The European Commission's science and knowledge service

Joint Research Centre

Comparing methods for assessing climate impacts

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European Commission

Motivation

Wide range of climate impact results

- Policymakers needs: adaptation and mitigation
- Need to improve the empirical foundations of climate impact estimates

Workshop objective

Why results differ across methods ?

Compare methodologies:

- **Statistics, econometrics (Stat)**
- **Bottom-up, process models (IAMs)**

Systematic assessment: advantages and disadvantages of each approach; methodological aspects, e.g. how to model adaptation or consider cross-sectoral models feedbacks?

Focus issue on An Inter-method Comparison of Climate Change Impacts on Agriculture, Environmental Research Letters, 2017 (edited by JC Ciscar, K Fisher-Vanden, D Lobell)

Plan of the Workshop

- (**IAMs**)

HELIX project: estimating global climate impacts with a bottom-up methodology

- (**Stats**)

Tamma Carleton, University of California, Berkeley: Global mortality consequences of climate change accounting for adaptation costs and benefits

Stefan Fronzek, Finnish Environment Institute SYKE: Probabilistic risk assessment to climate and socio-economic changes across sectors and European regions using impact response surfaces

- (**IAMs**)

Taher Kahil, IIASA: Economic costs of reduced water availability under climate change: Application of IIASA global hydro-economic modeling framework

Shinichiro Fujimori, National Institute for Environmental Studies: Climate change cost: A CGE bottom-up approach

- **Panel discussion**

Global assessment: energy demand

(*FP7 HELIX project, preliminary results; do not quote*)

1.5C

2C

4C

Integrative, bottom-up modelling

3 steps

1. Start with high space-time resolution of climate data, common to all impacts (considers spatial correlation)
   Climate modelling community (HELIX)

2. Use of bottom-up biophysical impact models
   Biophysical impact community (POLES)

3. Economic integration
   Economic impact community (CGE)

Step 2: POLES global energy model

- Prospective Outlook on Long-term Energy Systems (POLES)
- Bottom-up, engineering approach (system dynamics)
- Detailed techno-economic database
- 39 regions
- Response of energy demand (electricity, coal, natural gas, oil) to climate change (heating and cooling degree days)

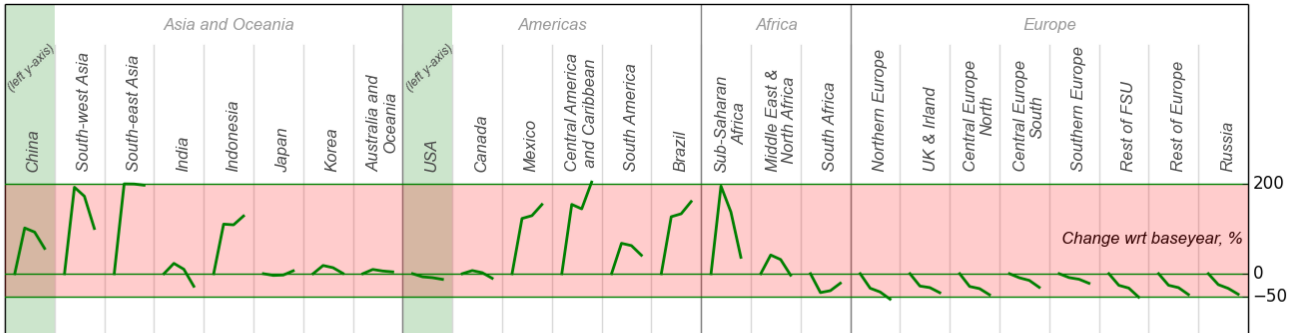
Step 3: integration with economics (CGE)

- Economic model to integrate the biophysical impacts, making them *comparable*

- *Model*: Multi-sector, multi-country Computable General Equilibrium (CGE) (CAGE-GEME3 with 19 sectors and 25 regions)
- CGE as an accounting framework: direct and indirect effects; includes cross-sectoral and cross-country effects

- *Comparative static* framework: impact of future climate change on today's economy

Example: residential energy demand



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Mtoe

FP7 HELIX project, preliminary results; do not quote

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