



WTO OMC

Food security and Trade

WTO/ESCAP/UP Regional Workshop in Agriculture
and Agricultural Negotiations in Asia and the Pacific



UP School of Economics
R Clarete
October 16-18, 2012

Purpose of the Session

- Participants improve their understanding of food security, and the role that food trade plays in attaining it.
- Participants appreciate the relationship between tradability and food price volatility of cereals.
- Participants understand why there is only thin trade in rice.
- Participants explore possible ways out of a food insecurity trap in rice.

Dimensions of Food Security

- World Food Summit 1974: food availability
- 1980s: focus veered towards food access
- 1990s: safe utilization of food
- 2001 Food Insecurity Report: vulnerability
 - “**all people**, at **all times**, have **physical, social and economic access to sufficient, safe and nutritious** food that meets their dietary needs and food preferences for an active and healthy life”
- Dimensions: availability, access, and safe utilization of food

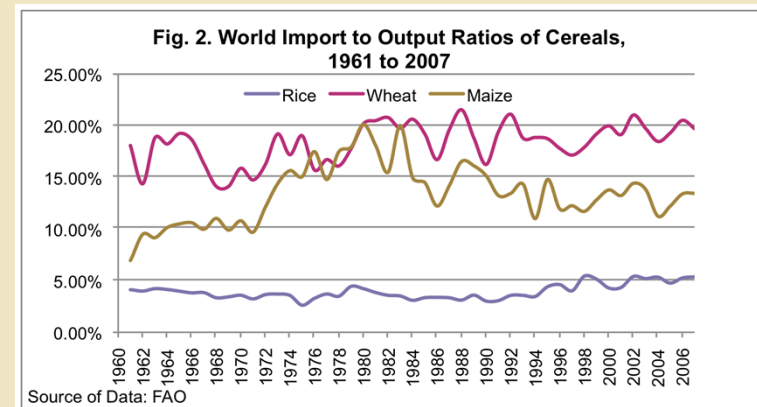
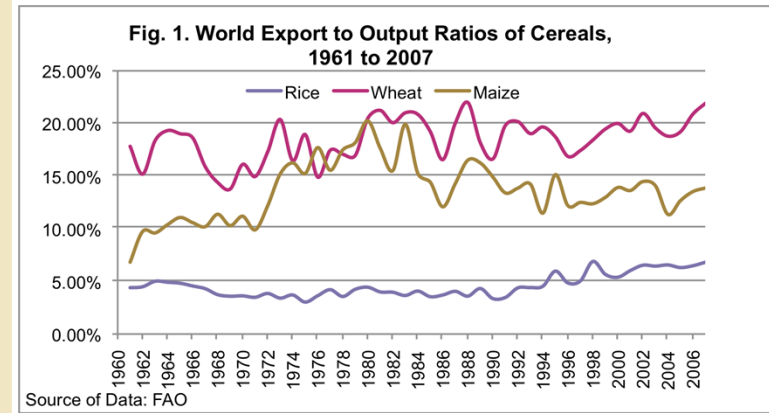
How Tradable Are Cereals?

How Tradable Are Cereals

- Covered cereals in this presentation: Rice, maize and wheat, but the focus of it is on rice
- Indicators: Imports to production (MOR) and exports to production ratios (XOR)
- Annual indicators from 1961 to 2007
- Data comes from FAOstat

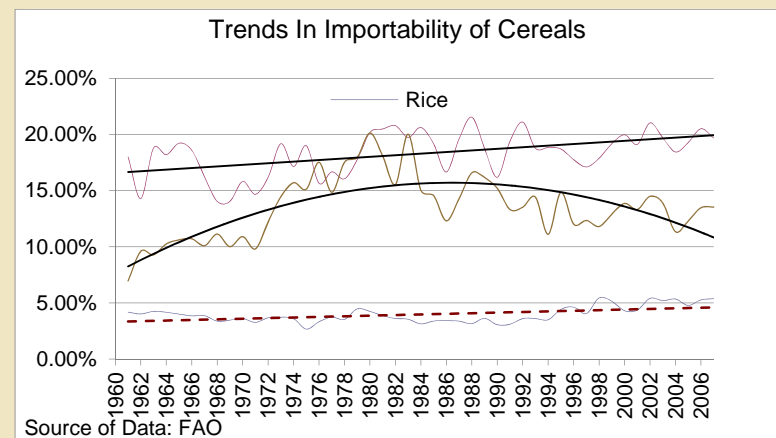
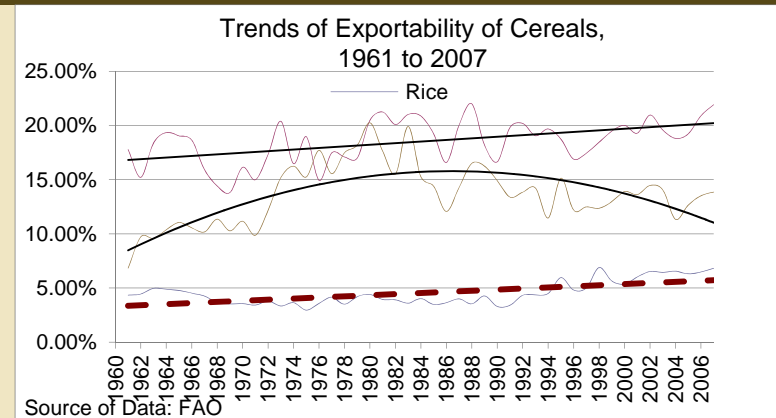
Relative Tradability of Cereals

- Wheat is most tradable (average export to output ratio or XOR= 18.51 %; to output ratio or MOR=18.3 %)
- Maize is next (XOR=13.64 %; MOR = 12.35 %)
- Rice turned out to be the least tradable (XOR= 3.98 %; MOR=.3.97 %)



Rising Tradability of Cereals

- Tradability of wheat and rice has been rising
- Trend is pronounced in case of wheat, less so with rice
- Tradability of maize has risen until the 70s, then it declined

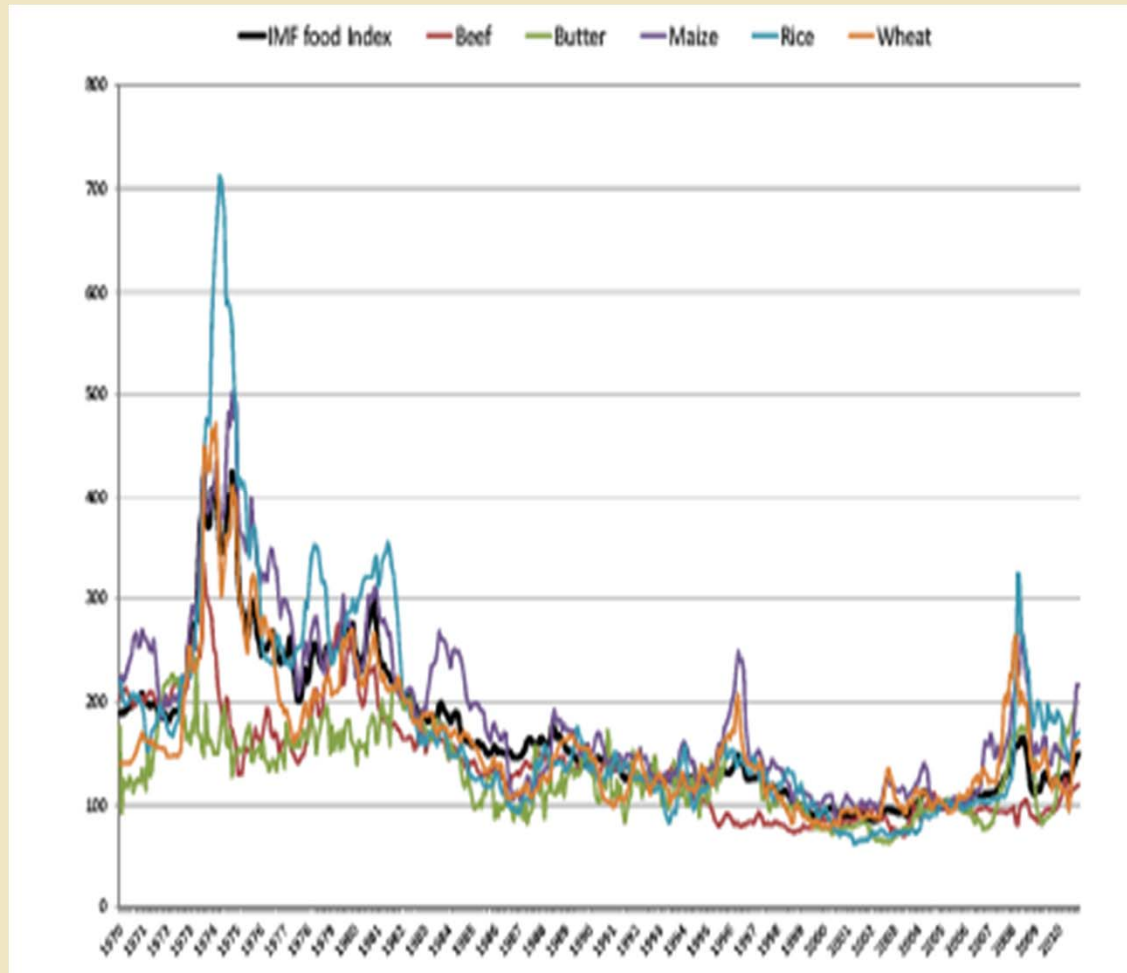


Stability of Tradability of Cereals

- Of the three cereals, rice's importability, i.e. MORs, is most unstable (volatility index for rice is 78 % compared to 62 % for wheat and 68 % for maize).
- Corresponding volatility indices of XORs are 84.76 %, 68.83 % and 69.03 %
- XORs tend to be more unstable than MORs.

Food price volatility

Real World Food Prices: 1970 to 2009



- Real food prices have fallen through time.
- Since early 2000, real food prices seem to have risen.

G20 Report on Food Price Volatility (2011)

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Food Price Volatility Matters for Food Security and the Economy

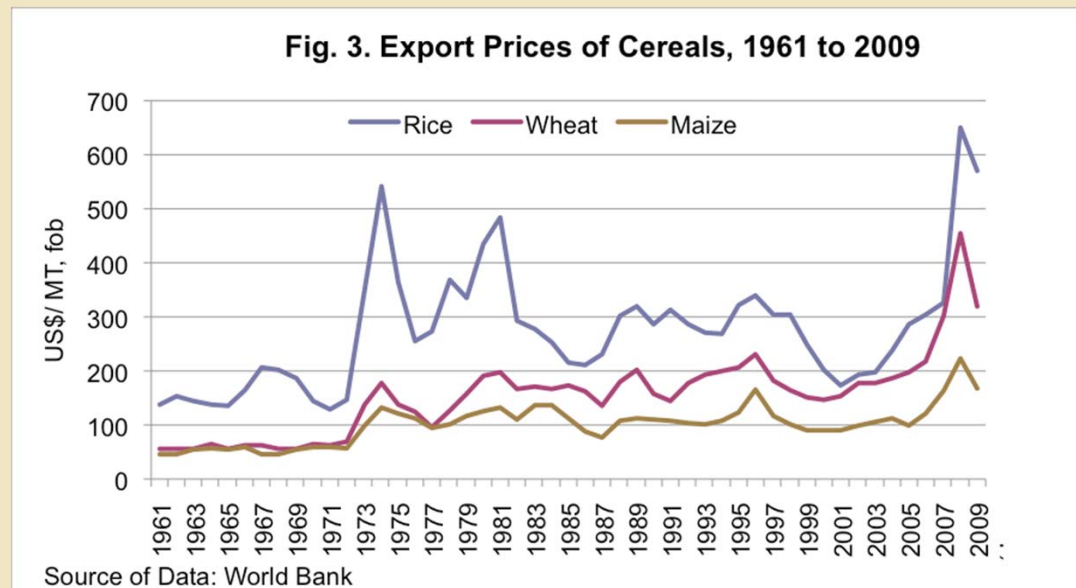
- Food price volatility measures how food prices vary over time.
 - High or extreme price volatility causes uncertainty.
- It is a concern for developing countries, with food having significant share of either their export receipts or import bills
- Consumers adjust household budgets to meet rising food costs, representing at most half, and for the poor up to three quarters of their budgets.
 - Other household spending gets crowded, e.g. education, medicine,
 - Hunger, undernourishment, high incidence of disease, and decline in future productivity
- Producers and those in the food supply chain facing sharply falling prices may see their investments in productivity put to waste.
- It causes food price inflation, balance of payments pressures and consequent exchange rate movements and fiscal imbalances.

Food Price Stability

- Price stability as key indicator of food security
- Price Stability defined as price movements tolerated by market
- Price movements reflect both demand and supply shocks, including changes of economic status
- **Claim:** as food becomes more tradable, food prices tend to be more stable

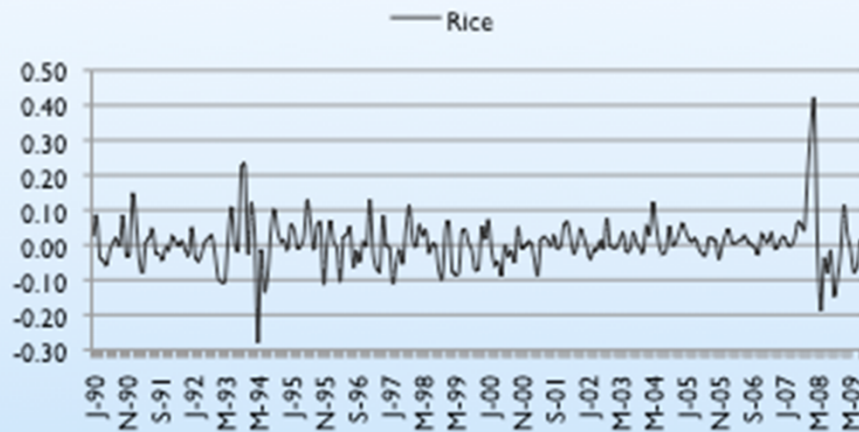
Trends in Cereal Prices

- Price instability causes food insecurity (WB).
- Three broad swings of rice prices namely in the 1970s, 1990s, and in 2008.
- High correlation of cereal prices (Timmer)

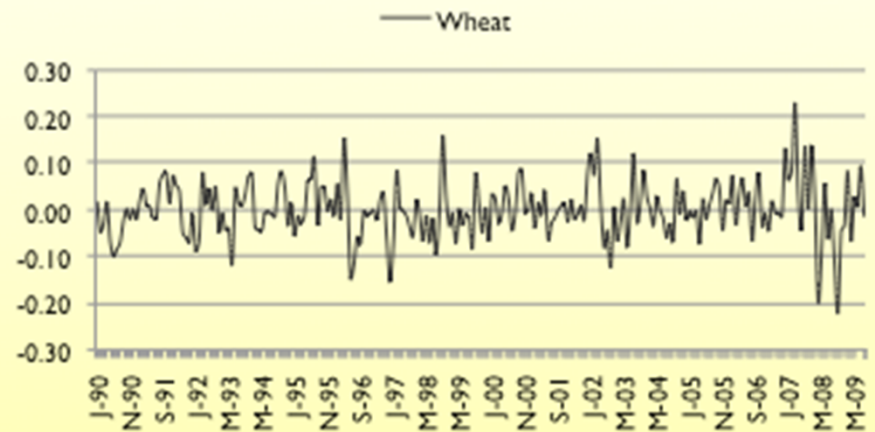


Comparative Price Volatility

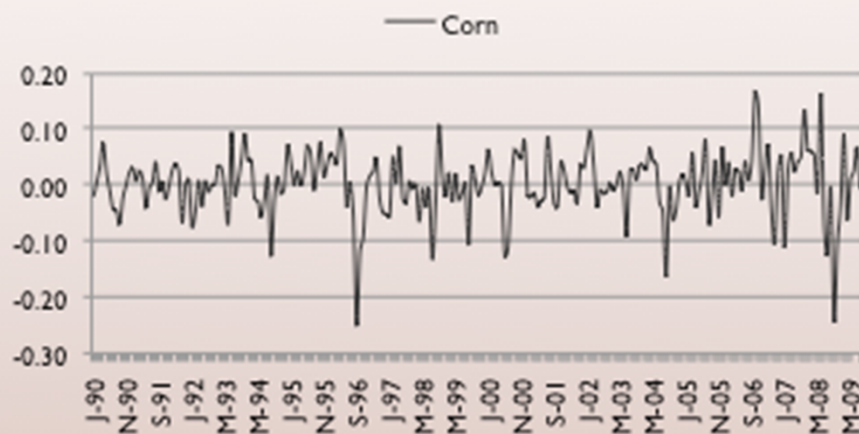
Volatility of Monthly Rice Prices



Volatility of Monthly Wheat Prices



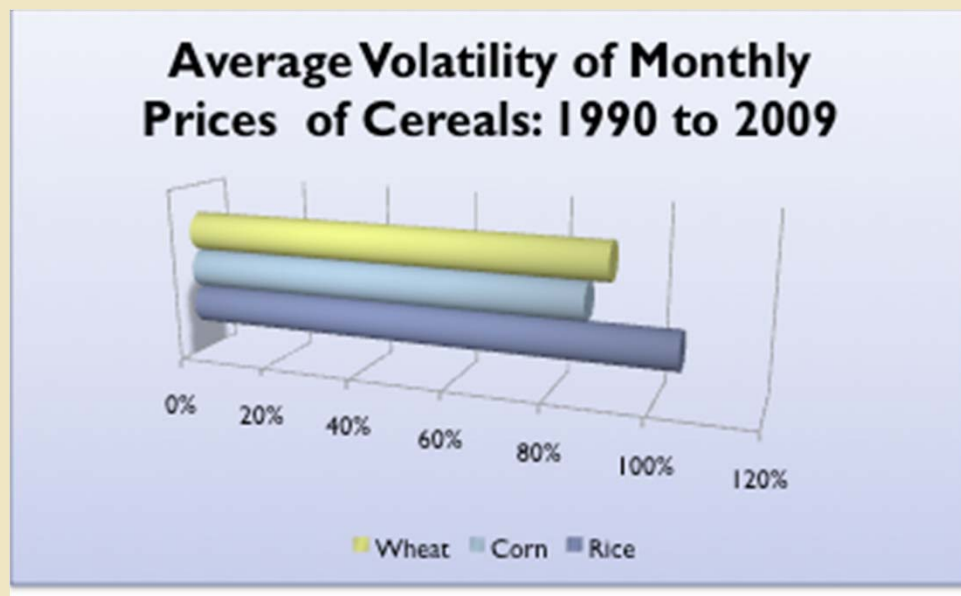
Volatility of Monthly Corn Prices



- Monthly rice prices are most volatile
- Variable plotted: natural log of monthly price changes
- Volatility index: standard deviation

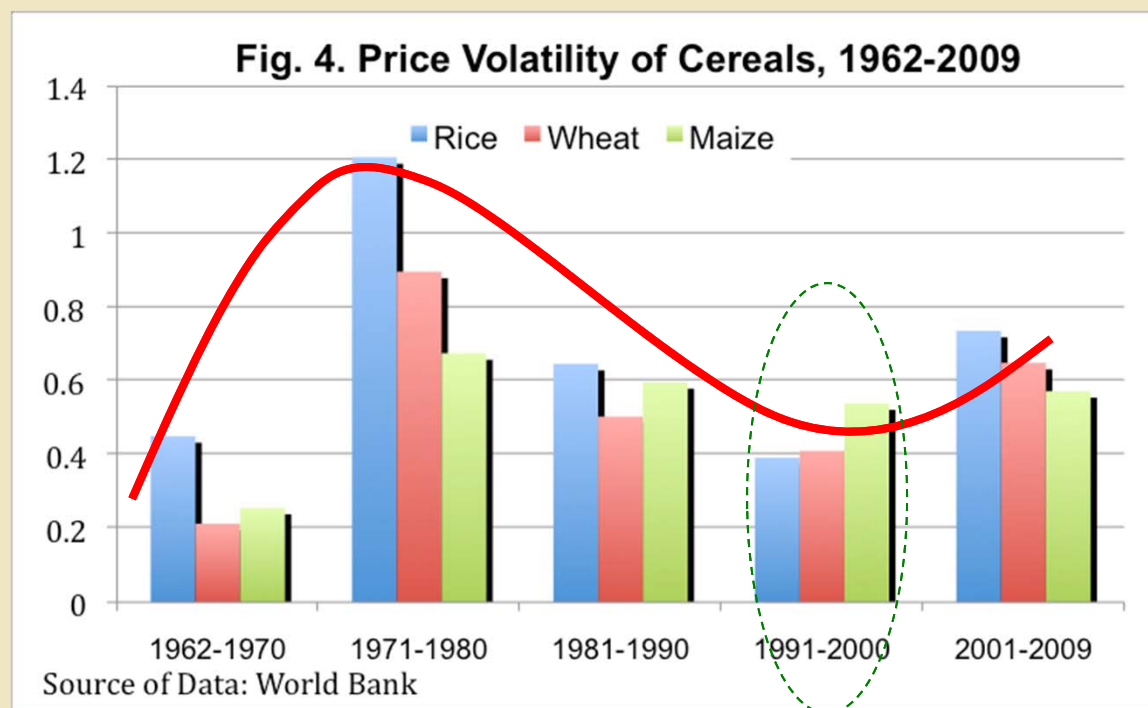
Average Volatility of Monthly Prices of Cereals

- Using monthly prices (data is from IMF), rice has the highest volatility
- Maize and wheat prices follow



Average Volatility of Annual Prices of Cereals

- Using annual prices from 1960s, rice has the highest volatility
- Maize and wheat follow, except in the 1990s



Tradability and Price Volatility

Table 6. Average Cereal Price Volatility and Trade to Output Ratios: 1962 to 2007

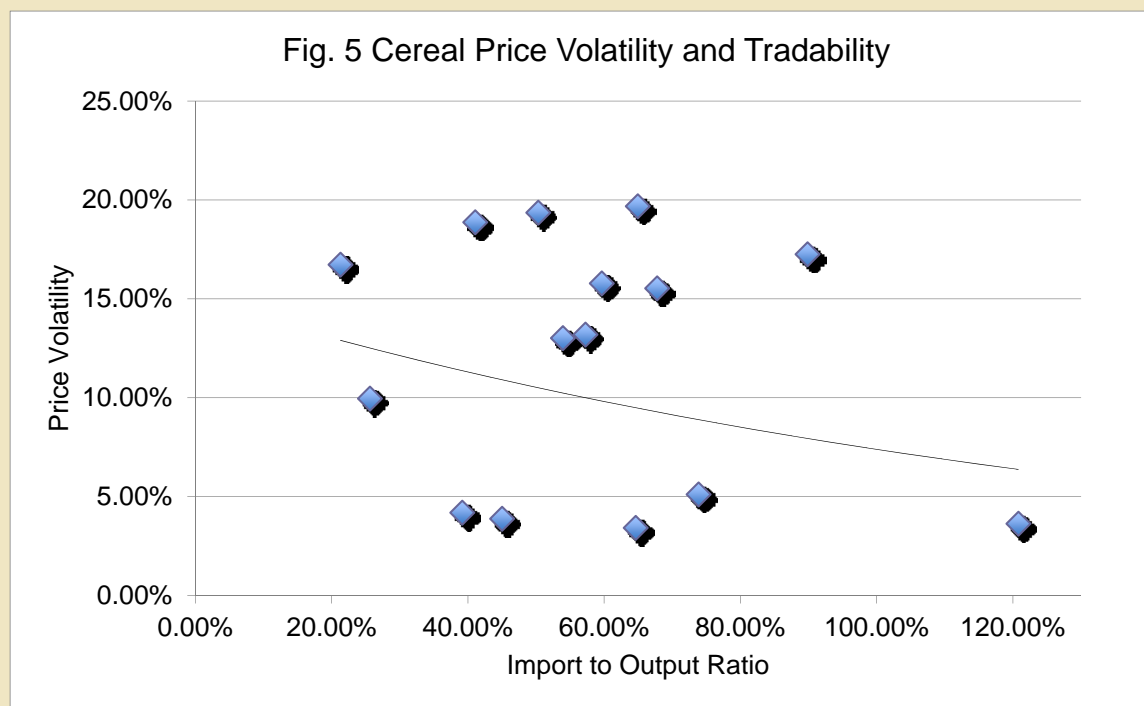
	Rice		Wheat		Maize	
	Volatility	XOR	Volatility	XOR	Volatility	XOR
1962-1970	45.02%	4.30%	21.30%	16.87%	25.61%	10.10%
1971-1980	120.81%	3.70%	89.87%	17.51%	67.79%	15.79%
1981-1990	64.64%	3.77%	50.34%	19.59%	59.66%	15.67%
1991-2000	39.18%	5.03%	41.06%	18.97%	53.94%	13.19%
2001-2007	73.86%	6.45%	64.93%	20.09%	57.25%	13.36%
1962-2007	166.71%	4.53%	130.12%	18.51%	120.70%	13.64%

	Rice		Wheat		Maize	
	Volatility	IOR	Volatility	IOR	Volatility	IOR
1962-1970	45.02%	3.88%	21.30%	16.73%	25.61%	9.95%
1971-1980	120.81%	3.62%	89.87%	17.25%	67.79%	15.53%
1981-1990	64.64%	3.42%	50.34%	19.36%	59.66%	15.78%
1991-2000	39.18%	4.18%	41.06%	18.87%	53.94%	13.02%
2001-2007	73.86%	5.11%	64.93%	19.68%	57.25%	13.19%
1962-2007	166.71%	3.97%	130.12%	18.30%	120.70%	13.51%

Source of Basic Data: FAO for trade data; WB for prices

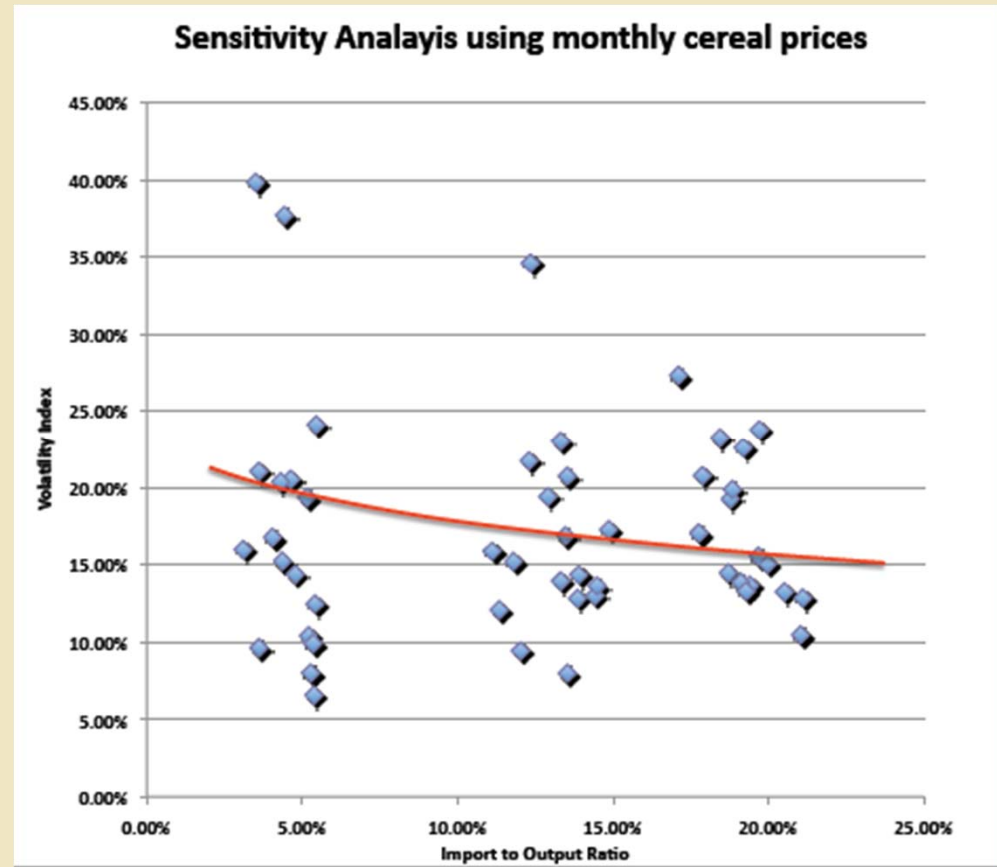
Inverse relationship between tradability and price volatility

- Plot of the decade averages of IORs and volatility indices of the three cereals shows that price volatility is inversely proportional to tradability.
- More trade seems to help stabilize food prices.



Sensitivity Analysis

- Using monthly cereal prices, the inverse relationship appears to hold.



Granger causality test

- Excessive price volatility appears to cause rice trade to be low.

Test #1: Price volatility Granger causes lower trade

Dependent variable: quant (Rice exports)

Log likelihood = -1.163e+11
0.0000

Prob > chi2 =

quant	Coef.	Std. ERR,	z	Remarks
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Dependent variable: quant

quantlag	0.3695033	0.0292251	12.64	
quantlag2	0.0596144	0.0155061	3.84	
exconstlag	- 0.0417605	0.0242242	-1.72	*significant at 10 %
exconstlag 2	- 0.0539147	0.0402726	-1.34	insignificant

Wald chi2(4) = 242.09 Prob > chi2 = 0.0000

Prob > chi2 = 0.0649* pairwise significant at 10%

Test #2: Low trade Granger causes price volatility

Dependent variable: extreme price volatility (exconst)

Log likelihood = -7602.101

Prob > chi2 = 0.0071

quant	Coef.	Std. ERR,	z	Remarks
exconstlag	-0.0564815	0.0220887	0.011	
exconstlag2	0.0596603	0.0201787	0.003	
quantlag	0.000671	0.0134203	0.960	insignificant
quantlag2	-0.0163969	0.0123545	0.184	insignificant

Wald chi2(4) = 14.89

Prob > chi2 = 0.0049

Volatility reduces trade

Table 2. Contribution of extreme rice price volatility to rice export volumes

	Basic model	Alternative Extreme Volatility Measures		
		A ¹	B ²	C ³
ln GDP agriculture of exporting country	0.66***	0.76***	0.73***	0.75***
ln GDP per capita of importing country	-0.49*	-0.51*	-0.50*	-0.51*
ln population of exporting country	0.6300	0.41	0.51	0.47
ln population of importing country	0.11	0.05	0.08	0.07
time trend	0.03*	0.03*	0.03*	0.03
standard deviation of 24 monthly price fluctuations	-0.08***	0.03	0.01	0.00
standard deviation of 24 monthly prices one year lag	-0.06*	0.01	0.00	0.01
extreme volatility A ¹		-0.18***		
extreme volatility A one year lag		-0.26***		
extreme volatility B ²			-0.18**	
extreme volatility B one year lag			-0.11	
extreme volatility C ³				-0.16**
extreme volatility C one year lag				-0.21***
F-test: 2 Extreme Var:		0.00***	0.06*	0.01***

F-Test results denote P-value that the 2 extreme variables jointly exceed zero.

Notes: *** significant at 1% ** significant at 5% * significant at 10%

¹ 97.5 % quantile estimated assuming that the rates of monthly price changes are normally distributed

² 97.5 % quantile estimated using a non-parametric generalized-additive-model of commodity price movements estimated using the spline-backfitted-kernel (SBK) estimator (see Martins-Filho, et al. (2009)

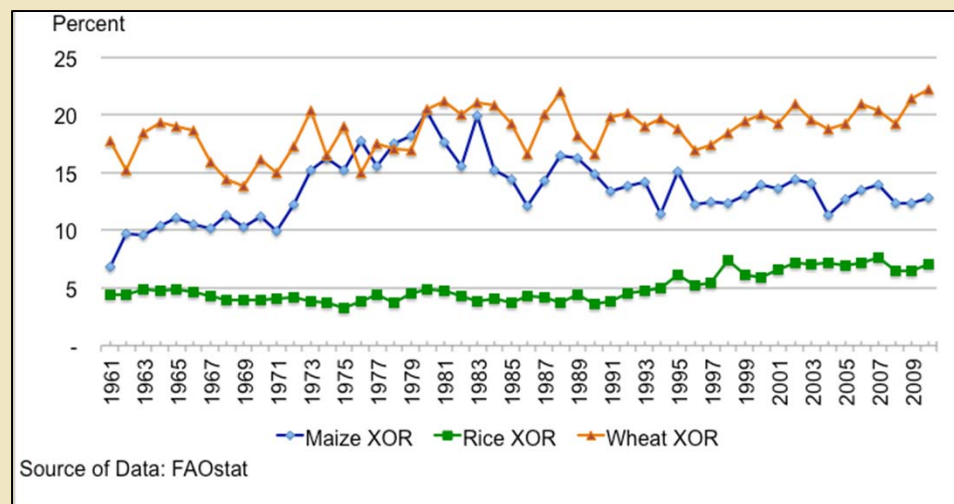
³ 97.5 % quantile estimated using the Generalized Autoregressive Conditional Heteroskedasticity (GARCH) (Bollerslev, T., 1986)

Source: Labao, A. (2012)

- Volatility dampens rice trade
- Estimates from a gravity model of trade
- Trade can reduce volatility.

Why rice trade is thin

- Internal distortion in importing countries requiring domestic rice farmers to import competition
- Virtual self-insurance against a food insecurity risk with a thin trade in rice

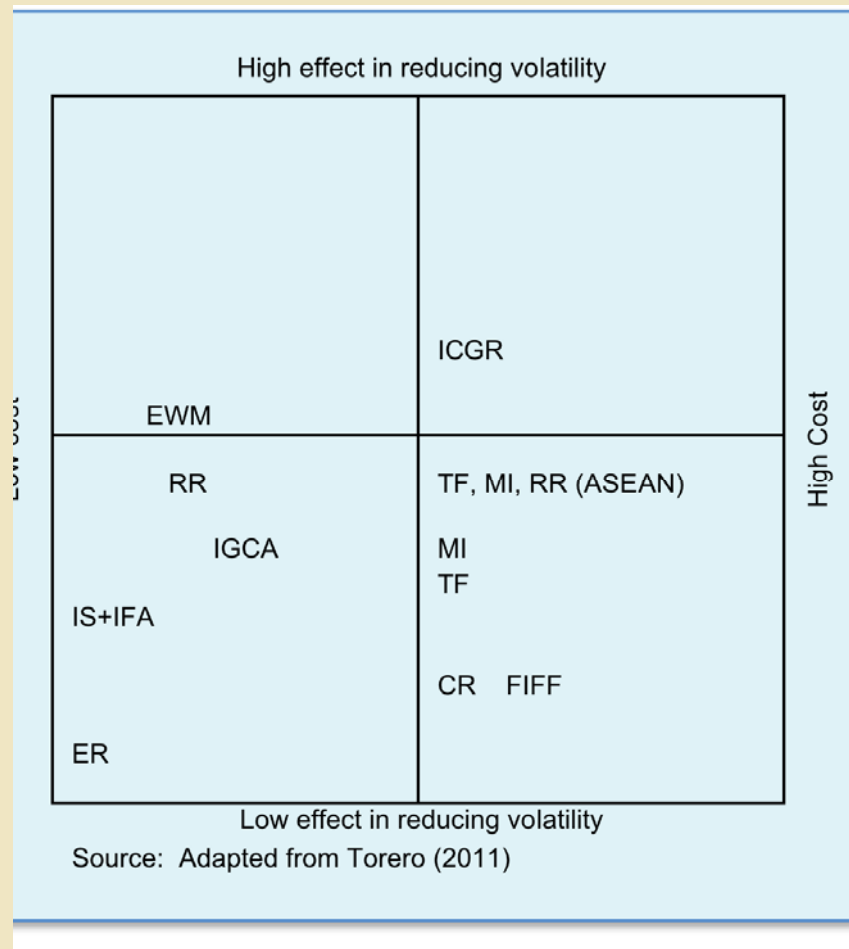


Enhancing Resilience to Extreme Food Price volatility

Selected measures for reducing food price volatility

- Early warning mechanism
- Food reserves
 - internationally coordinated grains reserves
 - regional reserves
 - country reserves
 - IGCA – international grains clearance arrangement
 - information on storage and international food agency
 - emergency reserves
- Trade facilitation
- Food importing financing facility
- MI – market information
- TF, MI, RR - ASEAN approach

Relative importance of measures



- Contribution to reducing volatility
- Implementation cost
- ASEAN package of trade facilitation, market information, and regional reserves is low cost and high contribution to reducing volatility

A framework for reducing volatility

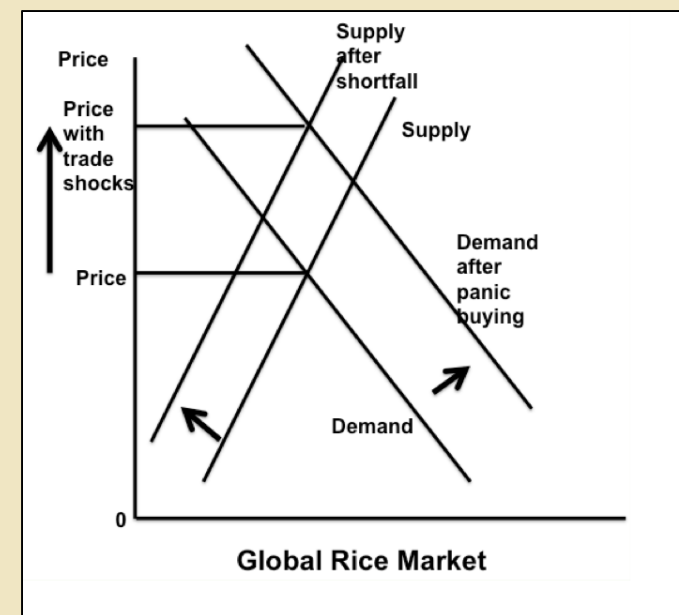
- Rice trade facilitation
- Rice market information and intelligence
- Rice stocks

Role of trade

Trade shocks in 2008

- Supply shock was 2.87 million mt.
- Raised world rice prices by 60.9 %.
- Demand shock, or accelerated purchases of major rice importers within the first four months of 2008 , was 3.89 million mt.
- Raised prices by 65.4 %
- The combined effect of supply and demand shocks (trade) shocks raised prices by 126.3 % year to year,
- Actual change in world prices from 117 to 149 %.

(source of estimates: Headey (2011)).



Rice Trade Shocks

Country/region	Export/import volumes (millions mt):			Percentage change (%)
	2006/07	2007/08	Change	
Total rice trade	31.44	31.19		
<i>Major exporters</i>				
India	5.74	4.65	-1.09	-18.9
Vietnam ^a	4.07	3.11	-0.96	-23.6
China	1.34	0.96	-0.37	-27.7
Egypt	1.20	0.75	-0.45	-37.7
Sum: supply shocks	12.35	9.48	-2.87	-23.2
<i>Major importers</i>				
Energy exporters ^b	5.43	6.43	1.04	19.2
Philippines	1.82	2.57	0.77	42.8
Bangladesh	0.76	2.04	1.28	166.2
Sum: demand shocks	7.96	11.05	3.09	38.7
Sum: demand and supply side shocks				
Actual change in world rice prices: July 2007 to June 2008				

Trade reduces volatility (1)

- ASEAN region is less vulnerable to extreme rice price volatility if it pursued a deeper trade strategy.
- Policy simulation using the Arkansas Riceflow Model on the impact of a hypothetical 10 % decline of rice outputs in India or China
- Two alternative policy configuration of the ASEAN region.
 - One is the baseline rice trade policy configuration
 - a hypothetical scenario that trade is deep, which is represented in the Riceflow Model by eliminating tariff and non-tariff restrictions to rice trade, and excluding export restrictions.

Trade reduces volatility (2)

Table 3. Baseline rice import Most Favored Nation (MFN) tariff policies in the Riceflow Model

Import Policies of Selected Countries 2009				
Country	Policy Type	Paddy	Brown	Milled
Indonesia	fixed import tariff	USD43/mt	USD43/mt	USD43/mt
Malaysia	ad-valorem import tariff	40%	40%	40%
Philippines	ad-valorem import tariff	25%	50%	50%

Import matrix for the selected countries (mt) 2009			
	Indonesia	Malaysia	Philippines
India	0	8	0
Myanmar	0	17	13
Pakistan	0	49	16
Thailand	219	50	147
Vietnam	17	634	1708
Total	236	757	1884

Source: University of Arkansas Riceflow Model database in Alvaro Durand-Morat and Eric Wailes (2010)

Trade reduces volatility (3)

Table 4. Impact of a 10 % Supply Shock in China or India with two Alternative Policy Configuration

	Baseline	Percent change			
		ben1*	ben2**	Sce1 - Ben1***	Sce2 - Ben2 ****
Average market price of imports (USD/mt)					
Indonesia	445	9.3	0.5	-6.0	-5.0
Malaysia	693	4.1	1.0	-23.0	-21.6
Philippines	871	4.0	0.5	-27.7	-26.2
Average retail price of rice (USD/mt)					
Indonesia	646	0.9	0.0	-0.4	-0.4
Malaysia	450	3.6	0.9	-18.7	-17.0
Philippines	780	3.1	0.4	-17.9	-16.0
Aggregate demand (tmt)					
Indonesia	41,437	-0.1	0.0	0.0	-0.1
Malaysia	2,411	-1.1	-0.3	6.1	5.7
Philippines	12,973	-0.8	-0.1	4.9	4.4
Aggregate imports (tmt)					
Indonesia	236	-28.3	-1.8	17.4	20.7
Malaysia	757	-2.9	-0.7	35.7	39.4
Philippines	1,884	-5.2	-0.4	84.9	100.0
Global trade (tmt)					
World	29,659	4.2	-0.1	5.1	6.2

* Benchmark 1: status quo + 10% production decrease in China

** Benchmark 2: status quo +10% production decrease in India

*** Scenario 1: deeper trade by removal of import tariffs in Indonesia, Malaysia, and the Philippines + 10% production decrease in China

**** Scenario 2: deeper trade by removal of import tariffs in Indonesia, Malaysia, and the Philippines + 10% production decrease in India

Source: Computation by E. Wailes using the Riceflow Model in Alvaro Durand-Morat and Eric Wailes (2010)

Policy options for trade

- Reduced self-sufficiency targets for guaranteed rice imports
- Clear set of criteria on the ATIGA waiver
- A decoupled Thai's paddy pledging program
- Expanded coordinated rice policy action
- Coordinated investments to expand export capacity of ASEAN in Myanmar and Cambodia

Market information

Uneven and Poor Quality of Market Information

- However, trade shocks are by themselves endogenous, i.e. part of the normal operations of the market.
- One fundamental factor is the uneven and poor quality of market information among players.
- Importers with low information level tend to stock up to avoid future price increases. All of them doing the same shift market demand to increase, causing import shocks.

Efficient market hypothesis

- Theory asserts that market prices are “informationally efficient”.
- Market players form price expectations rationally
 - Given new information, say a drought in country X, agents adjust price expectations.
 - Forecasts are based on new information.
 - Not all agents need to have accurate price expectations, but as a whole the market is “right”.
 - Responses to the shock or new information are random, and are normally distributed.
 - Not one single agent can earn excess profits.
- Expected price movements $E[P_{t+1}]$ are governed purely by new information.

Grossman and Stiglitz Critique

- Paradox if market prices are informationally efficient, then why do market players invest in gathering market information.
- Grossman and Stiglitz propose in their models agents with varying information to produce “partially informationally efficient” market equilibria.
- Grossman agents invest in gathering information to profit from the information disadvantage of other agents, increasing the information content of market prices, and arrive at a rational expectations market equilibrium prices.
- Such prices aggregate disperse information, while avoiding perfect revelation due to unobservable supply shocks.

Shiller's irrational price bubble

- Observation that volatility of market prices is extreme.
- Excess volatility is a result of psychological beliefs that exert a greater influence on the market than do economic fundamentals
- If prices of an asset begin to rise, positive returns by incumbent investors fuels the spread of over-enthusiasm in the market, attracting public attention
- New uninformed agents come in and bid up prices, feeding the expectation of future returns, and

Self Fulfilling Crisis

- Exporters anticipating higher prices tend to store stocks.
- Exporting countries likewise fearing shortages restrict exports.
- These actions result in export shocks.
- Combination of short run export declines, and import surges result increase market prices.
- As information is corrected and made more uniform among market players, market reverses.

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Peculiarities of the rice market

- Thin trade
- Presence of GtoG trading.
- These do not help in the Grossman-Stiglitz process of aggregating information.
- Thus, irrational price bubbles build up.

Possible intervention: rice exchange

- Commodity exchanges have two benefits
 - Efficient price discovery
 - Risk reduction
- There are none for rice.
 - There are international exchanges for wheat, maize, and soybeans.
 - Rice exchanges are national, and none regionally.
- Rice trade is thin.
- Feasibility of a rice exchange is not well established

2008 was not due to market fundamentals

- Timmer (2009) noted, the 'explosion' of rice prices in 2008 could have been avoided because the market fundamentals did not support the price surge.



Possible Mitigating influence of Accurate Market Information

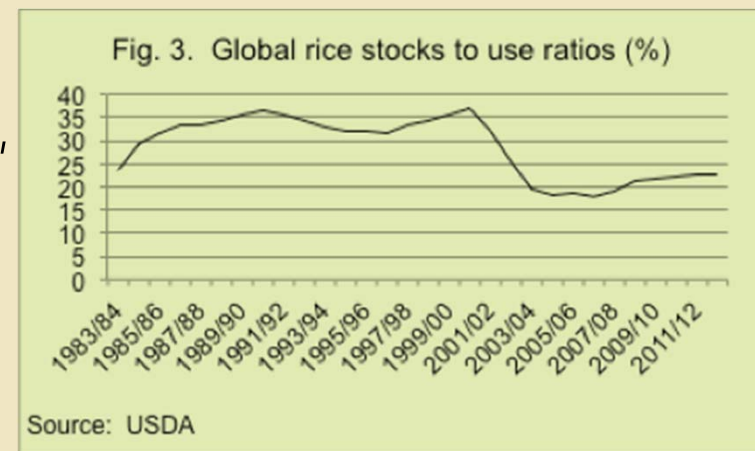
- If information was more accurate and widely disseminated, the crisis may have been mitigated.
- The rice market in 2008 could have settled at the \$600 per ton level.
- There would have been adjustments but the world could have saved more resources.



Food stocks

Rice stocks

- Rice market vulnerable to extreme price volatility with low stocks to use ratios
- Categories of rice reserves: emergency vs. smoothing intra- or multi-year price volatility (strategic reserves)
- Timmer suggests: reserves at four levels, private, country reserves (small importing), country reserves (large producing, importing), and international reserves.
- Reserves strengthen confidence of stakeholders in rice trade.



Proposals on rice stocks

- Increase stocks to use ratios
- Information sharing about rice stocks.
- International food agency to coordinate the operations of the reserves, to gather and disseminate information about food stocks.
- Emergency reserves, von Braum and Torero suggests about 5 % of food aid flows.

What ASEAN may consider

- Determining the appropriate size of reserves
 - Strategic reserves depend upon the reliability of sourcing imports from sources, availability of substitutes, and the holding cost.
- ASEAN Plus 6 emergency rice reserves?
 - Bangladesh, India, and Pakistan

Regional cooperation

Regional cooperation

- Intergovernmental bodies, say ASEAN, can invest in sharing and collective analysis of market information and data and serve as a focal information center.
- Credibility of the information center has the potential of harmonizing and upgrading information about the market.
- Produce a public good.

Rice trade forum

- Need to continue the implementation of the rice trade forum.
- Sharing of market information and intelligence;
- analysis of the impact of demand and supply shocks, as well as policy developments on the rice market;
- providing the platform for a discussion of the above proposals in this brief, or any other ideas for deepening rice trade in the region and avoiding extreme rice price volatility.
- Ideas coming out of the forum go to the AFSRB then to the Special SOM-AMAF for their respective assessments and appropriate actions.



Thank you for listening.



UP School of Economics

R Clarete
October 16-18, 2012