

Climate Impacts and Adaptation Workshop
May 17-18, 2012—National Bureau of Economic Research, Cambridge, MA
Forthcoming Special Issue of *Energy Economics*

Organizers:

Karen Fisher-Vanden, PSU

David Popp, Syracuse

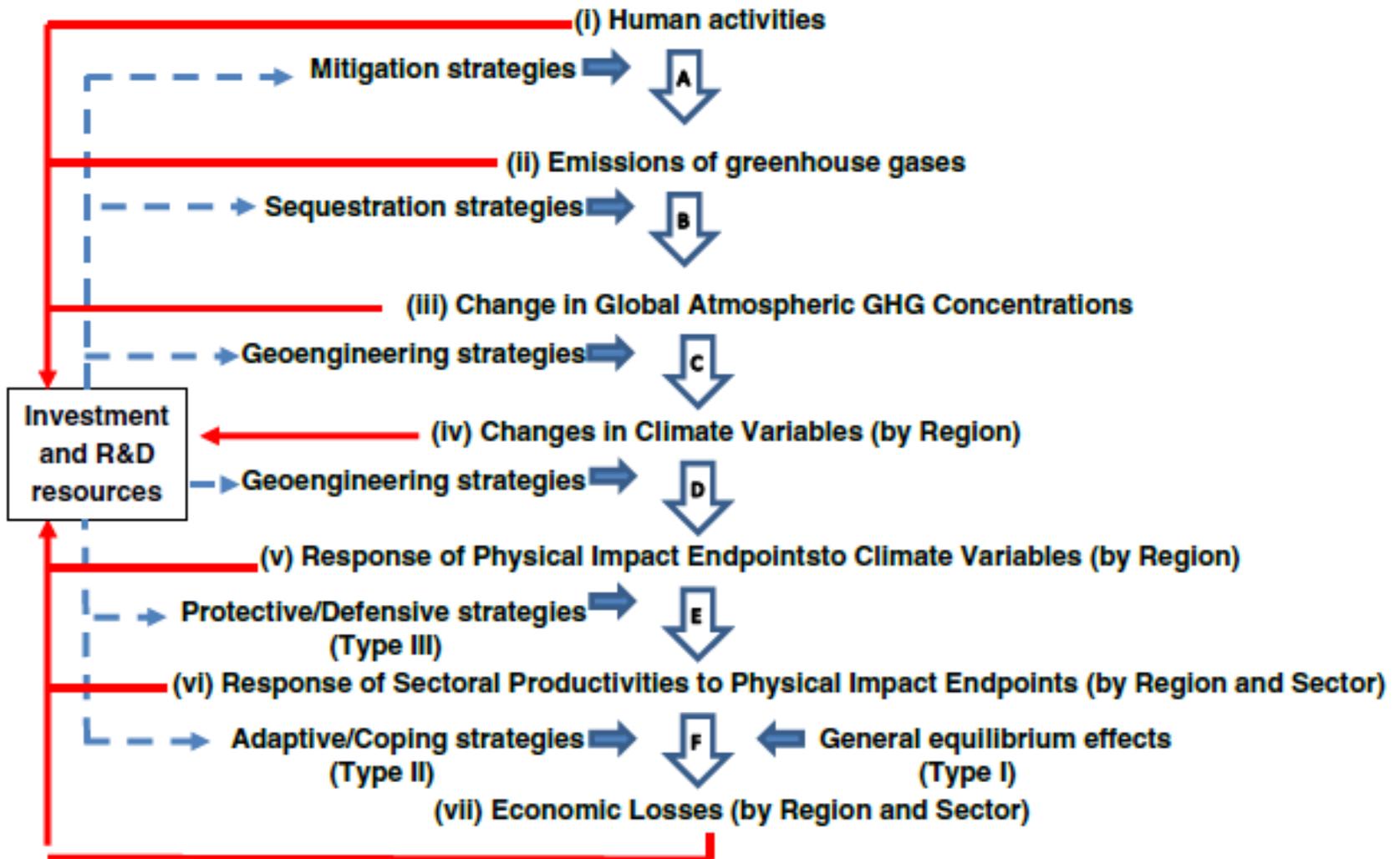
Ian Sue Wing, Boston University

- Effort as part of the Program on Integrated Assessment Model Development, Diagnostics, and Inter-model comparison (PIAMDDI), funded by the Dept of Energy (Weyant, PI) to improve the connection between empirical research and models
- Goals of the workshop—bring together empirical researchers and IA modelers to:
 - Begin discussion on devising ways to incorporate existing empirical work into models (translational work)
 - Develop ideas for joint research so that future empirical work may be better integrated into models (development work)

Motivation and Purpose of the Workshop

- Most IAMs lack the representation of climate impacts and adaptation responses which are key to decision making
- Yet, there has been a recent flurry of empirical research in the economics literature. Why hasn't this work made its way into IAMs?
 - Empirical work on impacts and adaptation is typically done at a level of detail much too rich for IAMs
 - Lack of understanding of what adaptation exactly is (Figure 1)
- Six topic area sessions: extreme events/sea level rise; energy; health; agriculture; water resources; and land use/migration
- Each session included a review of the state of the art in empirical research and modeling, followed by a facilitated discussion.

Climate Impacts and Adaptation Responses in IAMs



Source: Fisher-Vanden, Sue Wing, Lanzi, and Popp (2013)

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Session I—Energy and Water

Session Chair: **Ian Sue Wing**, Boston University

Sheila Olmstead, RFF, review of empirical studies on water impacts and adaptation

Claudia Ringler, IFPRI, review of modeling studies on water impacts and adaptation

Erin Mansur, Dartmouth College and NBER, review of empirical studies on energy impacts and adaptation

Juan-Carlos Ciscar, JRC, European Commission, review of modeling studies on energy impacts and adaptation

Panel discussion: incorporating empirical energy and water findings into IAMs.

Moderator: **Ian Sue Wing**, Boston University

Panelists: Juan-Carlos Ciscar, Erin Mansur, Emanuele Massetti, Sheila Olmstead, Claudia Ringler

Issues raised (sample):

- How do you represent institutions in IAMs; e.g., institutions defining how scarce water is allocated
- With energy, need to distinguish between intensive margins (SR substitutions) vs. extensive margins (LR investments to deal with, say, higher A/C demand)

Session II—Agriculture and Land Use

Session Chair: **Karen Fisher-Vanden**, Pennsylvania State University

Steve Rose, EPRI, review of modeling studies on land use impacts and adaptation (presented by Karen Fisher-Vanden)

Allen Klaiber, Ohio State University, review of empirical studies on land use impacts and adaptation

Max Auffhammer, UC Berkeley and NBER, and **Wolfram Schlenker**, Columbia University and NBER, review of empirical studies on agricultural impacts and adaptation

Tom Hertel, Purdue, review of modeling studies on agricultural impacts and adaptation

Panel discussion: incorporating empirical agricultural and land-use findings into IAMs. Moderator: **Karen Fisher-Vanden**, Pennsylvania State University
Panelists: Max Auffhammer, Tom Hertel, Allen Klaiber, Robert Mendelsohn, Wolfram Schlenker

Issues raised (sample):

- Crop models, which could provide the link between empirical research and IAMs, not designed for climate change impacts assessment. Were not calibrated on extremes.
- Severe lack of empirical work on developing countries.

Session III—Health and Extreme Events

Moderator: **David Popp**, Syracuse University and NBER

Carolyn Kousky, RFF, review of empirical studies on impacts of and adaptation to extreme events

Enrica De Cian, FEEM, review of modeling studies on impacts of and adaptation to extreme events (co-authored with Francesco Bosello, FEEM)

Olivier Deschenes, UC Santa Barbara and NBER, review of empirical studies on health impacts and adaptation

David Anthoff, UC Berkeley, review of modeling studies on health impacts and adaptation

Panel discussion: incorporating empirical extreme events and health findings into IAMs. Moderator: **David Popp**, Syracuse University and NBER

Panelists: David Anthoff, Enrica De Cian, Olivier Deschenes, Carolyn Kousky, John Weyant

Issues raised (sample):

- Need to understand how proactive adaptation measures (e.g., sea walls) can lead to building in vulnerable areas
- Double-counting issues; e.g, protecting against waterborne diseases due to climate change could be a function of income and not explicit adaptation measures. Improvements in public health rather than explicit adaptation

Common themes

1. Coupling of models with econometric studies

- Use of econometric models to
 - Parameterize IAMs
 - Test behavior of IAMs
 - Formal coupling—e.g., use of economic model to capture endogenous market responses (e.g., price and trade feedbacks)
- DICE type aggregate IAMs work best with reduced form econometric models
- CGE-type IAMs and process models work better with structural econometric models
- Should we be proposing funded research to encourage:
 - Translational work: translating existing empirical work into existing IAMs
 - Development work: new econometric and modeling techniques to allow for better integration

2. Need to focus on extremes rather than means

3. Scale issues

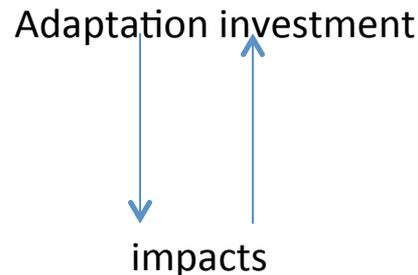
- Most impacts and adaptation studies at finer regional and sectoral scale than IAMs. How do we aggregate up to model scale?

4. Is there double counting if we incorporate reduced form results into models?

Common themes

5. Empirical work on adaptation needed but difficult to do

- Easier to evaluate adaptation investment effect on impacts than impacts effect on adaptation investment decision (which involves intertemporal decision making under uncertainty)



6. Need more empirical work on developing countries

7. Need more work on effects of climate change on shifts in growing season, forest rotations

8. How do we get empirical researchers working with the IAM community when publication process does not reward integrative work like this?

- Empirical researchers not interested in doing work that they “throw over the fence” to modelers. Prefer to work on collaborative research projects

Workshop Outcomes

- **Review papers from the workshop and summary of the findings will be published in a special issue of *Energy Economics***
 - **Papers currently posted on NBER website:**
<http://www.nber.org/confer/2012/IAMs12/program.html>
- **Follow-up workshop planned**
 - This second workshop will focus on developing the following three paper topics that were formulated in the first workshop:
 - Reconciling the disconnect between empirical, crop model, and IAM studies of the effects of climate change on crop yields and adaptation responses. (Sue Wing, coordinator)
 - Estimating and modeling energy adaptations—distinguishing between intensive versus extensive margins. (Popp, coordinator)
 - The influence of institutions on water supply adaptation responses. “Efficient adaptation” estimates may provide a lower bound on adaptation costs, but the “no adaptation” may not be the upper bound because of mal-adaptation. (Fisher-Vanden, coordinator)