Climate Change, Urbanization, and Food Security

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Global Food Crisis – 2007/2008

- Massive Increase in food prices
- Street riots in different parts of the world
- South Asia suffered a lot
- Poverty
Global food price

The Economist food-price index
Real terms*, January 1980=100

Sources: The Economist; Thomson Reuters

*Deflated using US CPI
Figure 1: Export prices of rice and wheat, and government intervention policies, August 2005-July 2008
Figure 1: Food and Cereals Price Indexes

Sources: India’s food and cereals price indexes are from Office of Economic Adviser, Ministry of Commerce and Industry, [http://eaindustry.nic.in/](http://eaindustry.nic.in/) (accessed 12 June 2011). World food and cereals price indexes are from FAO.
Domestic price: China
Driving forces of food price

- Bio-fuel
- Rising oil price
- Increase in demand from China and India
- Market speculation
- Climate change
- Change of land use due to urbanisation
Focus: climate change

When the Rains Don’t Fall

By Amantha Perera Reprint
Focus: land use

Binhai, China in 1992 (L) and 2012 (R)
Modelling food crisis

- Cannot capture all driving forces – complex
- Our focus is on climate change and urbanization
- Cannot model directly within our time framework
- Decided to use
  - Land productivity shock ("safe") as proxy for climate change
  - Land supply shock ("qfactsup") as proxy for urbanization
## Scenarios

<table>
<thead>
<tr>
<th>Base Re-Run</th>
<th>Policy 1 (Hungry India)</th>
<th>Policy 2 (Urbanizing China)</th>
</tr>
</thead>
<tbody>
<tr>
<td>afereg</td>
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<tr>
<td>pop</td>
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</table>
Hungry India: Food Production
Hungry India: Food Price

![Graph showing the percentage change of food prices in China from 2010 to 2020. The graph displays a decline in food prices over the years.]
Hungry India: GDP
Hungry India: Rate of Return
Hungry India: Capital Accumulation
Hungry India: Foreign Investment
Hungry India: Saving
Hungry India: Outbound Investment
# Hungry India: Trade Balance

<table>
<thead>
<tr>
<th>DTBALi<a href="D">*India</a></th>
<th>2004</th>
<th>2008</th>
<th>2012</th>
<th>2016</th>
<th>2020</th>
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<tr>
<td>1 food</td>
<td>-1578.8</td>
<td>-4373.9</td>
<td>-12127.6</td>
<td>-24195.4</td>
<td>-36132.1</td>
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<tr>
<td>2 extract</td>
<td>396.5</td>
<td>2431.6</td>
<td>8583.1</td>
<td>14326.4</td>
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<td>3 LghtMnfc</td>
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<td>509.5</td>
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<td>4 mnfc</td>
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<td>7444.5</td>
<td>9356.0</td>
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<tr>
<td>5 serv</td>
<td>892.5</td>
<td>2526.7</td>
<td>3868.2</td>
<td>4248.3</td>
<td>4905.8</td>
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<tr>
<td>Balance of Trade</td>
<td>2556.8</td>
<td>8538.3</td>
<td>6845.9</td>
<td>-1989.8</td>
<td>-3580.0</td>
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</table>
Climate Change matters in food security, and decline in food production will have massive long-term negative impacts on the economy.

Limitations of our exercise:
- arbitrary productivity shocks
- single channel of climate damages

Future research agenda:
- calibrate a more realistic baseline
- disaggregate food sector
Urbanizing China: Need New Growth Engine
Urbanizing China: Booming Real Estate

China Arable Land (thousand hectares)

- 1996: 130,000
- 2001: 126,000
- 2007 and 2008: 122,000

1.8 billion mu
Urbanizing China: Yield Productivity Gain

China Grain Production
(10 thousand ton)
Urbanizing China: Yield Productivity Gain

China Grain Cropping Area (thousand hectare)
China Grain Yield (kg/hectare)
Urbanizing China: Food Self-Sufficiency
Urbanizing China: GDP
Urbanizing China: Food Balance

[Graph showing changes in China's food balance from 2004 to 2013, with lines representing different categories such as import (imp) and export (exp).]
Urbanizing China: Yield Productivity Gain
## Urbanizing China: Land Price

<table>
<thead>
<tr>
<th>pfe<a href="D">**China</a></th>
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<th>2 extract</th>
<th>3 LghtMnfc</th>
<th>4 mnfc</th>
<th>5 serv</th>
<th>6 CGDS</th>
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<tbody>
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## Urbanizing China: Factor Uses

<table>
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<th>3 LghtMnfc</th>
<th>4 mnfc</th>
<th>5 serv</th>
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<td>4 Capital</td>
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