Commodity market instability and development: What does research say about policies?

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Plan of presentation

- Commodity market instability: Conceptual issues
- How important is the commodity instability problem
- Causes of food commodity price volatility
- Impacts of market instability
- Price transmission
- Asymmetries in market instability
- Distortions and market instability
- Market instability and poverty traps
- Policies to deal with price volatility
- Priorities for action by the international community to assist developing countries to deal with continuing food market volatility?

Conceptual issues

- What matters for market participants is uncertainty, namely ex-ante unpredictability and not ex-post realized price variability
- Risk is determined by exposure to uncertainty or unpredictability
- Unpredictability not easily measured, while ex-post variability readily measured
- Impacts of volatility on DCs large at both micro and macro levels because of large dependence on primary commodities for export earnings, but also food commodities for satisfying domestic food requirements.
- Impacts large because of credit constraints at both micro and macro levels

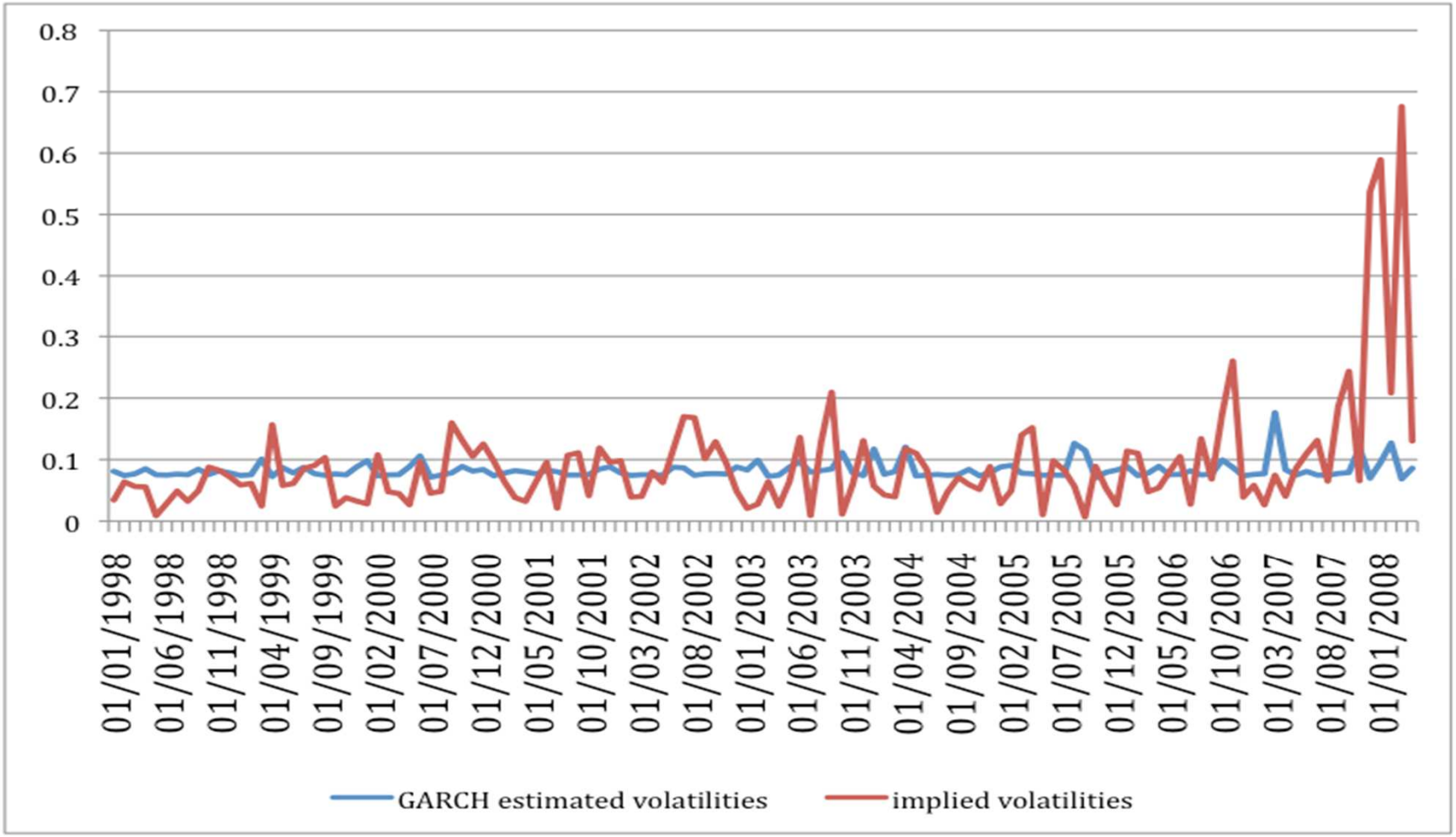
Issues relevant to commodity prices and volatility

- Do commodity prices have trends?
- Are shocks temporary or permanent?
- Are shocks persistent?
- Do commodity market prices comove?
- Nature of unanticipated shocks
- Volatility best measured by forward looking measures, such as conditional variance of future prices (eg. via GARCH estimates) or implied volatilities from options data

What does the literature say

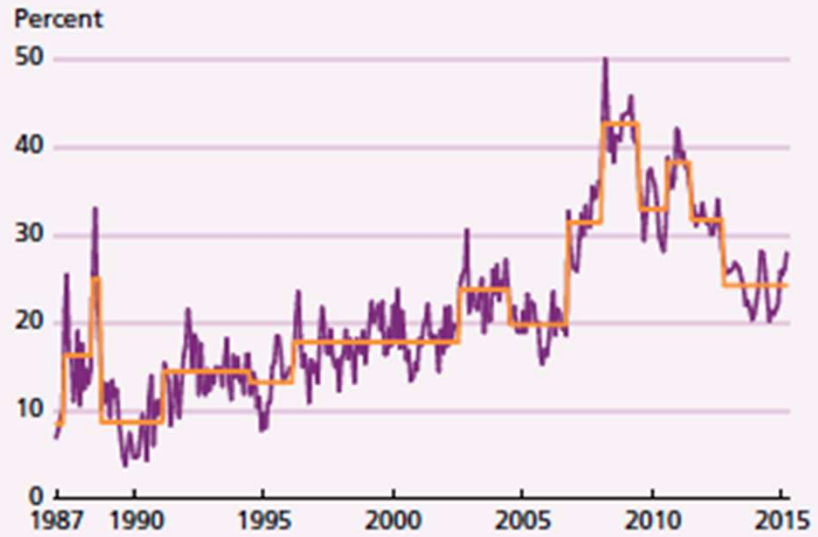
- Small negative real trends but depends on time period. Signal to noise ratio small.
- Tests of temporary or permanent trends have low power.
- Trends seem variable hence uncertain.
- Shocks and their effects on market prices exhibit persistence
- Duration of price slumps larger than that of price booms
- Severity of booms and slumps unrelated to their duration
- Probability of ending a boom or slump independent of time spent in boom or slump
- Co-movement largely absent in unrelated commodities
- Food commodity price volatility is influenced by yields, exchange rate volatility, petroleum price volatility, stock levels, export concentration, interest rate volatility, national policies
- Volatility changes over time (has volatility increased?)
- **Conclusion: Market risks and fundamentals of volatility are variable over time**

Volatility estimates can vary widely. Estimates of implied volatilities of wheat returns in CME versus estimates using GARCH (correlation -0.03)



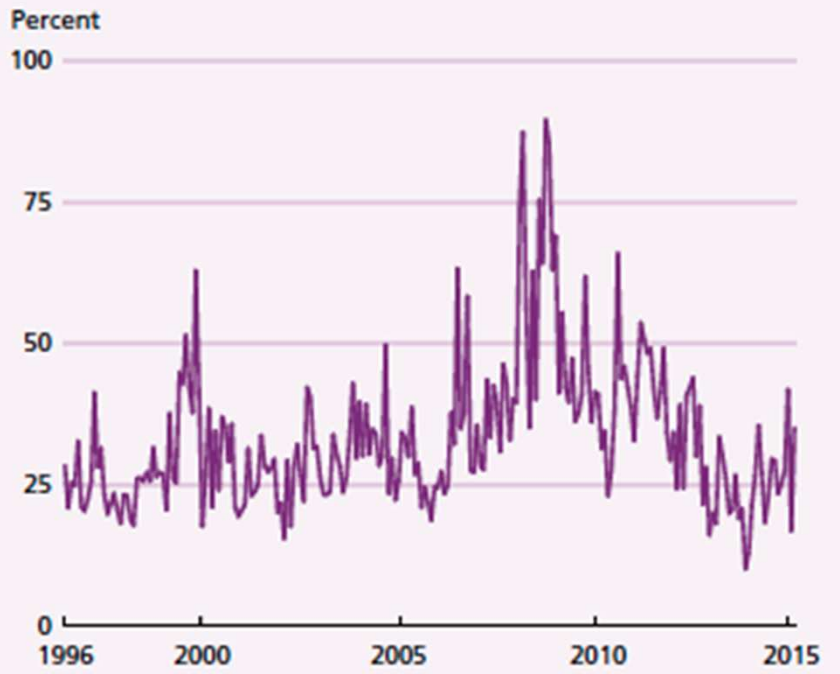
Market volatility has declined considerably after the food crisis of 2007-8 (FAO Food Outlook May 2015)

Figure 1.1: Implied wheat price volatility*



* based on Black-Scholes formula for at-the-money options with six months maturity

Figure 1.2: Realized wheat price volatility
(Chicago No. 2 SRW Wheat)



How serious is the commodity market volatility problem for developing countries?

- According to UNCTAD (2014), a commodity dependent country is one where commodity exports account for 60 percent or more of merchandise export value.
- In 2012-13 94 developing countries which were CDDCs, up from 88 in 2009-10.
- Of these 45 were in Africa, 20 in Latin America and the Caribbean, 19 in Asia, and 10 in Oceania.
- These countries represented 71 percent of all developing countries in 2012-13.
- Sixty three developing countries were classified in 2012-13 as being extremely commodity dependent, defined as those where commodity exports accounted for more than 80 percent of total merchandise export value.
- Of all Least Developed Countries 39 countries (or 85 percent of the group) were CDDCs in 2012-13, an increase from 37 in 2009-10.
- UNCTAD cautions that the recent increase in commodity dependence maybe the result of rising commodity prices. Between 2009-10 and 2012-13, the UNCTAD non-oil commodity price index rose by 14 percent, while crude oil prices rose by 48 percent.
- Most of these CDDCs also had very high degree of commodity export concentration, namely dependence on only a few commodities for total exports.

Consequences of commodity market instability

- Commodity market instability and upredictability is crucial for commodity exporting countries, and this is where the commodity dependence literature has focused for most of the past 40 years.
- Food commodity dependence, expecially by LDCs, LIFDCs, and NFIDCs came to the fore more recently with the first world food crisis of 1973-74, and recently with the food crisis of 2007-8.
- Food market instability and especially unpredictability matters a lot for food security for countries and households that are net staple food buyers. There are 62 Low Income Food Deficit Countries (LIFDCs) a FAO classification.
- Almost all LDCs are also included in the LIFDC list.
- A list of NFIDCs (Net Food Importing Developing Countries) a World Trade Organization (WTO) group, as of 2012 includes all 49 LDCs and another 31 higher income developing countries, for a total of 80 countries.

Causes of food commodity market instability and price spikes

- ***Weather and climate change*** – Well known. Climate change is altering weather patterns, but its impact on extreme weather events is not clear.
- ***Stock levels*** - When accessible stocks are low relative to use, price volatility may be high.
- ***Energy prices*** - Increasing links to energy markets through both inputs such as fertilizer and transportation, and through biofuel feedstock demand, are transmitting price volatility from energy to agricultural markets.
- ***Exchange rates*** - By affecting domestic commodity prices, currency movements have the potential to impact food security and competitiveness around the world.
- ***Growing demand*** –With per capita incomes rising globally and in many poor countries expected to increase by as much as 50%, food demand is becoming more price inelastic, such that larger price rises are necessary to accommodate temporary demand increases.
- ***Resource pressures*** - Higher input costs, slower technology application, expansion into more marginal lands, and limits to double cropping and water for irrigation, are limiting production growth rates.
- ***Trade restrictions*** – Both export and import restrictions amplify price volatility in international markets.
- ***Speculation*** - High levels of speculative activity in futures markets may amplify price movements in the short term although there is no conclusive evidence of longer term systemic effects on volatility.
- ***Short term interest rates –*** interest rates, which are affected by macro developments, affect the cost of storage, and hence the level of stocks

The main causes of the recent price spikes have been rising energy prices, the depreciation of the U.S. dollar, low interest rates, and investment portfolio adjustments in favor of commodities (Headey and Fan, 2011). Hoarding behavior may have accounted for as much as 40% of the price spikes.

Impacts of food market instability and unpredictability on food security

Table 1. Food expenditures of people living on less than $1.25 per day, 30 developing countries, 2001-2010

				Average net share in expenditure of the poor, % of total							
	All countries gross share of food	All countries gross share of total consumption	All countries net share of total consumption	India	China	Bangladesh	Pakistan	Vietnam	Uganda	Tanzania	Indonesia
Total	100.0	60.8	37.0	59.7	26.2	26.1	37.8	-15.6	15.2	33.4	32.7
Rice (+ processed)	22.4	13.9	8.2	14.7	5.6	5.0	1.7	-9.3	0.1	2.8	2.6
Other food	15.6	9.7	7.6	9.9	7.5	7.7	4.4	3.5	1.6	7.9	18.9
Vegetables	15.3	9.3	4.5	11.0	0.5	4.6	6.2	-3.2	4.5	5.7	1.7
Meats	9.1	5.4	2.4	1.8	9.6	-0.3	1.3	-1.7	2.1	0.3	-0.6
Wheat (+ processed)	8.4	5.0	3.5	4.6	3.4	0.6	10.4	1.3	0.2	1.8	0.0
Oilseeds and edible oils	6.5	3.9	3.4	5.2	0.2	2.6	4.5	1.0	1.4	2.7	3.9
Fish and fish products	6.3	3.8	2.5	1.6	3.6	5.0	0.3	-1.7	2.1	3.3	2.7
Milk and dairy products	5.6	3.3	2.9	6.1	0.0	-0.3	3.4	0.7	0.3	-0.1	0.5
Maize and other grains	4.1	2.6	-0.5	1.5	-5.5	-0.1	0.2	-4.1	1.2	6.3	0.0
Fruits	3.9	2.3	1.1	0.9	1.4	1.0	1.0	-1.2	-0.5	-0.3	-0.6
Sugar	2.7	1.7	1.5	2.3	0.0	0.2	4.5	-0.9	2.3	3.1	3.5

Source. Anderson, Ivanic, Martin (2014)

Price transmission

- Dawe (2008) found that transmission rates of rice and wheat prices were generally low in Asia. In India, Philippines, and Vietnam the pass-through was just 6–11 percent, but in the remaining countries it was 41–65 percent.
- Rapsomanikis (2009) in a study of several Eastern and Southern Africa countries found that transmission of international to domestic maize prices is generally strong, but it takes several months for full transmission (4-8 in most cases).
- A variety of trade distortions aimed at insulating domestic markets from world price shocks, end up in aggregate to destabilize the world prices themselves. Anderson, Ivanic and Martin (2014) found that the aggregate effect of all countries' price-insulating behavior during 2006–08 was to raise the price in the international marketplace by 52 percent for rice, by 18 percent for both wheat and maize, and by 31 percent for edible oils.

Impact of price instability on smallholders

- Most studies estimate large negative impacts of food commodity price increases on household welfare.
- Most empirical analyses are estimates not based on actual observed effects
- Consideration not given to coping mechanisms and consumption smoothing behavior
- Recent studies (Ziegelhoffer, 2015, Mukasa, 2015) do find negative consequences on househodl from high food prices and volatility using observed data.

Do market distortions and structural features affect market instability?

- Trade insulating policies, while decreasing domestic market instability tend to increase world instability (beggar thy neighbor) (Tyers and Anderson , 19920
- More recently Anderson and Nelgen (2010) examined market insulating behavior during the recent food crisis, and found that the average short-term price transmission elasticities for the 11 most traded agricultural commodities, was 0.5 in developing countries and 0.54 in high income countries in the period 1986-2004, hence not much different.

Asymmetries and market instability

- Morriset (1997) showed that spreads between domestic consumer prices and respective international commodity prices, as well as spreads between domestic wholesale prices and international prices increased dramatically in the 25 year period before 1997, because of the asymmetric response of domestic consumer prices to movements in world prices.
- In all major consumer markets, decreases in world commodity prices have been systematically much less transmitted than increases to domestic consumer prices.
- This asymmetric response, which has been attributed to trade restrictions and processing costs, appears rather to be largely caused by the behavior of international trading companies.
- The impact has been great: this oligopolistic behavior may have cost commodity exporting countries over US$100 billion a year because they have limited the expansion of the final demand for these products in the major consumer markets.
- That asymmetric price transmission (APT) is a widespread phenomenon has been well documented (Meyer and von Cramon Taubadel, 2004)
- On explanations of this asymmetry, the leading view is that of market power by oligopolistic firms.
- Other explanations include asymmetric information by market actors, asymmetric adjustment costs, price support, and skewness of demand and supply shocks.
- There are not adequate theoretical models on which to base empirical estimations, and hence this topic is an area of considerable research interest and potential.

Market instability and poverty traps

- The idea is that a short term shock may induce a household to lose a substantial amount of its productive assets, thus, in the presence of credit constraints, not allowing it to produce adequate income in subsequent periods, and hence falling in a state of chronic poverty.
- Several ways in which a household can experience a short-term real income shock. These include asset losses, through for instance, health related shocks, even deaths, that could induce loss of productive labor, or natural disaster, which could destroy assets, or current agricultural production. Market related shocks are related to adverse price developments, which could affect negatively both sales of cash crops, declines in labor opportunities or declines on wages, or increases in prices of commodity consumed.
- Increases in market prices of basic purchased commodities, such as wheat, maize, or rice, would have to be substantial to induce a large income shock.
- For instance if a household spends 30 percent of its budget on maize, or rice, then a 50 percent increase in the price of the commodity would imply a 15 percent real income shock (0.5*0.3). To accommodate this the household could employ a variety of “consumption smoothing” strategies, or reduce the amount of consumption of the staple. However, as the amount of consumption decline would have to be very large to maintain the level of real income (in this example it would take a 50 percent decrease in maize consumption to nullify the rise in price), households normally do apply a range of such methods to maintain or not reduce much their real consumption.

Can agricultural market volatility be prevented or lessened?

- Major determinants of volatility are
- 1. Shocks to production and consumption
- 2. Passive and active border and domestic policies
- 3. Stock holding behavior
- Difficult to prevent food market volatility and food price spikes. Better to instill more confidence in markets so as to prevent hoarding behavior and overreactions by public and private agents
- To reduce global volatility need to influence national food policies and stocks
- Policy changes through WTO, OECD, UN fora
- In the absence of global coordinated efforts countries must resort to management of the various import risks

Four ways to manage food import risks

- **avoiding or reducing the risk** altogether (by altering domestic production, higher degree of staple food self sufficiency)
- **change the fundamentals of supply and demand**, by manipulating directly the markets that create those risks (through for instance buffer stocks for global price stabilization)
- **transfer some of the risk to a third party for a fee**. This is the standard approach to insurance
- **do none of the above** and just cope
- Basic problem is **market unpredictability**

Policy options for food importing developing countries to deal with external unpredictable and high food prices

- Trade policies (tariff changes, export taxes, restrictions) not very effective
- Domestic taxation policies: not very effective
- Stock policies. Not effective and expensive
- Input and other production subsidies (may work in some cases)
- Combine small scale market operations with effectively targeted safety nets
- Regional free trade may enhance regional food security
- Coordination and information between private and public sectors

Market based approach. Hedging food import price risk with futures and options

- **Relevant questions.**
- Better to hedge with futures, options or combination?
- At what exchange to hedge?
- What is a good hedging strategy?
- What is technical capability needed?
- What are the costs of hedging?
- What are the likely benefits and costs given past price behaviour?

Issues and risks of futures and options trading

- Futures trading involve sophisticated analysts and traders.
- A food importing country could participate basically as a hedger not as speculator
- With futures trading a fund is needed to start trading and respond to margin calls (usually a fraction of the amount traded)
- Margin calls have to be paid immediately otherwise positions are closed, hence need to have access to quick financial resources
- Purchase of call or put options entail only a one time cost (risk is of losing the amount invested in the option if option not exercised).
- Hedging or trading in futures or options does not change the fundamentals of the market, hence does not lessen degree of instability
- Gain to be had is lower market uncertainty, more predictability, hence better planning

External insurance systems available in developed countries but not in DCs

- Government subsidized insurance
- Futures and options markets
- OTC risk management products
- International compensatory finance mechanisms (e.g IMF food facility) ex-post and do not deal with immediate problem
- In developed countries much more predictability of agricultural prices because of policies (e.g minimum prices)

Results of research

- Individual consumption is fairly well insured (consumption smoothing) , but only partially so, and better for the “rich” than for the poor
- Food consumption may be even better insured
  - But not against systemic shocks
  - Or when social networks break down
- Insurance varies a lot by wealth
  - The poor are poorly insured
  - While the “rich” may be fully insured against individual and systemic shocks
- In high risk environments, the profit loss from adjustment to risks by the poor is likely to be high
- Covariate risks are much more difficult to insure

Implications

- Focus on systemic risks, such as weather, prices
- Understand the relative importance of different risks for farmers' income and welfare
- Worry more about impact of risk on agricultural supply of the small holders and poor as those who supply the most are better insured via existing market based risk management institutions
- Focus on macro-economic risk reduction
- Within systemic risks focus on market failure risk layer

Technological and institutional innovations to reduce exposure to uninsured weather risks

Three strategies

1. Reduce exposure to covariate risks

Resilient farming systems. E.g., flood and drought tolerant new cereal varieties (CGIAR)

2. Reduce cost of risk management strategies

Weather index or price insurance

3. Provide access to more effective risk-coping opportunities

Guaranteed employment, productive safety nets

Policies to lower the probability of excessive market volatility and price spikes

- A. Better information (on stocks, policies, other fundamentals)
- Effective at preventing or lessening irrational and destabilizing short term behavior
- B. Global early warning system of crises
- Could be useful at triggering safety net and compensatory actions for developing countries
- C. Prevent export bans through WTO
- Effective at instilling confidence in markets about smooth flow of supplies

D. Physical stock policies, national or international

- **Should physical, public, globally managed or decentralized grain reserves to prevent spikes be instituted?**
- **Answer: Most likely no. Why:**
- Needs agreement on allocation of stocks, rules for release, financing of costs. All these technically and politically difficult
- Reserves are dependent on transparent and accountable governance
- Reserves cost money and stocks must be rotated regularly
- The countries that most need reserves are generally those least able to afford the costs and oversight necessary for maintaining them
- The private sector is better financed, better informed, and politically powerful, and counteract whatever actions a public stock can take.
- Public reserves can bring uncertainties in market, due to uncertainty about stock management policies.
- Reserves distort markets and mismanagement and corruption can exacerbate hunger rather than alleviate it
- **National stock policies if accompanied by appropriate rules of operation and management can maintain stability in domestic markets**
- Need effective control of domestic market
- Transparency and good management essential

Other stock related policies

- **Virtual reserves to influence irrational market expectations in times of price spikes**
- Valid idea, but difficult to apply and maybe unnecessary
- Difficult to control irrational exuberance and expectations
- Applicable only in organized commodity markets with futures trading
- Can be very costly and may not be effective at preventing spikes
- **Emergency physical reserves to keep food aid flowing**
- Reasonable idea and cost effective

E. Should commodity exchanges be reformed by:

- limiting the volume of speculation relative to hedging through regulation;
- making delivery on contracts or portions of contracts compulsory;
- imposing additional capital deposit requirements on futures transactions.
- Answer: probably YES but needs further study
- Speculation is a symptom not a cause of spikes, and has not altered market fundamentals albeit has enhanced spikes. Price spikes occur irrespective of existence of organized exchanges

Policies to assist developing food importing countries to manage food market volatility and price spikes

- Hedge food import risks with futures and options
- Assure import financing
- Global safety nets

A system to ensure food imports in low income countries net grain importing countries through a dedicated Food Import Financing Facility

- The major problem faced by LDCs and NFIDCs during periods of food import needs in excess of normal commercial imports, is import financing for both private as well as parastatal entities
- Major reason for this is exposure limits of exporting country private trade financing banks to various developing countries
- Need system that can provide guarantees to trade financing banks to increase temporarily their exposure limits to grain importing countries

Basic rationale and concept of a FIFF

- **Purpose**: To allow LDCs and NFIDCs to finance commercial food imports in periods of excess import bills
- **Problem to be dealt with**: Credit and financing exposure ceilings from developed country financing institutions to LDCs and NFIDCs
- **Concept**: Provide additional finance for commercial food imports in excess of normal commercial food imports. In other words increase risk bearing capacity of financial institutions financing food imports
- **How**: By inducing increases in credit ceilings and country exposures under specific conditions, via a credible mechanism of intermediation. This can be effected by sovereign loan guarantees for the additional financing (only) by developed countries. Amounts of guarantees would not surpass 10-15 percent of food import bills of LIFDCs and would constitute a very small fraction of total debt levels of major donors (less than 0.05 percent)

Global safety net. Proposal for a Global Financial Food Reserve (GFFR)

- Aim not to prevent spikes but to have some resources to assist quickly countries most affected by price spike
- Idea to establish a fund that would maintain a long position in basic commodities in organized exchanges (much like existing financial commodity funds). This would constitute a “virtual commodity reserve” to act as a dormant physical commodity reserve.
- When markets would go into a spike, as signaled by high probabilities of crossing appropriate price bands, the GFFR could either take delivery or take monetary profits. Such physical or financial resources could be utilized to assist, according to pre-specified rules, highly affected countries to lessen the extra cost of food commodity imports
- Would act as part of a global safety net for low income net food importing countries
- Cost modest. Between 2006 and 2008 the total cereal import bill of LDCs increased by roughly 20 percent or about 4 billion US$. If 10 percent of that could have been considered as extraordinary cost of vulnerable poor countries that would be compensated by developed countries as extraordinary aid under some global safety net, then this would amount to 400 million US$.
- If the fund before the crisis was of a size of 100 million US$, and it was all invested in cereal stocks via long future positions, then at 5 percent margin it would have commanded physical amounts, worth about 2 billion US$. The profits from a 20 percent increase in prices during the spike (and the actual increase during a spike would have been much larger than this) would then have been around 400 million US$

What can the international community do to help developing countries deal with food market volatility
A. Measures to lower the probability of food market upheavals

- **Support the establishment or enhancement of existing systems for the availability of national and global market information and monitoring.**
- **Establish a global early warning system of impending food price spikes.**
- **Revise the WTO rules to prevent export bans of basic food commodity products.**
- **Revise the rules of existing organized commodity exchanges in developed countries to prevent excessive speculation**

B. Measures to help needy food importing countries to manage adverse impacts of price spikes

- **Provide technical assistance to vulnerable food dependent developing countries to analyze the food risks they face in the global food market system, and assess country specific options to deal with them.**
- **Create a fund for the establishment of an internationally coordinated "Global Financial Food Reserve" (or GFFR) of basic food commodities**
- **Create a dedicated Food Import Financing Facility (FIFF) to increase trade finance for low income countries in times of food price spikes**
- **Support the establishment of a physical emergency reserve of about 300,000 to 500,000 tons of basic grains**
- **Assist food importing developing countries to develop market based strategies to manage the risks of their food imports.**
- **Promote the organization of appropriate commodity exchanges in both developed and developing countries**
- **Promote the establishment of international standardized commodity contracts in basic food commodities**
- **Promote the creation of permanent global safety nets relating to food price spikes**

Very few of the above have been considered in the post 2008 period. But action should be now not when a price spike occurs.

THANK YOU