ECONOMIC IMPACT OF CHANGING CLIMATE AND TRADE POLICIES

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Outline

• Motivation and context
• Scenarios
• Results
• Conclusions
What does the future hold for agriculture in the global trading system?

• Agriculture policy landscape is evolving.

• Predictably:
  • Population expected to exceed 9 billion by 2050
  • Relative inelastic demand for agricultural products
  • Growth in emerging markets

• Unpredictably:
  • Climate change will have heterogeneous productivity impacts
  • Policy makers may intervene in trade in unexpected ways

• How will climate change and trade policy affect future production, trade, and welfare?
Modelling approach

- WTO Global Trade Model to analyse direct and indirect effects

- Dynamic computable general equilibrium (CGE) model, suitable to calculate detailed effects at the sectoral level

- Takes into account the intermediate production and trade linkages between sectors.

- Data aggregation – 15 regions, 26 sectors (23 agriculture, textiles, manufacturing, services), 5 factors (based on GTAP)

- Timeframe: 2015 to 2040. Baseline results are compared to results with two scenarios.
Baseline

- Basic GTAP model
- Simulates change over 25 year time period (2015-2040)
- Standard features include
  - Population and labour force changes (UN population)
  - GDP per capita growth (IMF Global projection model)
  - Changes in skilled labor (IIASA)
- Additional elements
  - Productivity changes by region and sector
  - Demand changes as incomes change
  - Savings rates
Share of destination markets in US exports for crops (%) - Baseline

- Other Asia: 12.62%
- Japan: 6.84%
- China: 28.6%
- India: 10.06%
- ASEAN: 0.86%
- Mexico: 8.98%
- Canada: 4.22%
- LAC: 10.24%
- EU: 5.63%
- MENA: 4.2%
- SSA: 10.06%
Wide variation exists in import dependency among regions and by product.
Policy scenarios

• Climate Change
  • Data from Global Agro-Ecological Zones, IIASA/FAO
  • Land substitution component
  • Yearly average productivity shocks differentiated by region and crop

• Trade costs
  • All regions assumed to increase tariffs in 2019 and maintain those rates until 2040
  • Tariffs differentiated by region and reflecting existing WTO bound limits
  • Trade costs assumed to be one half of the values assumed in Nicita et al (forthcoming in Journal of Political Economy)
Global crop prices increase at different rates under the three scenarios
The size of the climate-induced price changes varies for different regions.
Herfindahl index shows some moderate increases in market concentration

<table>
<thead>
<tr>
<th>Sectors</th>
<th>Initial 2015</th>
<th>Baseline 2040</th>
<th>Trade costs 2040</th>
<th>Climate change 2040</th>
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<tbody>
<tr>
<td>Agriculture</td>
<td>0.113</td>
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<td>Crops</td>
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<tr>
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<tr>
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<tr>
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<tr>
<td>Services</td>
<td>0.150</td>
<td>0.124</td>
<td>0.111</td>
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</table>
Market shares remain relatively constant under different scenarios
### Share of US exports in global exports for different commodities (%)

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<th>Climate change</th>
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<td></td>
<td>2015</td>
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<td>Services</td>
<td>13.81</td>
<td>10.72</td>
<td>8.55</td>
<td>10.63</td>
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</table>
Welfare impacts from climate change are substantially smaller than those from increasing trade costs.
Conclusion

- Climate change leads to higher average agricultural prices, while increasing trade costs lead to lower average prices.
- Developed economies could increase agricultural export market share due to climate change given their temperate climate.
- Climate change productivity shocks lead to reduced welfare with a few exceptions in temperate regions. Trade costs lead to larger negative global welfare impacts, in general, than climate change impacts.
- Adaptation to climate change could be compromised by policy interventions that weaken global market integration.