“Excessive Volatility and Its Effects
What to do?”

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Food and Nutrition Security in Africa, Food Africa midterm Seminar
Helsinki, Monday June 16th, 2014
What we learned from 2007-08?
Evolution of prices

What was the response

- Export bans and restrictions
- Policies to stabilize prices
- New initiatives on reserves
- Food subsidies
- Price controls on strategic staples or on trader margins
- Input subsidies
Effects on world prices of trade policy reactions for selected countries

- Exogenous demand increase [initial perturbation]
- Effects of increases in export taxes to mitigate the shock on domestic prices
- Effects of decrease in import duties to mitigate the shock on domestic prices
- Interaction effects between import and export restrictions

Source: Bouet and Laborde, 2009. MIRAGE simulations
What was the proposed options in 2008-09

(1) ER = Emergency Reserve, Von Braun & Torero (2009 a,b)
(2) ICGR = Internationally coordinated grain reserves, Linn (2008)
(3) RR = Regional Reserves as the one of ASEAN
(4) CR = Country level reserves, this could imply significant relative costs at the country level, significant distortions and little effect on volatility given low effect over international markets.
(5) VR = Virtual Reserves, Von Braun & Torero (2009)
(6) DFIF = Diversion from industrial and animal feed uses, Wright 2009
(7) IS+IFA = Better information on Storage and International Food Agency (Wright 2009)
(8) IGCA = International Grain Clearance Arrangement, Sarris (2009)
(9) FIFF = Food Import Financing Facility, Sarris (2009).
(10) EWM = Early Warning mechanism
(11) TF = Trade Facilitation - Wright (2009) and Lin (2008)
How are we today?
Price Levels

IGC Commodity Price Indices

January 2000 = 100

Soybeans
GOI*
Wheat
Maize
Rice

150 200 250 300

M J J A S O N D J F M A M

2013 2014
Periods of Excessive Volatility

**Note:** This figure shows the results of a model of the dynamic evolution of daily returns based on historical data going back to 1954 (known as the Nonparametric Extreme Quantile (NEXQ) Model). This model is then combined with extreme value theory to estimate higher-order quantiles of the return series, allowing for classification of any particular realized return (that is, effective return in the futures market) as extremely high or not. A period of time characterized by extreme price variation (volatility) is a period of time in which we observe a large number of extreme positive returns. An extreme positive return is defined to be a return that exceeds a certain pre-established threshold. This threshold is taken to be a high order (95%) conditional quantile, (i.e. a value of return that is exceeded with low probability: 5 %). One or two such returns do not necessarily indicate a period of excessive volatility. Periods of excessive volatility are identified based a statistical test applied to the number of times the extreme value occurs in a window of consecutive 60 days.

**Source:** Martins-Filho, Torero, and Yao 2010. See details at http://www.foodsecurityportal.org/soft-wheat-price-volatility-alert-mechanism
**In summary**

<table>
<thead>
<tr>
<th></th>
<th>From previous month f’cast</th>
<th>From previous season</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wheat</td>
<td>▲</td>
<td>▲</td>
</tr>
<tr>
<td>Maize</td>
<td>▲</td>
<td>▲</td>
</tr>
<tr>
<td>Rice</td>
<td>▲</td>
<td>▲</td>
</tr>
<tr>
<td>Soybeans</td>
<td>▼</td>
<td>▲</td>
</tr>
</tbody>
</table>

▲ *Easing*  ▪ *Neutral*  ▼ *Tightening*

*For wheat, maize and rice, previous season refers to 2013/14. For soybeans, previous season refers to 2012/13.*
Crop Conditions in AMIS countries (as of May 28th)

Crop condition map synthesizing information for all four AMIS crops as of May 28th. Crop conditions over the main growing areas for wheat, maize, rice, and soybean are based on a combination of national and regional crop analyst inputs along with earth observation data. Crops that are in less than favourable conditions are displayed on the map with their crop symbol.
Have there been an improvement in the short term?
Global Stock to use ratios

Source: USDA
High concentration of exports

**Maize**
- United States (53.0%)
- Argentina (15.1%)
- Brazil (6.3%)
- France (6.0%)
- India (3.5%)

**Wheat**
- United States (22.9%)
- France (12.4%)
- Canada (12.0%)
- Russian Federation (8.9%)
- Argentina (6.7%)

**Rice (paddy)**
- United States (90.4%)
- Paraguay (1.4%)
- France (1.2%)
- China (1.1%)
- Brazil (0.9%)

**Rice (broken)**
- Thailand (54.8%)
- Pakistan (9.1%)
- Brazil (7.3%)
- United States (4.4%)
- Belgium (4.0%)

Source: FAO (2011a).
Some improvements
% of Exports from the Northern Hemisphere

Source: USDA
Some Improvements
Significant increase on the production of wheat by the Black Sea region

Source: USDA
Proportion of maize production of the US in the production of biofuels, 1995–2010

Source: USADA
Projection of the US ethanol production

Source: EIA, AEO 2013
Increase in the number of extreme events

Source: www.emdat.be
International markets are vulnerable to climatic shocks

Wheat

Index of export volume (1990/91=100)

- Black Sea region
- Latin America
- OECD exporters

NOT ENOUGH
How vulnerable are we in the medium and long term?
Growing Human Pressure

Climate change

Ecosystem decline

Surprise

Source: Johan Rockstrom: Let the environment guide our development
The global demand for food will increase in 60% by 2050 (FAO 2012)
Growth of Global Demand

Source: USDA
Development = Higher Income, Higher Demand (and for different products)

Domestic Consumption, Export and Import Quantity of Cereals and Meals in kilotonnes of protein for China, 1980-2009

- Domestic Consumption (Food+Feed)
- Export Quantity
- Import Quantity
Restrictions in the access to Land

Expansion of the land with low level of nutrient reserves (K)

Per capita arable land (per capita hectare used)

Source: Bruinsma 2009

Source Ahamed et al 2006
Serious restrictions in the access to water

Under a “business as usual” scenario the restriction of water by 2050 will put at risk:

→ 52% of the global population
→ 45% of the global production of grains

Source: Veolia Water and IFPRI 2011
Serious restrictions in the access to water

The scarcity of water will be a challenge of growing economies in LAC (Peru and Mexico) and for Africa and Asia.
Climate Change

The concentration of greenhouse gases is increasing

Important consequences on climate and for appropriate climate for crops

Source: Andy Jarvis, Carolina Navarrete, Julian Ramirez, Emmanuel Zapata, Peter Laderach; Centro Internacional de Agricultura Tropical, CIAT. Cali 2012
Climate Change Effects

WORLD FOOD PRICE INCREASES UNDER VARIOUS CLIMATE CHANGE SCENARIOS, 2010–50

Source: Nelson et al. (2010).

Note: The study for this graph considers three combinations of income and population growth: a baseline scenario (with moderate income and population growth), a pessimistic scenario (with low income growth and high population growth), and an optimistic scenario (with high income growth and low population growth). Each of these three income/population scenarios is then combined with four plausible climate scenarios that range from slightly to substantially wetter and hotter on average, as well as with an implausible scenario of perfect mitigation (a continuation of today’s climate into the future). The climate change effect presented in the graph is the mean of the four climate change scenarios.
Example of beans
¿How are we today?

Parameters determined based on statistical analysis of current bean growing environments from the Africa and LAC Bean Atlases.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Growing season (days)</td>
<td>90</td>
</tr>
<tr>
<td>Killing temperature (°C)</td>
<td>0</td>
</tr>
<tr>
<td>Minimum absolute temperature (°C)</td>
<td>13.6</td>
</tr>
<tr>
<td>Minimum optimum temperature (°C)</td>
<td>17.5</td>
</tr>
<tr>
<td>Maximum optimum temperature (°C)</td>
<td>23.1</td>
</tr>
<tr>
<td>Maximum absolute temperature (°C)</td>
<td>25.6</td>
</tr>
<tr>
<td>Minimum absolute rainfall (mm)</td>
<td>200</td>
</tr>
<tr>
<td>Minimum optimum rainfall (mm)</td>
<td>363</td>
</tr>
<tr>
<td>Maximum optimum rainfall (mm)</td>
<td>450</td>
</tr>
<tr>
<td>Maximum absolute rainfall (mm)</td>
<td>710</td>
</tr>
</tbody>
</table>

Fuente: Andy Jarvis, Carolina Navarrete, Julian Ramirez, Emmanuel Zapata, Peter Laderach; Centro Internacional de Agricultura Tropical, CIAT. Cali 2012
What will happen?

2020 – A2 - changes
Scenarios matter for Global Trade pattern
Agricultural world trade may increase or decrease due to climate change

Imports, volume, 2050 compared to the baseline

Authors: D. Laborde, Csilla Lakatos, Geral Nelson, Richard Roberton and Marcell Thomas
Heterogeneous consequences on Real Income

Climate Change will lead to winners and losers among countries

Authors: D. Laborde, Csilla Lakatos, Geral Nelson, Richard Roberton and Marcell Thomas
What is the global governance response?
## G20 Food Security Initiatives

<table>
<thead>
<tr>
<th>Initiative</th>
<th>Start</th>
<th>Goal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agricultural Market Information System (AMIS) and Rapid Response Forum</td>
<td>2011</td>
<td>Transparency in markets and encourage coordination in policy response</td>
</tr>
<tr>
<td>Global Agricultural Geo-monitoring Initiative (GEOGLAM)</td>
<td>2011</td>
<td>Forecast agricultural production</td>
</tr>
<tr>
<td>Code of Conduct for Emergency Humanitarian Food Reserves</td>
<td>2012</td>
<td>Humanitarian reserves instead of trying to affect prices in the market</td>
</tr>
<tr>
<td>ECOWAS Emergency Humanitarian Food Reserves</td>
<td>2011</td>
<td>Regional strategic emergency Humanitarian reserves</td>
</tr>
<tr>
<td>Removal of Export Restrictions on Food Purchases for Non-commercial Food</td>
<td>2011</td>
<td>Still discussion continue with WTO</td>
</tr>
<tr>
<td>Humanitarian Purposes by the World Food Program (WFP)</td>
<td></td>
<td>Pulling mechanism. Pilot project focuses on maize production in Sub Saharan Africa (farm storage technology; reduction of alfatoxin contamination)</td>
</tr>
<tr>
<td>AgResults</td>
<td>2012</td>
<td>Pulling mechanism. Pilot project focuses on maize production in Sub Saharan Africa (farm storage technology; reduction of alfatoxin contamination)</td>
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<tr>
<td>Tropical Agricultural Platform</td>
<td>2012</td>
<td>Tropical agricultural innovation to improve production and productivity.</td>
</tr>
<tr>
<td>Meeting of Chief Agricultural Scientists (MACS)</td>
<td>2012</td>
<td>Promote collaboration between public and private sector organizations</td>
</tr>
<tr>
<td>International Research Initiative for Wheat Improvement (IRIWI)</td>
<td>2012</td>
<td>Reinforce cooperation and coordination between national and international bread and durum wheat research programs</td>
</tr>
<tr>
<td>Platform for Agricultural Risk Management (PARM)</td>
<td>2013</td>
<td>Provide expertise and solutions for risk management and facilitating co-ordination among practitioners in this field</td>
</tr>
<tr>
<td>Improving Efficiency of Water Use</td>
<td>2013</td>
<td>Science based and policy based options to improve the efficiency of water use in agriculture</td>
</tr>
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# G20 Food Security Initiatives

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</tr>
</thead>
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<tr>
<td>Identify Best Practices to Increase Agricultural Productivity Growth</td>
<td>2012</td>
<td>Consistent framework for on-going analysis of current national approaches and policy practices to increase sustainable agricultural productivity growth</td>
</tr>
<tr>
<td>Sustainably</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Multilateral Development Bank Action Plan for agriculture, food security</td>
<td>2011</td>
<td>Report still not delivered</td>
</tr>
<tr>
<td>and nutrition</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Support the Agreement to scale up nutrition</td>
<td>2011</td>
<td>Significant progress with SUN</td>
</tr>
<tr>
<td>Support the Principles for Responsible Agricultural Investment</td>
<td>2011</td>
<td>Field testing</td>
</tr>
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<td></td>
<td></td>
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</tbody>
</table>
G20 Australia

- Key pillars: (i) investment, (ii) enhance trade, (iii) infrastructure, (iii) financial inclusion, (iv) labour markets and (v) promote competition

Source: MIRAGRODEP model simulations, IFPRI 2014
• Economic growth will lead to improvement in food security

• More than 2 per cent above the trajectory implied by current policies over the coming 5 years

A 10% increase in GDP/PC leads to a 6% reduction in stunting

Source: Ruel and Alderman, 2013
Income Growth Can Have Unintended Consequences of Increasing Risks of Overweight and Obesity

A 10% increase in GDP/PC leads to a 7% increase in overweight and obesity in women

Ruel and Alderman, 2013
Where should we go?
What to do?

• **In the short and medium term**: Market-Based Hedging Strategies for coping with excessive volatility

• **In the short term** – Targeted cash transfers (conditional or unconditional) for the most vulnerable groups

• **In the medium and long term**: Measures to increase productivity, sustainability and resilience of agriculture
Market-Based Hedging Strategies

• In countries with well-integrated commodity exchanges: mechanisms of financial hedges and physical commodity hedges, which integrate price protection into a physical import or export agreement, may be more feasible.

• In countries that don’t have this: it is important first to build the necessary institutional arrangements to advocate for financial risk management instruments.

• Use of weather or catastrophe risk transfer instruments should be specially considered.
Medium and long term policies

• Pro-trade policies:
  • Improve Availability of food products (quantity). Trade allows to rely on world supply (large and stable)
  • At a low price. By definition, for importing countries : world price < domestic price, and in “real” terms: increasing income of households → trade liberalization
  • Of improved quality.
  • But trade openness generates winners and losers. It can increase inequalities!
    • Role for redistributive policies and safety nets
  • And some conflicting issues. FDI in land vs “land grabbing”: redefining property rights may lead to improved environmental sustainability but may lead also to social conflicts
Import tariffs on food products: a heavy burden for the poor

Source: Deason and Laborde (2010)
Medium and long term policies

- Policies to increase agricultural productivity and resilience
  - Input subsidies – Transitory, smart and well targeted input subsidies
  - Increase competition in the input industry
  - Investment in R&D
  - Investment in infrastructure – irrigation and roads
- Policies to reduce post-harvest losses
  - Improved handling of harvests and storage practices
  - Information systems
  - Rural roads
RISING FOOD PRICES
AND THEIR IMPACT ON HUNGRY PEOPLE AROUND THE WORLD

PRICE INCREASES 2005 → 2011
RICE +102%
WHEAT +115%
MAIZE +204%

FOOD PRICE CRISIS TAKES A BITE OUT OF FOOD CONSUMPTION IN LATIN AMERICA

In seven Latin American countries, the 2007–08 food price crisis led to an average 8% drop in calories consumed.

WHAT WOULD HAPPEN TO HOUSEHOLD SPENDING IN BANGLADESH IF FOOD PRICES INCREASED BY 50%?

NUTRITIONAL NOSEDIVE

If poor people in developing countries face a 50% increase in all food prices across the board and no rise in income, iron intake will fall by 30%.

If iron consumption declined by 30% in the Philippines, only 5% of Filipino women would consume adequate levels of iron.
Let’s avoid this!