Food security under stress from price volatility, agricultural neglect, climate change and recession

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Current (selected) issues: food security under stress and what to do

1. volatility,
2. agricultural neglect,
3. climate change risks
4. recession problems

Trade policy? crosscutting - necessary
- not sufficient
Are we living in unusual times?

1872-2008 prices and population

Food price spike, 2007-08

Prices fell partly because of financial crisis and recession

Source: Data from FAO 2009 and IMF 2009.
Food crisis and human development

- Hunger (calories): from 800 Mill. to 1 Billion

- Micro-nutrient deficiencies: about 2 Billion

- 200-400 thousand more infant deaths per year

- people with permanent damage from malnutrition increased about + 40 million
Food protests and food prices

Source: J. von Braun based on data from FAO 2009 and news reports.
## Major pledges to address the food crisis (2008/9)

<table>
<thead>
<tr>
<th>Donor organization/country</th>
<th>Pledge (bil.$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>World Bank</td>
<td>2</td>
</tr>
<tr>
<td>EU (EC &amp; national)</td>
<td>5 +</td>
</tr>
<tr>
<td>USA</td>
<td>6</td>
</tr>
</tbody>
</table>

### Increase in public budgets on agric. and social protection

<table>
<thead>
<tr>
<th></th>
<th>bil. $US</th>
<th>% change</th>
</tr>
</thead>
<tbody>
<tr>
<td>China</td>
<td>23</td>
<td>+27%</td>
</tr>
<tr>
<td>India</td>
<td>6</td>
<td>+24%</td>
</tr>
</tbody>
</table>

Plus 2009 stimulus packages:
- China: 109 bil. US$ for agriculture
- India: also increased ++

Source: IFPRI, compiled from news sources and government budgets.
Rising protectionism?

- Export restrictions in 2008 were serious!
- Tariff increases do not explain trade decline;
- Trade financing an issue in the recession

- The potential cost of rising protectionism with and without a successful Doha Round: up to -11.5% in world trade (volume) if tariffs increase to their current WTO limits (bound level)

Source: Laborde, Torero 2009, IFPRI
What to do about volatility?

1. Keep trade open at times of global and regional food shortage is a must

2. Regulation of food commodity markets? (only as part of financial markets)

3. Establish grain reserves policy at global level (emergency reserve, shared physical reserves, and a virtual reserve > a new institution at global level needed)
Land / Water Constraints

- There is at most 12% more arable land available that isn’t presently forested or subject to erosion or desertification – and degradation of many soils continues.
- The area of land in farm production could be doubled…
- But only by massive destruction of forests and loss of wildlife habitat, biodiversity and carbon sequestration capacity, and
- at high marginal costs of investment

Source: Robert Thompson, 2009
Looking for Land: Trend in Foreign Direct Investment in agriculture

Source: IFPRI media and reporting analyses Note: Thicker lines reflect investments >100,000 ha; for some thinner lines, data on investment size is not available.
### Majority of the world’s farms are small…

<table>
<thead>
<tr>
<th>Farm size (ha)</th>
<th>% of all farms</th>
<th>Number of farms (millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 2</td>
<td>85</td>
<td>451</td>
</tr>
<tr>
<td>2 - 10</td>
<td>12</td>
<td>62</td>
</tr>
<tr>
<td>10 - 100</td>
<td>2.7</td>
<td>14</td>
</tr>
<tr>
<td>&gt; 100</td>
<td>0.6</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>530</td>
</tr>
</tbody>
</table>

Source: FAO Agricultural World Census.

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…and average farm sizes are getting smaller

Average farm sizes in selected countries

Sources: Fan and Chan-Kang 2003, FAO Agricultural World Census and Indiastat.
## Agricultural productivity growth in developing countries

### Annual total factor productivity growth, 1992-2003

<table>
<thead>
<tr>
<th>Region</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>East Asia</td>
<td>2.7</td>
</tr>
<tr>
<td>South Asia</td>
<td>1.0</td>
</tr>
<tr>
<td>East Africa</td>
<td>0.4</td>
</tr>
<tr>
<td>West Africa</td>
<td>1.6</td>
</tr>
<tr>
<td>Southern Africa</td>
<td>1.3</td>
</tr>
<tr>
<td>Latin America</td>
<td>2.7</td>
</tr>
<tr>
<td>North Africa &amp; West Asia</td>
<td>1.4</td>
</tr>
<tr>
<td><strong>All regions</strong></td>
<td><strong>2.1</strong></td>
</tr>
</tbody>
</table>


Small farms can be very productive.
Central for long-term agric. growth: Double public agric. R&D to impact poverty

<table>
<thead>
<tr>
<th>Region</th>
<th>R&amp;D allocation (mil. 2005 $)</th>
<th>△ in # of poor (mil.)</th>
<th>+ Agr. output growth (% pts.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SSA</td>
<td>608</td>
<td>2,913</td>
<td>-143.8</td>
</tr>
<tr>
<td>S Asia</td>
<td>908</td>
<td>3,111</td>
<td>-124.6</td>
</tr>
<tr>
<td>Devel.ing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>World</td>
<td>4,975</td>
<td>9,951</td>
<td>-282.1</td>
</tr>
</tbody>
</table>

CGIAR investment to rise from US$0.5 to US$1.0 billion as part of this expansion

And biotech as part of the public science policy strategy

Limited land with water: Current Areas of Physical and Economic Water Scarcity

Agriculture and climate change: part of the problem and the solution

• **Agriculture is part of the problem:**
  Agriculture: 13.5 % of the CO$_2$ equivalents (Transport: 13.1%), and forestry 19%

• **Agriculture is part of the solution:**
  Biomass; CO$_2$ sequestration; soil management
Climate change *will* affect agriculture

• **Threat 1: Changes to production with**
  - higher and more variable temperatures
  - changed precipitation patterns
  - more extreme events (droughts, floods), etc.

• **Threat 2: climate change policies**
  - for agriculture and poor farming communities if agriculture is not or not well included in Copenhagen etc.
Climate change reducing productivity: Rice yields may decline 20% by 2050

Explicit pro-poor climate change policies needed at all levels

Climate change
- Crop and livestock selection
- Cropping and grazing pattern
- Irrigation/watering technology

Extreme weather events
- Water allocation policy
- Infrastructure investment
- Land use change

Demographic change
- Agriculture and water price policies
- Investment, subsidy, tax policies
- Trade policies

Conflict and crises
- Regional trade policies
- Global climate policies
- Global trading patterns

GLOBAL CHANGE ADAPTATION STRATEGIES SPACIAL SCALES

Agriculture must be on the Copenhagen agenda, but how?

1. **Investment:** agriculture-related investments, as part of a Global Climate Change Fund

2. **Incentives:** C&T and carbon market may conflict with food security: “Carrot before stick”; phase in incentives first to reduce emissions, support technol. change

3. **Information:** Establish comprehensive information and monitoring services of land use and soils for verification base
Further stress for food security from financial crisis and recession

• Less capital for agriculture now

• Higher debt burden for farmers who invested in agriculture expansion

• Reduced employment and wages of unskilled workers

• Reduced remittances
Recession scenarios 2005-2020 – food security and prices

Scenarios

baseline: econ. growth as in past years

1: Recession: econ. growth falls by 2-3%,
agric. investment maintained

2: Recession: econ. growth falls by 2-3%,
agric. investment reduced
Recession Scenarios with IMPACT model

Recession scenarios with and without agric. investment action

Support pro-poor food and nutrition interventions

Protective actions e.g.:
- Cash transfers
- Employment-based food security programs

Preventive actions e.g.:
- School feeding
- Early childhood nutrition programs

Focus on children, women, and poorest
In sum: Priorities for food security action

1. Promote pro-poor agriculture growth
2. Facilitate open trade and reduce market volatility
3. Expand social protection and child nutrition action

Action needed for all 3

With sound governance it can / must be done
Major discrepancies of models on the spatial distribution of precipitation changes remain in the latest-generation models.

But, reasonable agreement for the regions of drying trend; overall amplitude of the precipitation decreases that occur at the margins similar to those for the tropical warming.

Observed rainfall trends show a significant summer drying trend in main regions of inter-model agreement, e.g. Caribbean Central-American region.

Source: J. D. Neelin et. al., PNAS 2006
A virtual global food reserve

- A coordinated commitment by the group of participating countries. Each of the countries would commit to supplying funds if needed for intervention in grain markets.

- Determining the size of this fund will require further analysis as commodity futures markets allow for high levels of leverage. For example, a fund of US$12 to 20 billion might cover 30 to 50 percent of normal grain trade volume.

- These resources would be promissory, or virtual, not actual budget expenditures.
Institutional design behind the reserves to address price spikes

Intelligence unit
- Model fundamentals
- Model dynamic price band
- Trigger alarm

High level technical commission
- Approve intervention

Futures market

Appoint

Country commitment to supplying funds
How the virtual reserves will work

• The intervention will take place in the futures market => A signal of a potential intervention will be announced

• Intervention will happen when the “global intelligence unit” triggers the alarm that prices are significantly above their estimated dynamic price band based on market fundamentals

• The intervention would consist of executing a number of silent short sells over a specific period of time in futures markets around the world at a price lower than the current future price.

• The global intelligence unit would recommend the price or series of prices to be offered in the short sales
Why it will work

• The increase in the supply of future sells (short) will lower spot prices and minimize speculative attacks
  - If there is a response it will imply that speculators will have to ask for a higher price which will imply a profit for the virtual reserve
  - If there is a response with a lower price then the reserve will loose money but prices will be even lower

• The virtual fund will come into play only if there is a need to realize the future sells

• Usually, this action would not be necessary and the whole operation would stay virtual.
Evidence that future prices could affect spot prices

- McKinnon; (1967). Futures markets, buffer stocks, and income stability for primary producers. JPE, 75 (6), pp. 844-861
- etc
d. Non commercial traders

The graph shows the total number of long/short positions by non-commercial traders as a fraction (vertical axis) of the total reportable long positions (commercial + non-commercial) for Corn Futures contracts from January 2000 to January 2008.

**SOURCE:** U.S. Commodity Futures Trading Commission

**COMMODITY:** CORN - CHICAGO BOARD OF TRADE; 5,000 BUSHELS (contract code 2602)

**Description:** The graph illustrates the importance of non-commercial traders in the Corn futures market.
## e. Evidence of causality

<table>
<thead>
<tr>
<th>Indicator of speculation activity</th>
<th>Wheat</th>
<th>Corn</th>
<th>Soybeans</th>
<th>Rice</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Monthly volume (futures contracts CBOT)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Monthly open interest (futures contracts CBOT)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Ratio volume to open interest (1)/(2) (futures contracts)</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>(Apr/05 - Oct/07)</td>
<td></td>
<td></td>
<td>(Dec/04 - Jun/07)</td>
<td></td>
</tr>
<tr>
<td>4. Ratio non-commercial positions to total reportable positions (long)</td>
<td></td>
<td></td>
<td></td>
<td>+</td>
</tr>
<tr>
<td>(Sep/05-Mar/08)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Ratio non-commercial positions to total reportable positions (short)</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>(Jan/05-Jul/07)</td>
<td></td>
<td></td>
<td>(Aug/05-Feb/08)</td>
<td></td>
</tr>
<tr>
<td>6. Index traders net positions (long – short positions)*</td>
<td>+</td>
<td></td>
<td></td>
<td>N/A</td>
</tr>
<tr>
<td>(Jan/06-May/08)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- “+” : evidence of causality
- Starting period of evidence of causality in parenthesis
- * It combines futures and options positions, data available since January 2006.


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