-0.08	0.82	-1.13	0.81	0.18	-0.03

4.23 Impact on Total Imports

As a results of stochastic production shock rice imports in Philippines and Indonesia increase by 9.43 10.94 percent respectively. Table 4.7 represents change in total imports in selected ASEAN rice importing countries due to release of 787,000 Mt of APTERR stocks. The stochastic results indicate that imports in Indonesia with release of 100 percent of APTERR stocks increase by 0.94 and in Malaysia imports decrease by 0.08 percent. However, total rice imports in Philippines decrease by 11 percent with 100 percent release of APTERR. There is marginal effect on imports of other major rice importing countries in ASEAN region when 100 percent APTERR stocks are released in the Philippines.

Table 4.7 Change in Total Rice Imports of selected ASEAN countries

Country	Benchmark		Percentile		Scenario		Percentile		Change	
	Mean	SD	10th	90th	Mean	SD	10th	90th	Mean	SD
Indonesia	10.94	41.43	-31.28	77.83	11.88	41.75	-32.39	80.07	0.94	0.32
Malaysia	0.71	4.26	-4.34	6.88	0.63	4.08	-4.90	5.87	-0.08	-0.18
Philippines	9.43	4.56	4.05	15.83	-1.57	4.46	-6.60	4.84	-11.00	-0.10

4.3 Economic Analysis of the APTERR

This section of the chapter will discuss institutional economic and political economy analysis of ASEAN APTERR framework.

In 2009, Philippines imported about 16 percent of its total domestic rice consumption needs via

imports. Based on FAO statistics, Philippines imported 1.85 Mmt of rice from Vietnam, Thailand and other countries to meet its demand for domestic consumption (FAO, 2009c). The 2008 rice price spike and events of panic buying of rice among importers that followed in its aftermath has cautioned policymakers in Philippines that total reliance on international trade to meet its food security is every risky. Similarly, the thinness of rice trade (only 5 to 7 percent of world rice production is exported), with about 84 percent of exports concentrated in five countries (Thailand, Vietnam, Pakistan, India, and the US), growing demand for rice from African countries and climate change threats to major import sources has led the policymakers in Philippines to strive to achieve self-sufficiency by 2013 (Department of Agriculture, 2011).

To address food security concerns as well as gain public confidence in government's ability to feed its population there is always an incentive for a populist government in the Philippines to undertake expensive programs that promote self-sufficiency in rice production at the expense of trade. The Philippines has limited potential to increase its production due to limited land area for expansion of rice production, lack of infrastructure (irrigation, and transportation) and increased demand for rice due to high population growth (Dawe et al., 2006). The national approach to address food security in the Philippines is to increase production via increase in productivity and to be self-sufficient by 2013 and beyond (Department of Agriculture, 2011). Therefore in the Philippines, the Food Staples Self-sufficiency Roadmap (FSSR) project coordinated by Department of Agriculture is to achieve rice self-sufficiency by increasing productivity and farm mechanization, reducing post-harvest and food waste losses, and diversifying diet to low priced food crops. Unfortunately, all the goals outlined in FSSR by the government of Philippines are long terms objectives and do not address the issue of price volatility which is a short-term problem. Therefore, the Philippines needs APTERR or the National Food Authority (NFA) to meets it food security needs on short term basis. According to Intal and Garcia (2005), the price stabilization or addressing price volatility at any cost is an expensive proposition to the Philippines as costs associated with stabilizing food prices for NFA in 1990 were higher than investment in agricultural research and development or irrigation. According to AGILE[41] (2000) and Intal and Garcia (2005) the National Food Authority (NFA), the state trading enterprising responsible for providing price support for farmers and

[41] An Evaluation of the Accelerating Investment and Liberalization with Equity report submitted to USAID/Philippines by Nathan Associates on March 3, 2000

price ceiling for consumers has failed in its objective to address food security concerns of the Philippines. The NFA procurement of stocks via imports is expensive if there is a regional calamity such as production shortfall in major rice exporting countries then there is an emotional decision to procure large stocks at higher prices to address food security. The role of the NFA should be to manage the emergency rice reserves program and let the private sector be (commercial enterprises) involved in imports, storage and distribution of rice (Intal & Garcia, 2005). Therefore, the APTERR can address food security concerns of the Philippines on an emergency basis in the short term as there is the commitment of 300,000 Mt stocks from Plus Three countries to the ASEAN APTERR framework which, is equivalent to almost three months of total rice imports in the Philippines. The policy option of reliance on enhanced trade to address price volatility can be a reliable option only if ASEAN exporters like Thailand and Vietnam can assure major importers like the Philippines and Indonesia that, if there is no ban on rice exports in future, then importers can forgo their self-sufficiency targets which are expensive and inefficient (Clarete, 2012).

The pilot project operations of the APTERR were funded by donations from member countries (Japan and Thailand). As per Lin's (2009) estimate the economics of ICGR (Internationally Coordinated Grain Reserves) are too high and it would cost about 1.05 billion USD a year. However, according to Clarete (2012) the economic cost of operating APTERR annually is over 3 million USD.A permanent fund contributed by member states or donations of funds from international agencies are essential for sustainable operation of the APTERR. Therefore, the idea of having an APTERR fund as mentioned in the APTERR charter is encouraging and such an APTERR fund will ensure financial sustainability of the organization. ASEAN Food Security Information System (AFSIS) an integral part of the ASEAN APTERR food security framework is crucial in operation of the APTERR. The information sharing among members will make stakeholders aware of food stocks and curb herding behavior of individual stakeholders in an event of crises (Wright, 2009). Likewise, coordination of a change in food policies among major rice importers and exporters will strengthen the ASEAN APTERR framework (APTERR, 2011). The experience with the operation of the AERR which preceded the APTERR that addressed humanitarian (tier 3) and forward contacts (tier 2) are important to make grain reserves more efficient with respect to its operation (Clarete, 2012). The APTERR reserves under first tier (forward contract) and second tier (forward contract and donations) are important to reduce price volatility (Clarete, 2012).

4.4 Political and Operational Challenges for Regional Grain Reserves

The objective of the APTERR is to address emergency and humanitarian needs of member ASEAN countries with no distortion in normal international rice trade (APTERR, 2011). The APT framework of cooperation from an institutional perspective has other agendas such as cooperation on the settlement of territorial disputes and promotion of ASEAN Plus Three free trade agreement that are likely to gather more traction or priority than the ASEAN Food Security framework. There is a lack of planning as to where the APTERR will be with respect to rule of operations and management of reserves. The APTERR agreement signed in October 2011 in Jakarta, Indonesia needs to be developed into a permanent operation module for addressing food emergencies in ASEAN countries. The two major policy interventions that have low cost implementation and high effectiveness to addressing price volatility are trade facilitation and market information, whereas other major policy interventions such as use of reserve stocks has a medium level of implementation cost and low impact in addressing price volatility (Von Braun, 2009). All of the above three options are already part of the ASEAN Food Security Program (Clarete, 2012). The events like the 2008 price spike can be avoided, if the ASEAN APTERR framework addresses food security issues from a regional perspective with enhanced trade being the first policy option followed by the APTERR grain reserves as a second line of defense to address food security on short term basis in the regional rice market. To address the issue of food security in developing countries there are different forms of policy interventions, but the objectives of these programs is not same as addressing price volatility (Torero & Von Braun, 2009b). The effectiveness of the APTERR when compared to other forms of similar policy intervention such as ICGR (Lin, 2009), IGCA (Sarris, 2009) is it has medium cost of operation and high level of effectiveness in addressing price volatility (Von Braun & Torero, 2009b; Clarete, 2012).

The role of grain reserves is of paramount importance in developing countries from a food policy perspective and so is the role of the APTERR. Based on Wright and Cafiero's (2011) argument, grain markets in advanced economies operate in a free market environment with no distortion, but there is an important challenge to such markets. When food supply is dependent on free markets or private storage an individual can have access to food supplies only if an individual has resources or funds, absence of resources or funds may lead an individual to starvation. So, there are national grain reserves in

developing countries and food banks in developed countries to address food security needs of individuals who do not have resources or funds to meet their food security needs. Therefore, national grain reserves must be maintained complementary to regional grain reserves as regional grain reserves are a short term response to local food crises (Wright & Cafiero, 2011).

4.5 Challenges with Coordination of Grain Reserves

The ICGR as proposed by Lin (2009) would have problems in coordination of its operation given the multi- national context of grain reserves. However, coordinating of rice reserves will not be a challenge as the rice market is highly concentrated and reserves can be highly effective in addressing price volatility (Timmer, 2009). To add further, if India and Pakistan (two major exporters of long grain rice in the international rice market) can be part of the APTERR ASEAN framework then this partnership of India and Pakistan in the APTERR reserve program can bolster the decision making and reserve capacity of the ASEAN APTERR framework.

Chapter 5 SUMMARY AND CONCLUSIONS

The empirical analyses of results on the role of the APTERR as a policy tool to address price volatility in APT countries using the RICEFLOW model are presented in chapter 4. Based on the stochastic and deterministic results presented and discussed, the basic findings are that the role of APTERR in addressing ASEAN rice price volatility is limited. The stochastic results show that there is a decrease in the retail price of long grain white rice by 3.11 percent for a 100 percent release of APTERR stocks in Philippines following a 2 percent production shock. The deterministic results clearly indicate that reserves are not adequate to address price volatility at production shortfalls, above 4 percent. The results from the empirical analysis state that the APTERR are ideal to address short term emergency situations and are not adequate for addressing extreme price volatility.

Based on Timmer's observation there are two major food crises every century, following every food crisis there are series of food policy related discussions, and workshops at regional and international levels outlining policy recommendations to address food security issues due to extreme price volatility. However, most of the policy recommendations such as use of grain reserves, or increasing agricultural productivity or those highlighted in the High Level Panel of Expert's (HLPE., 2011) report are partly or at least formally accepted or acknowledged by the government or group of governments. But there is a serious issue of lack of implementation due to two major problems. First there is a lack of political will to implement the policy recommendation. Such was the case for ASEAN Emergency Rice Reserve Program (AERR) although it was adopted in 1979 with no actual operationalisation until 2003. The program was operational only after it was supported by additional stocks from Plus Three countries and financial assistance from Thailand and Japan. Second, an economic union such as ASEAN has other important issues such transnational security, territorial or trade disputes, and transnational terrorism that may gather much more traction or attention relative to food security and staple food price volatility. Therefore, any multilateral food security agreement like ASEAN APTERR if adopted or accepted by a group of countries can be either sidelined or kept on hold. In general, domestic grain reserves operated by state trading enterprises in developing countries have been instrumental in providing price support to producers on one

end and subsidized food grain to consumers on other end. BULOG[42] in Indonesia, BERNAS[43] in Malaysia, and NFA in Philippines are examples of state trading enterprises in ASEAN countries. However, operation of a regional grain reserves is quite complex given the multilateral commitment of countries on rules and regulations with respect to operation of an organization. A successful regional grain reserve that can addresses food security needs, efficient management of stocks with a high level of government commitment, active participation of key stakeholders, and clearly defined rules on grain procurement and distribution. As far as APTERR is concerned rules on release, procurement and distribution of rice reserves are needed to be defined more clearly. Similarly, the organization needs a high level of government commitment from China and South Korea. In this study the analysis is based on the use of APTERR stocks to address different levels of production shocks in the Philippines. The results for Plus Three countries suggest that the role of Plus Three countries in addressing price volatility is based on what type of rice (medium or long grain) is committed to reserve, as the APT regional rice market is highly segmented by type of rice produced and consumed. Japan, and South Korea, produces and consumes medium grain rice while China, is a producer and consumer of both long grain and medium grain rice. Therefore, if the reserves committed to the APTERR by the China, Japan and South Korea are in medium grain rice then the role of reserves in addressing price volatility in long grain rice consuming countries is unknown. However, there is a high probability of WTO long grain rice imports from Japan and South Korea to be committed to APTERR stocks to address food emergencies in ASEAN countries. The commitment as well as priority of member countries to the APTERR stocks from a political economy perspective is full of uncertainty as there are other areas of co-operation such as the cooperation on free trade and settlement of territorial dispute by peaceful means that gain priority over cooperation on addressing food security.

The APTERR as an organization stated as a pilot project in 1979. The organization agreement was officially into force on 12 July 2012 with the APTERR Secretariat established on 29 March 2013 in Bangkok Thailand. The first official APTERR council ministerial meeting was held on 28 March, 2012 in

[42]BULOG (Badan Urusan Logistik) is a state trading enterprise engaged in food logistics, commodity trading, management of food stocks, maintains price floor, price stabilization, distribute rice to the poor and management of food stocks.
[43]BERNAS (Padiberas Nasional Berhad) is a state trading enterprise involved in importation, warehousing, distribution and marketing of rice in Malaysia.

Bangkok after a period of almost 10 years since the inception of pilot project in 2003. A total of 13,000 Mt of APTERR stocks were released during the implementation of the pilot project. The disaggregated total 13,000 Mt of rice stocks are as follows: 3,000 Mt of rice was distributed to Cambodia, Indonesia, Laos, Myanmar and the Philippines as a group while 10,000 Mt of rice was distributed from Vietnam to the Philippines. Additional details on the total release of APTERR stocks is presented in appendix table 8.0. Both of these releases were an immediate response to natural calamities. Such releases are critical in addressing hunger on short term basis, but reliance on the adequacy of APTERR stocks to address price volatility as witnessed in 2008 is not recommended. Furthermore, based on the pilot project experience, release of APTERR stocks are suitable for natural calamities that span one or another region/ province. But they are not suitable for an entire nation. A small production shock of about 2 to 4 percent is a reasonably acceptable production shock for the release of APTERR stocks. But APTERR stocks are not geared to massive production shocks of 5 percent or greater.

The policy recommendations are divided into two sections. Based on the discussion in chapter 4 there are two policy recommendations based on a food policy and political economy perspective. From a political economy perspective, China, Japan and South Korea are the largest contributors to the APTERR stocks. But their participation is minimal as far as policy making in the APTERR is concerned with exception of Japan. Therefore, China, and South Korea should be more active participants in the ASEAN APTERR food security framework. Second, based on the current territorial disputes in the South China Sea between APT members, China, the largest contributor to the APTERR stocks has growing nationalist interests that would undermine its commitment to the APTERR. Similarly, there may be a contest for leadership of the APTERR between China and Japan in near future. The future of APT framework of cooperation is still unclear whether if it will develop into an organization like ASEAN or APEC (Sukuzi, 2004). At present ASEAN has shown its support to host APT unit within the ASEAN Secretariat (www.asean.org). Based on Briones at al., (2012), regional grain reserves are too small to reduce price of the domestic market on an annual basis in case of large production shortfalls. Major rice exporters such as Thailand and Vietnam should make commitments equal to that of Plus Three countries and similarly major rice importers in ASEAN such as Indonesia, Malaysia, and Philippines should increase their domestic stocks commitment thereby making a robust reserve of 1.3 Mmt (Briones et al., 2012). The

argument for increasing the size of grain reserves is to offer policy option of grain reserves stocks will be released to address price volatility (even if they are not used) or in other words the use of grain reserves would be a policy leverage to reduce extreme price volatility if there is a production shortfall due to natural calamities or speculation in international or regional rice markets. There can be an extension of the APTERR with other regional grain reserves like South Asian Association for Regional Cooperation (SAARC) grain reserves to have Asian Rice Reserves. The Asian Grain Reserves (a combination of APTERR and SAARC rice reserves) will involve all major rice producing and consuming countries in Asia. A similar proposal was discussed at UNCTAD in 1974 after first food crises of 1973/74 and recently in 2011 the same proposal of 1974 was discussed by the G-20 countries to have an international grain reserves (Murphy, 2009).

A combination of short and long term strategy that addresses social, macro and structural policy constraints in the existing policy framework are needed to promote food security, poverty and hunger (ADB, 2012). As per Holmes (2008) the United Nations (UN) estimate that since the 1990s number of natural disasters worldwide has increased twofold and nine out of ten disasters are related to climate change. Therefore, grain reserves are a public insurance policy to combat climate change threats to agricultural production (Murphy, 2012b). The adoption of APTERR at the regional level is the best approach to stabilize prices, address food security, and the first step towards enhancing regional rice trade (ADB, 2009).

Future Research

The current RICEFLOW model used in assessing the impact of the APTERR to address price volatility in regional rice markets can be modified to create a new pseudo country that represents the supra national reserve APTERR and has linkages that capture the storage component or earmarked sector of APTERR grain reserves in every APT countries. The current model distinguishes long grain and medium grain trade however; there are no specifics available for the earmarked commitment by member countries on long grain and medium grain rice that can be simulated differently from the current trade flows in the model. The results presented in chapter 4 are based on an annual basis and estimates on the quantity of

grain reserves required to address price volatility on monthly basis can be made if there is monthly of data available.

APPENDIX

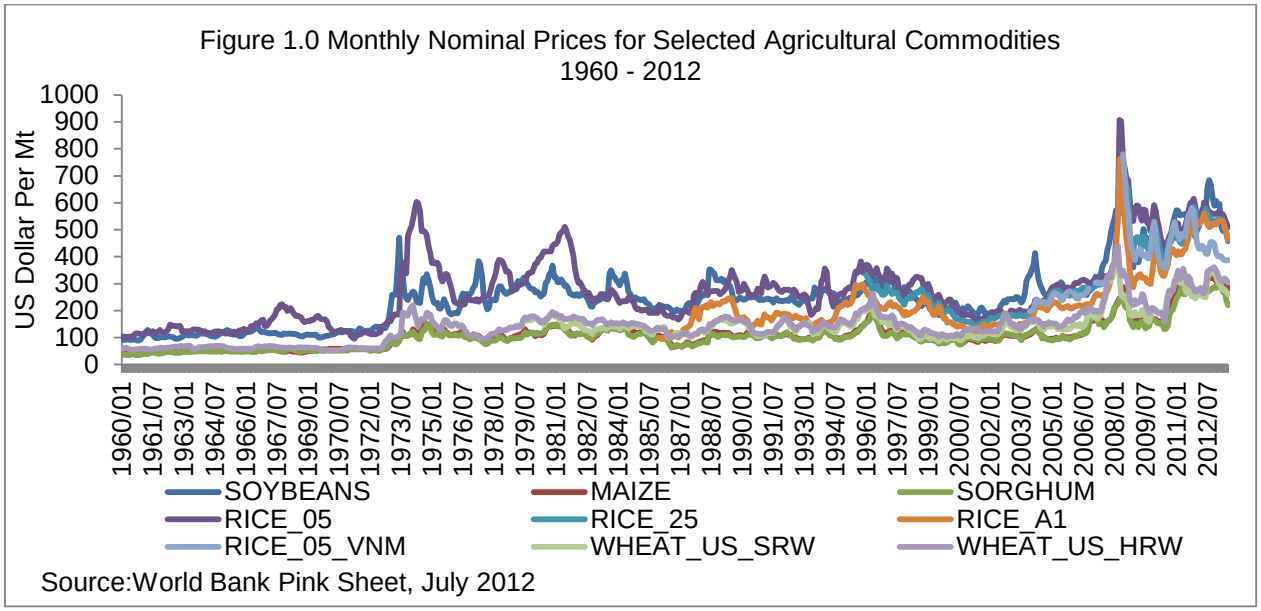


Figure 1.0 Monthly Nominal Prices for Selected Agricultural Commodities
1960 - 2012
US Dollar Per Mt
1000
900
800
700
600
500
400
300
200
100
0
1960/01
1961/07
1963/01
1964/07
1966/01
1967/07
1969/01
1970/07
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2005/01
2006/07
2008/01
2009/07
2011/01
2012/07
SOYBEANS
MAIZE
SORGHUM
RICE_05
RICE_25
RICE_A1
RICE_05_VNM
WHEAT_US_SRW
WHEAT_US_HRW
Source:World Bank Pink Sheet, July 2012

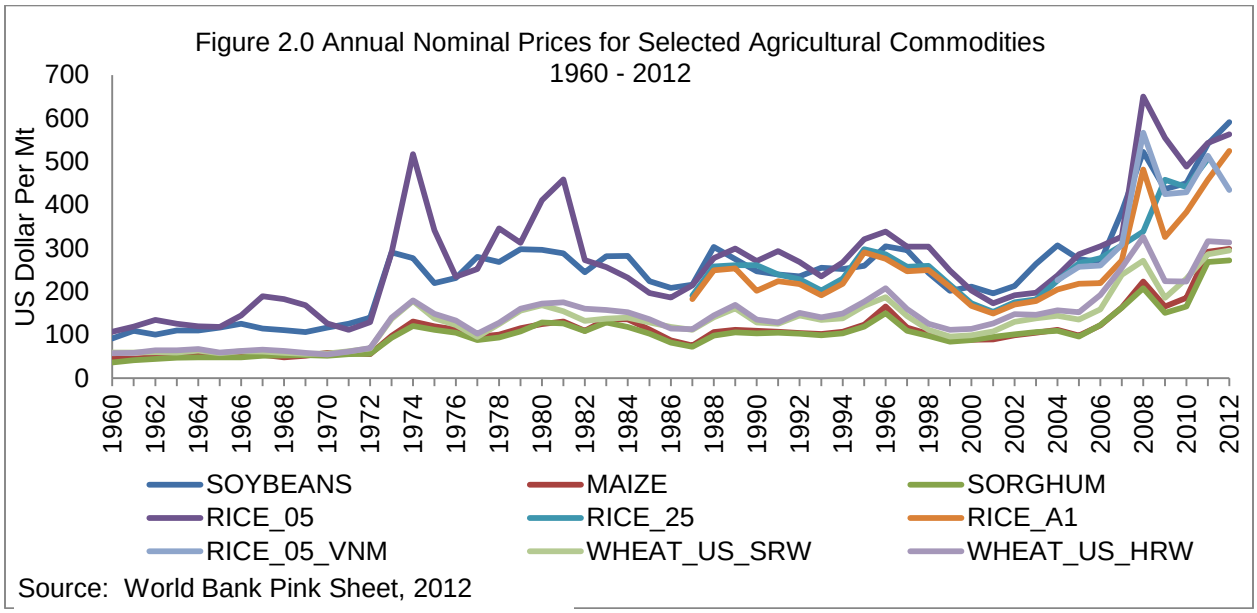
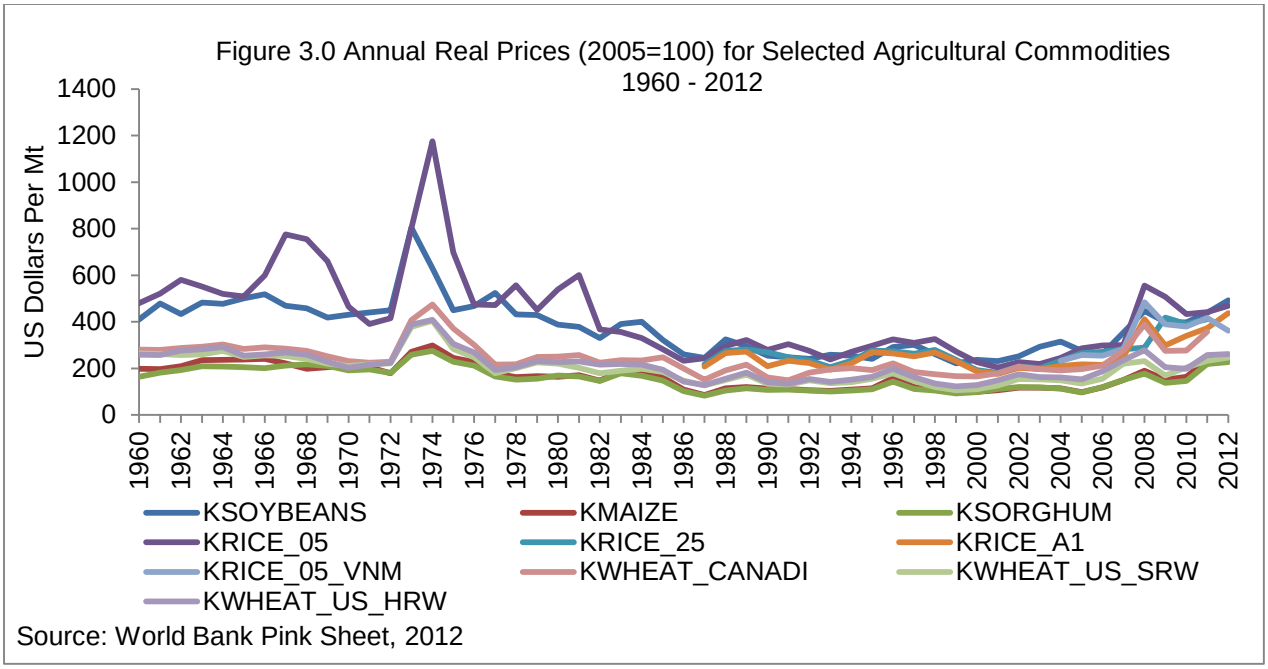


Figure 2.0 Annual Nominal Prices for Selected Agricultural Commodities
1960 - 2012
US Dollar Per Mt
700
600
500
400
300
200
100
0
1960
1962
1964
1966
1968
1970
1972
1974
1976
1978
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
SOYBEANS
MAIZE
SORGHUM
RICE_05
RICE_25
RICE_A1
RICE_05_VNM
WHEAT_US_SRW
WHEAT_US_HRW
Source: World Bank Pink Sheet, 2012



Source: World Bank Pink Sheet, 2012

Appendix Tables

Table 1.0 World Bank Classification of APT Countries based Income in 2011.			
Low Income	Low Middle Income	High Middle Income	High Income
$1,025 or less	$1,026 to $4,035	$4,036 to $12,475	$12,476 or more
Cambodia	Indonesia	China	Brunei Darussalam
Myanmar	Lao PDR	Malaysia	Japan
	Philippines	Thailand	South Korea
	Vietnam		Singapore
Source: World Bank, 2011			

Table 2.0 Intra ASEAN and ASEAN Plus Three Trade Flows RICEFLOW 2009 Database (Cont.)

Rice Type	Degree of Milling	Exporter	Importer	Quantity in Mt
Long Grain	Paddy	China	Indonesia	5281
Long Grain	Paddy	China	Philippines	1864
Long Grain	Paddy	China	Vietnam	8827
Long Grain	Paddy	Laos	China	12536
Long Grain	Paddy	Philippines	Indonesia	358
Total				28865
Long Grain	Brown	Cambodia	Malaysia	2102
Long Grain	Brown	Laos	China	4514
Total				6616
Long Grain	White	Laos	Vietnam	12916
Long Grain	White	Myanmar	Malaysia	16712
Long Grain	White	Myanmar	Philippines	12837
Long Grain	White	Myanmar	Singapore	3584
Long Grain	White	Myanmar	Thailand	64807
Long Grain	White	Thailand	Brunei	5313
Long Grain	White	Thailand	Cambodia	21743
Long Grain	White	Thailand	China	218575

Table 2.0 Intra ASEAN and ASEAN Plus Three Trade Flows RICEFLOW 2009 Database.

Long Grain	White	Thailand	Hong Kong	103190
Long Grain	White	Thailand	Indonesia	219124
Long Grain	White	Thailand	Japan	267424
Long Grain	White	Thailand	Laos	46587
Long Grain	White	Thailand	Malaysia	50389
Long Grain	White	Thailand	Philippines	146916
Long Grain	White	Thailand	South Korea	15094
Long Grain	White	Thailand	Singapore	74453
Long Grain	White	Thailand	Thailand	7824
Long Grain	White	Vietnam	Brunei	5880
Long Grain	White	Vietnam	Cambodia	2411
Long Grain	White	Vietnam	China	17398
Long Grain	White	Vietnam	Hong Kong	43219
Long Grain	White	Vietnam	Indonesia	16536
Long Grain	White	Vietnam	Japan	4166
Long Grain	White	Vietnam	Malaysia	633505
Long Grain	White	Vietnam	Philippines	1708239
Long Grain	White	Vietnam	Singapore	334935
Total				4053779
Medium Grain	Brown	China	Japan	8701
Medium Grain	Brown	China	South Korea	121355
Medium Grain	White	China	Hong Kong	40528
Medium Grain	White	China	Japan	73972
Medium Grain	White	China	South Korea	42066
Medium Grain	White	China	Singapore	2838
Total				289460
Fragrant	White	Thailand	Brunei	26817
Fragrant	White	Thailand	China	125304
Fragrant	White	Thailand	Japan	3356
Fragrant	White	Thailand	Malaysia	111619
Fragrant	White	Thailand	Philippines	8471
Fragrant	White	Thailand	Singapore	113453
Total				967940
Source: RICEFLOW Database, 2009				

Table 3.0 List of Countries represented in the RICEFLOW Model (Cont.)

Serial No.	Countries	ASEAN and ASEAN Plus Three Member Countries
1	Argentina	
2	Australia	
3	Bangladesh	
4	Belize	
5	Brazil	
6	Brunei	ASEAN member
7	Cambodia	ASEAN member
8	Canada	
9	Chile	
10	China	ASEAN Plus Three member
11	Colombia	

Table 3.0 List of Countries represented in the RICEFLOW Model.

12	Costa Rica	
13	Cote d Ivoire	
14	Cuba	
15	Egypt	
16	El Salvador	
17	Ghana	
18	Guatemala	
19	Guyana	
20	Haiti	
21	Honduras	
22	Hong Kong	
23	India	
24	Indonesia	ASEAN member
25	Iran	
26	Iraq	
27	Japan	ASEAN Plus Three member
28	Laos	ASEAN member
29	Malaysia	ASEAN member
30	Mexico	
31	Myanmar	ASEAN member
32	New Zealand	
33	Nicaragua	
34	Nigeria	
35	Pakistan	
36	Panama	
37	Peru	
38	Philippine	ASEAN member
39	South Korea	ASEAN Plus Three member
40	Saudi Arabia	
41	Senegal	
42	Sierra Leone	
43	Singapore	ASEAN member
44	South Africa	
45	Thailand	ASEAN member
46	UAE	
47	Uruguay	
48	USA	
49	Vietnam	ASEAN member
50	OCARI (Other Caribbean)	
51	OME (Other Middle East)	
52	EU27 (European Union 27)	
53	OAFR (Other Africa)	
54	OEUR (Other European)	
55	ONAFR (Other North Africa)	
56	ONASIA (Other North Asia)	
57	OOCEA (Other Oceania)	
58	OSAM (Other South America)	
59	OSEASIA (Other South East Asia)	
60	OWAFR (Other West Africa)	
Countries listed from serial no.50 to 60 are aggregated together based on geographic regions Source: RICEFLOW Database, 2009		

Table 4.0 Change in Retail Price in percent on Annual basis with and without release of APTERR.

	Release of APTERR Stocks in Percent				
Shortfall in Production	0	25	50	75	100
2	1.32	0.54	-0.24	-1.00	-1.75
4	2.68	1.88	1.08	0.30	-0.47
6	4.07	3.25	2.44	1.64	0.85
8	5.49	4.65	3.82	3.01	2.20
10	6.93	6.08	5.24	4.41	3.58
Source: Author					

Table 5.0 Change in Consumption in percent on Annual basis with and without release of APTERR.

	Release of APTERR Stocks in Percent				
Shortfall in Production	0	25	50	75	100
2	-0.32	-0.13	0.06	0.25	0.44
4	-0.65	-0.46	-0.27	-0.07	0.12
6	-0.98	-0.79	-0.59	-0.40	-0.21
8	-1.31	-1.12	-0.92	-0.73	-0.54
10	-1.64	-1.45	-1.25	-1.06	-0.87
Source: Author					

Table 6.0 Change in Imports in percent on Annual basis with and without release of APTERR.

	Release of APTERR Stocks in Percent				
Shortfall in Production	0	25	50	75	100
2	4.55	1.84	-0.81	-3.38	-5.91
4	9.28	6.47	3.72	1.03	-1.61
6	14.19	11.29	8.44	5.65	2.90
8	19.27	16.28	13.33	10.45	7.60
10	24.51	21.43	18.40	15.42	12.48
Source: Author					

Table 7.0 Impact on Philippines Long Grain White Rice Retail Prices (Peso per Kg)						
APTERR	Mean	Standard Deviation	Coefficient of Variation	10th	50th	90th
Percent				Percentile		
0	31.70	1.03	0.0324	30.58	31.48	33.14
25	31.47	1.00	0.0318	30.36	31.24	32.86
50	31.23	0.98	0.0313	30.14	31.00	32.58
75	30.97	0.95	0.0307	29.93	30.76	32.31
100	30.75	0.92	0.0300	29.72	30.52	32.04
Baseline Price (2009) in Philippines 30.73 Peso per Kg Source: Author and FAO, 2009						

Table 8.0 Change in Retail Price of Medium Grain White Rice and Fragrant White Rice in APT countries

	Benchmark		Percentile		Scenario		Percentile		Change	
Medium Grain Rice										
	Mean	SD	10th	90th	Mean	SD	10th	90th	Mean	SD
China	-0.10	10.10	-10.28	12.32	-0.02	10.05	-10.27	12.28	0.08	-0.05
Japan	2.63	8.21	-5.28	13.65	2.60	8.19	-5.28	13.56	-0.02	-0.02
Philippines	0.03	1.38	-1.42	2.02	0.03	1.41	-1.44	1.99	0.00	0.03
S. Korea	-0.16	4.50	-6.11	6.48	-0.18	4.51	-6.12	6.45	-0.02	0.01
Fragrant Rice										
Malaysia	0.94	4.14	-4.22	7.00	0.91	4.14	-4.25	6.91	-0.03	0.00
Philippines	0.97	4.25	-4.33	7.20	0.95	4.26	-4.36	7.11	-0.03	0.01
Thailand	1.06	4.62	-4.70	7.82	1.03	4.62	-4.73	7.72	-0.03	0.00
Vietnam	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Source: Author										

Table 8.1 Release of APTERR stocks released from December 2004 to December 2012

Country	Program	Duration	Total Quantity (Mt)	Beneficiaries
Lao PDR	Poverty Alleviation	Dec 2004 – Jun 2005	13.37	87 households and students in Vientiane province
Indonesia	Flood Disaster Relief	Nov 2005 – Nov 2006	100	9,992 people in Sampang district and 22,825 people in Jember district
Philippines	Typhoon Disaster Relief	Jul 2006 – Dec 2006	930.24	154,500 households in Leyte, Cebu, Davao and Manila City
Cambodia	Flood Disaster Relief and Poverty Alleviation	Jul 2007 – Jan 2008	379.76	11,798 households in Kampong Thom, Ratanakiri, Kandal, Kompong Chhnang and Takeo provinces
Indonesia	Flood Disaster Relief	Mar 2008 – May 2009	186.5	18,182 households in Central Java and East Java
Myanmar	Cyclone Disaster Relief	Nov 2008 – Jan 2009	164	13,120 people in Laputta and Bogalay townships
Philippines	Typhoon Disaster Relief	Nov 2009 – Feb 2010	520	7,137 households in Metro Manila and Ifugao provinces
Lao PDR	Typhoon Disaster Relief	Jul 2010 – Oct 2010	347	9,207 villages in Saravan and Attapeu provinces
Thailand	Flood Disaster Relief	Nov 2011 – Dec 2011	50	8,100 households in Central region (31,000 cans of cooked rice)
Indonesia	Poverty Alleviation	Oct 2012 – Dec 2012	200	20,000 households in Yogyakarta, Central Java, Banten and East Java provinces
Source: APTERR, 2013				

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