Integrated Impact Assessments - IAMs panel

Enrica De Cian, FEEM, CMCC, BU

Snowmass, July 2013
Outline

- Modeling Impacts and adaptation @ FEEM & BU
- Policy making input
- What have the organizers missed?
- Modeling team’s strategies for future
<table>
<thead>
<tr>
<th>Model type</th>
<th>OGM</th>
<th>Multi-sector, Multi-region recursive CGE</th>
<th>Multi-sector, Multi-region recursive CGE with AEZs and irrigation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model name</td>
<td>AD-WITCH (Bosello, De Cian, Carraro 2010)</td>
<td>ICES (Bosello, Eboli, Pierfederici 2012)</td>
<td>De Cian and Sue Wing (2013)</td>
</tr>
<tr>
<td>Category of impacts covered</td>
<td>Multiple impacts</td>
<td>Multiple impacts</td>
<td>Single impact</td>
</tr>
<tr>
<td></td>
<td>Aggregate regional damage functions (DICE/RICE)</td>
<td>Peseta approach</td>
<td>Impact of T and P on cereal productivity</td>
</tr>
<tr>
<td>Valuation techniques</td>
<td>Literature review on damage and protection costs</td>
<td>From bottom-up models + literature</td>
<td>Statistically-estimated yield response function to T and P (global panel data, SR vs. LR)</td>
</tr>
<tr>
<td>Regional and intertemporal coverage</td>
<td>2005-2100, 5 years, Optimization, Global</td>
<td>2004-2050, 1 year, Recursive, Global</td>
<td>2007-2052, 5 years, Recursive, Global</td>
</tr>
<tr>
<td>Treatment of adaptation</td>
<td>Planned, reactive, adaptive capacity</td>
<td>Autonomous adaptation</td>
<td>Autonomous adaptation</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Shocks are net of historical adaptation</td>
</tr>
<tr>
<td>Treatment of uncertainty</td>
<td>Catastrophic risk (Bosello, De Cian, Ferranna 2012)</td>
<td>NA</td>
<td>Confidence intervals</td>
</tr>
</tbody>
</table>
# Policy making input

## Usefulness for policy makers?

- Do we need really need IAMs to think about “right” levels of adaptation and mitigation?
- Depends on which policy-maker we have in mind
- Can we think of other tools?
- Adaptation as a practical, not theoretical issue

## Which cost indicators?

- Investment allocation over time, across regions (Massetti et al. 2010, Bosello et al. 2013)
- Show numbers for different years, especially over the SR
## What have the organizers missed?

| Model dynamics                        | • Equilibrium dynamics matter (Hallegatte et al. 2007)  
|                                      | • Productive vs. reconstruction capital  
|                                      | • Financial constraints to reconstruction resources  
|                                      | • Capital mobility (Lanzi & Sue Wing 2013)  |
| Past vs. future, Implicit vs. explicit adaptation | • Implicit past adaptation and risk of double counting  
|                                      | • Future adaptation is implicit in substitution elasticity values and in factor mobility  |
| Translation techniques               | • Translation techniques at least equally important to Valuation techniques  |
Modeling team’s strategy for future

(1) Risk and exposure GIS analyses of direct impacts + CGE analysis to quantify indirect effects of extreme events (Farinosi et al. 2012). Focus on specific events and specific regions.

(2) Analysis of catastrophic risk with AD-WITCH

(3) Combine statistically-estimated response functions of endpoints, exposure analysis, and CGE analysis (De Cian and Sue Wing 2013 for cereals and next energy demand, paper on EMF website)
Modeling team’s strategy for future

Example of translation questions (De Cian and Sue Wing 2013)

• Land productivity or total factor productivity?

• Static vs. dynamic? If the latter is followed, how should the time profile be specified?

• How do we aggregate responses of different countries into macro-region shocks?

• To what extent the effect of precipitation on crop yields capture the effect of water resources? Should specific shocks for water resources be added? Double-counting?
Final considerations

- Can we identify which impacts are more appropriate to be studied with either approach?

- The macroeconomic modeling of adaptation remains challenging, but there is demand for this type of work


The research leading to these results has received funding from the People Programme (Marie Curie Actions) of the European Union’s Seventh Framework Programme (FP7/2007-2013) under the REA grant agreement n° 298436