

Steering Climate Policy

The Role of Economic Modeling

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1. Fundamentals

Science at Sale?

- The obligation of news media to convey information as objectively and truthfully as possible has been progressively dropped.
- There is little reference to scientific evidence – only points of view.



The concept of global warming was created by and for the Chinese in order to make U.S. manufacturing non-competitive.

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Tens of Thousands Of Scientists Declare Climate Change A Hoax

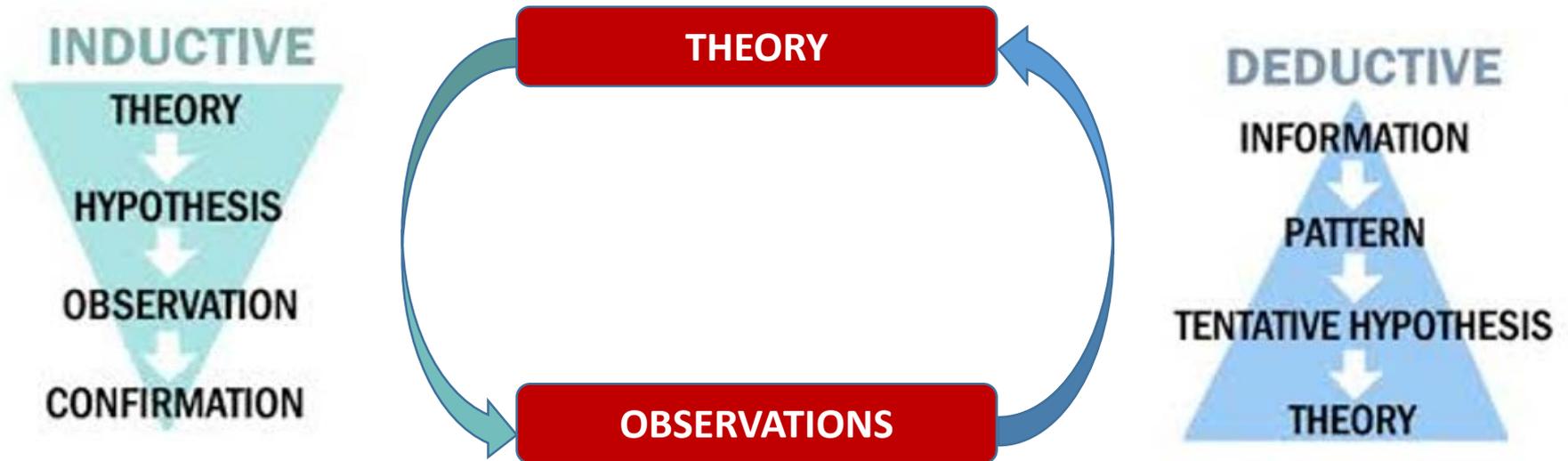
FAKE?

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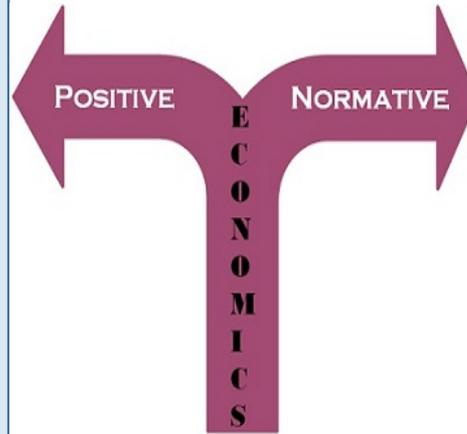
Scientific Analysis: Knowledge Building



- **Replicability:** Replicate or repeat a scientific study and obtain similar, if not identical, results.
- **Precision:** Theoretical concepts which are often hard to measure must be defined with such precision that others can use definitions to measure concepts and test theory.
- **Falsifiability:** A theory must be stated in a way that it can be tested or falsified.
- **Parsimony:** Scientist must accept the simplest (sufficient) explanation (Occam's razor).

Positive and Normative Analysis

A positive statement is a statement about what is and that contains no indication of approval or disapproval.

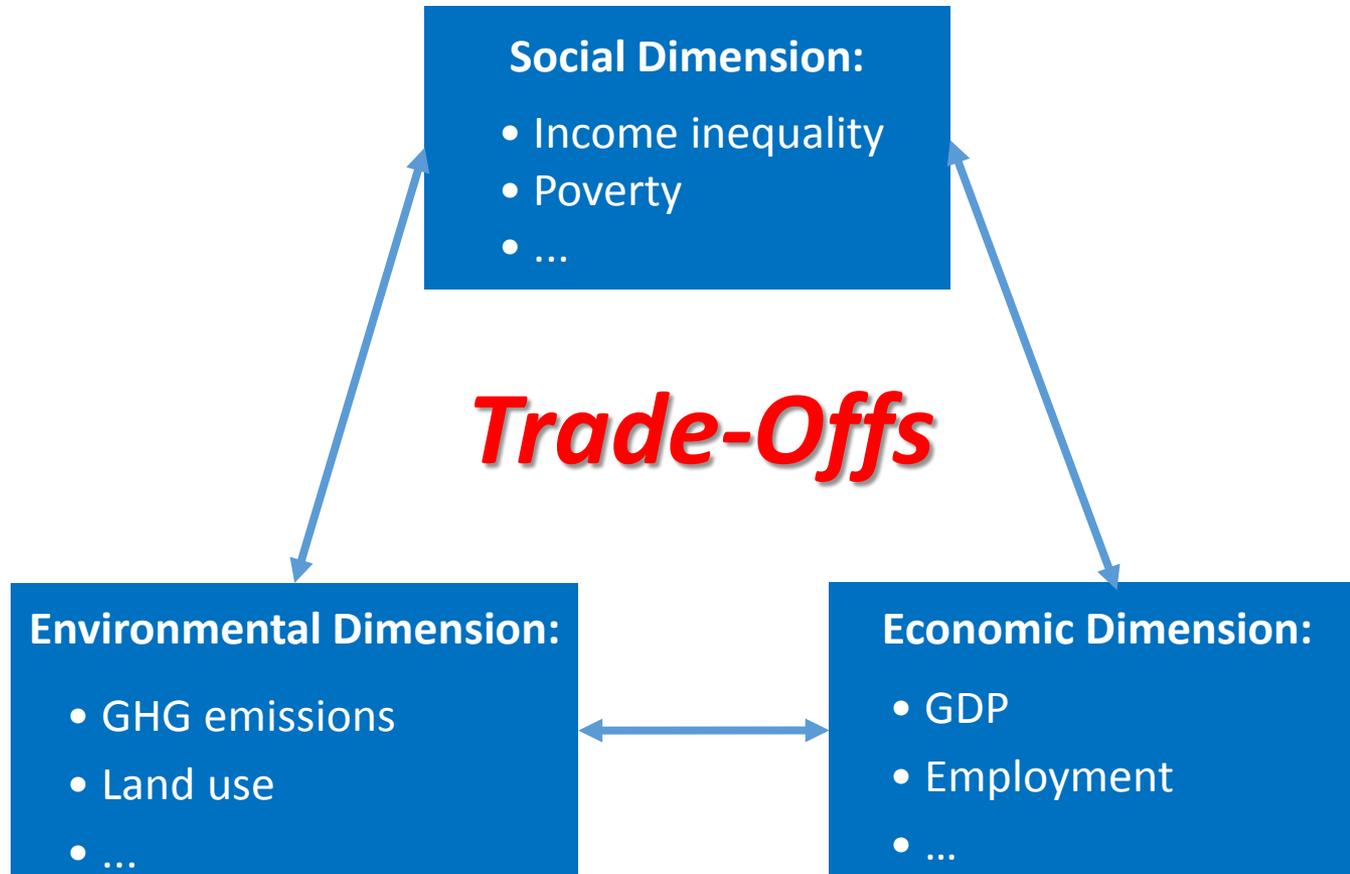


A normative statement involves value judgments about whether a situation is desirable or undesirable, “what ought to be.”

Positive model results can provide a basis for normative conclusions.

2. The Role of (Economic) Models

Sustainable Impact Assessment (SIA)



Multiple Dimensions – Multiple Targets – Multiple Instruments

Economics: Science of Trade-Offs

**Evaluation of alternative policy options
(incl. business-as-usual)**

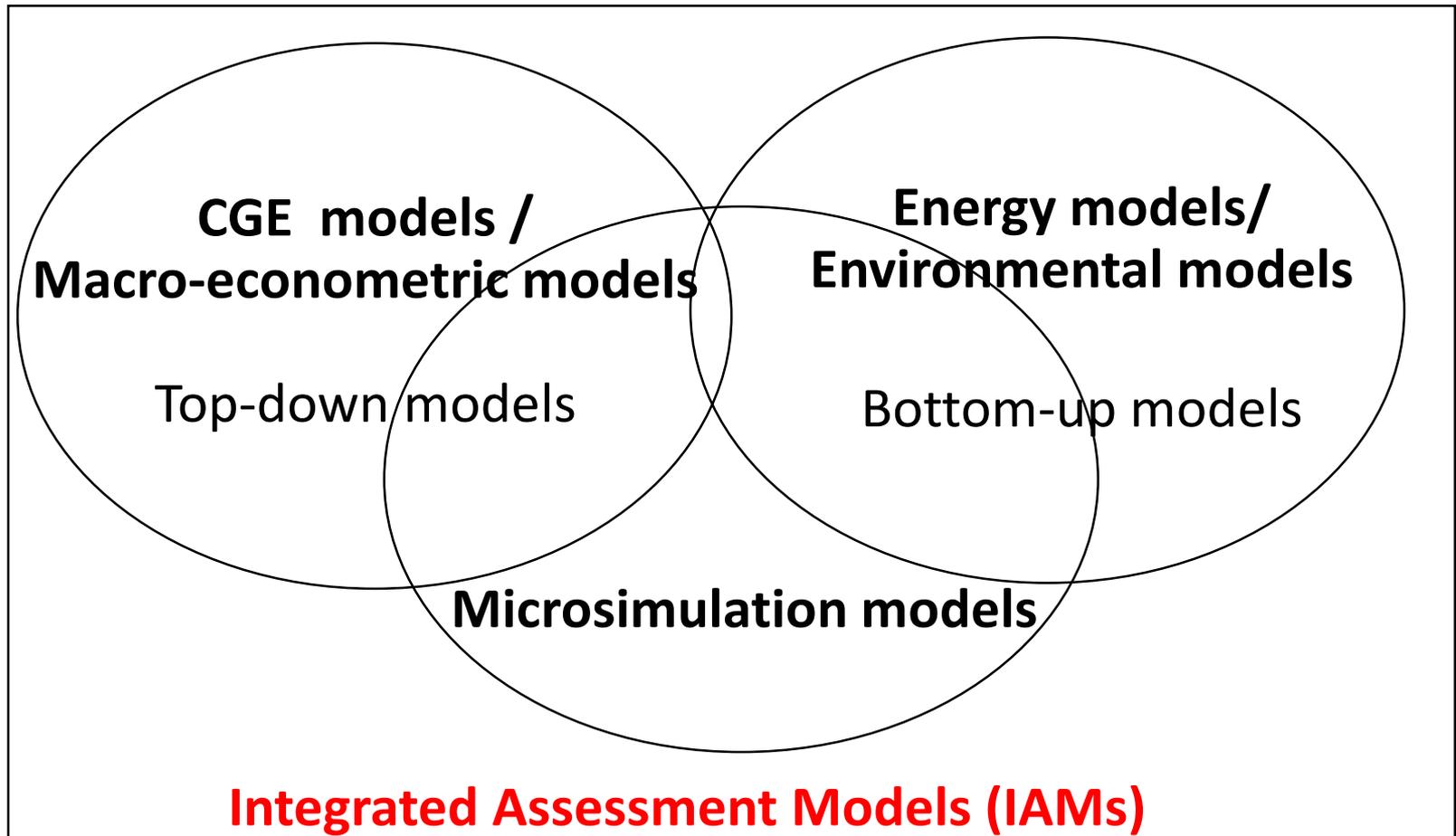


- Magnitude and distribution of costs and benefits
- Identification of conflicting objectives
- Coherence of policy design
- Robustness check (sensitivity analysis)
- High priority areas for future research



Information for rational decision making

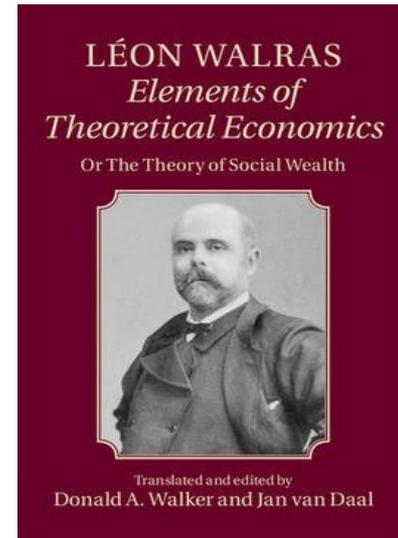
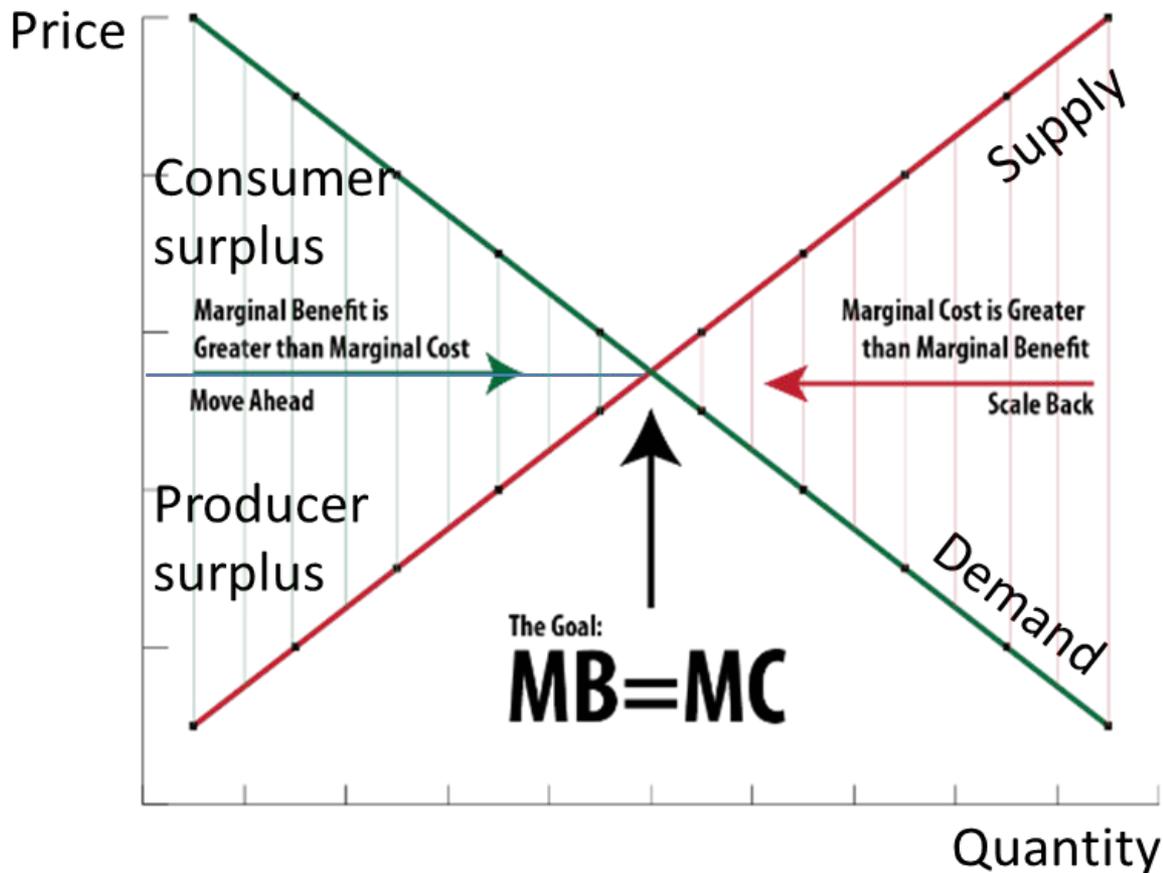
Sparse Model Taxonomy



3. Steering Climate Policy

Cost-Benefit Analysis

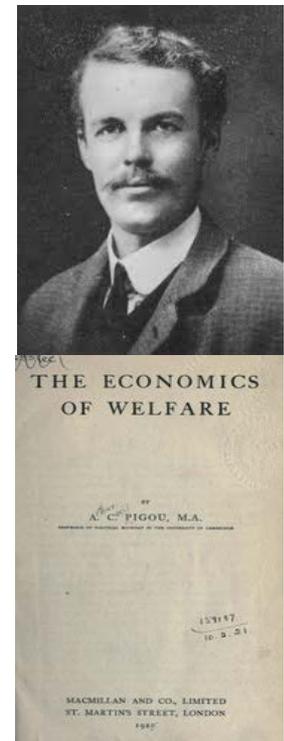
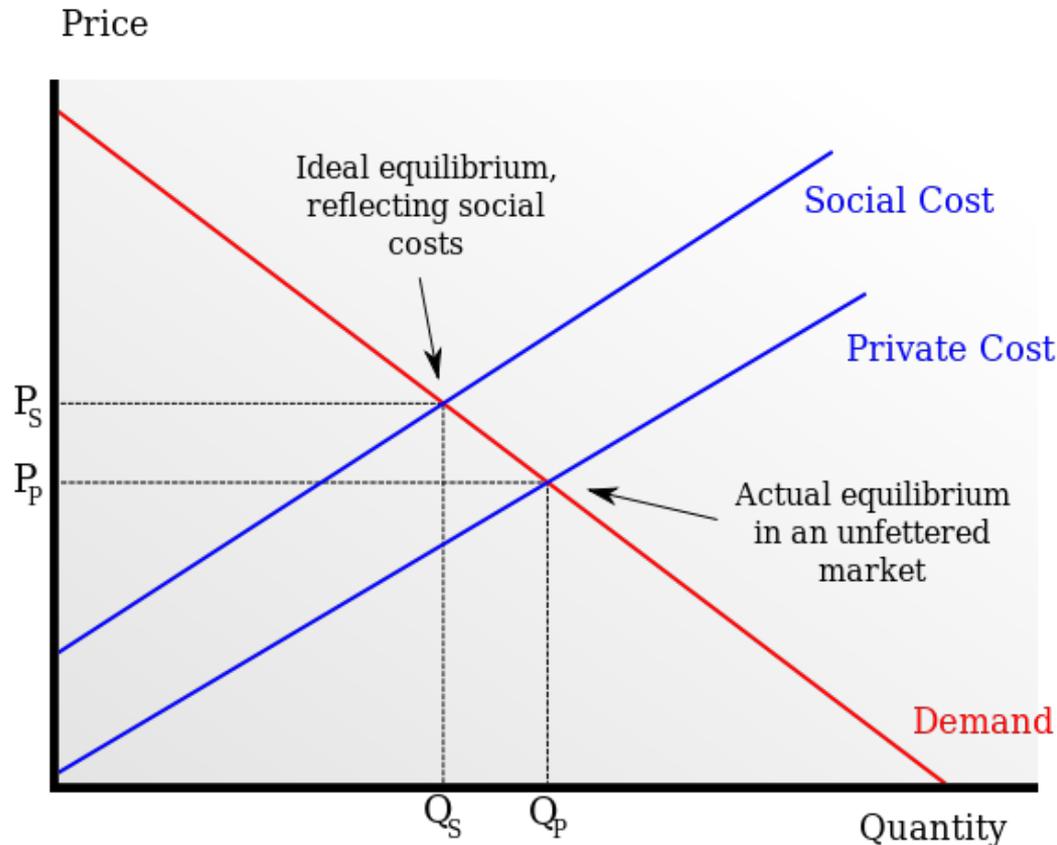
First fundamental welfare theorem:
Competitive markets assure efficiency!



Cost-Benefit Analysis Revisited

Market externality:

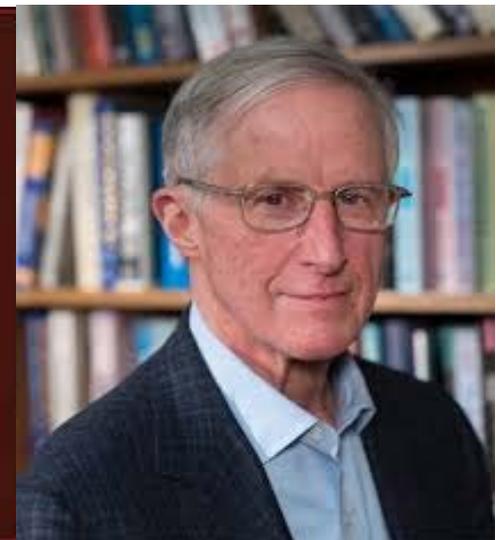
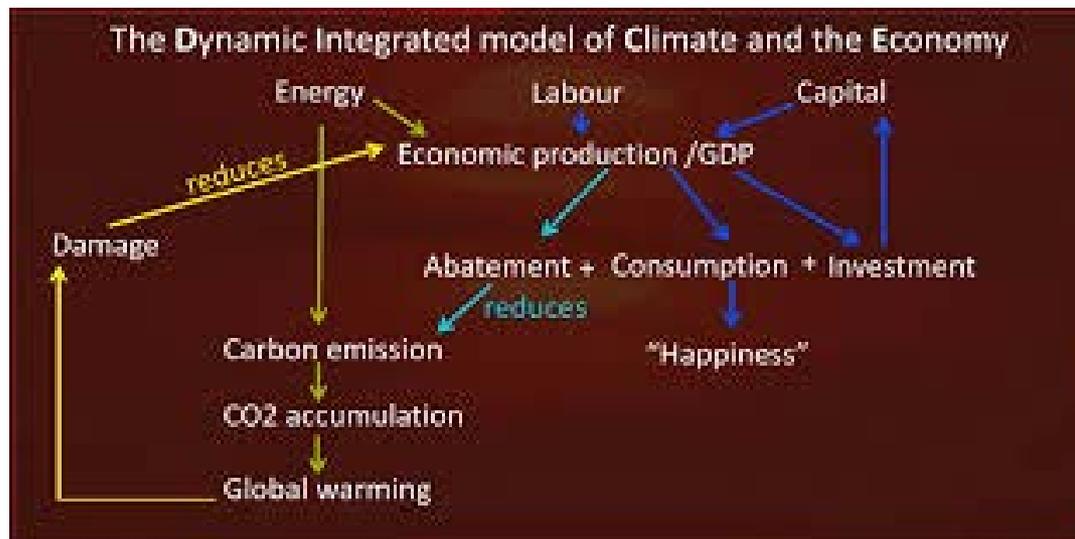
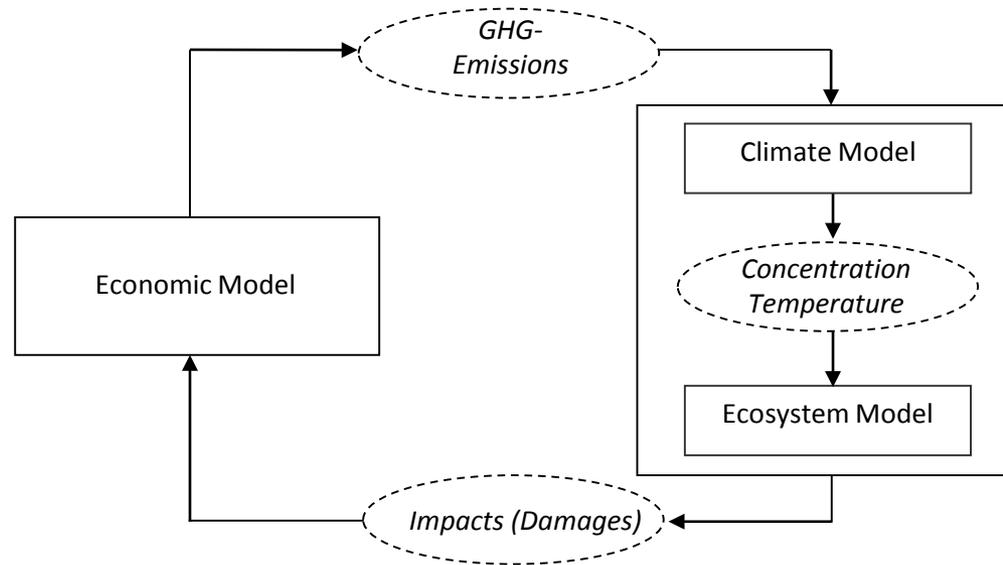
Costly spillovers should be taxed at the marginal social damage!



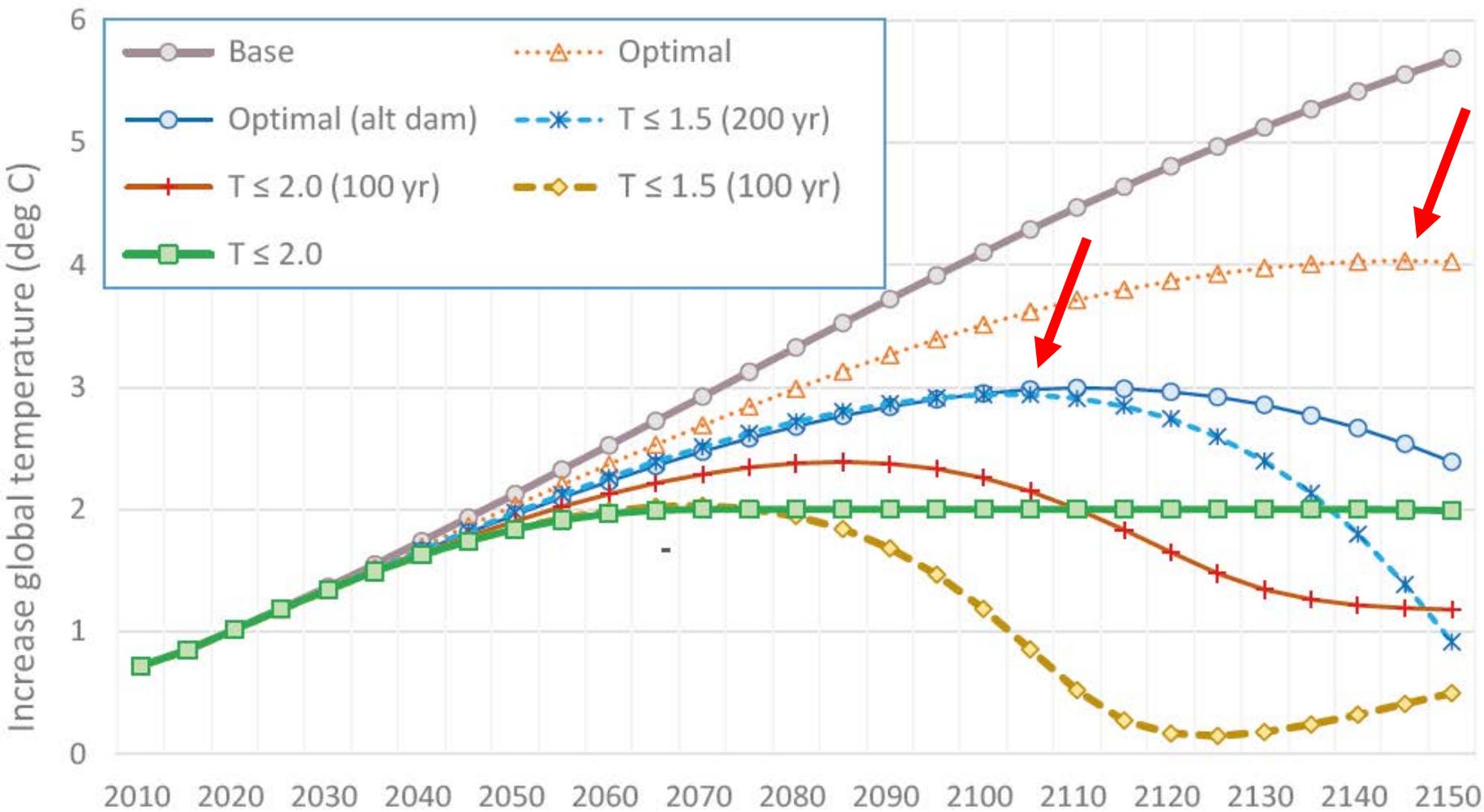
Social Cost of Carbon (SCC):

The monetary estimate of global climate change damages to society from an additional unit of carbon dioxide emissions.

Integrated Assessment Modeling

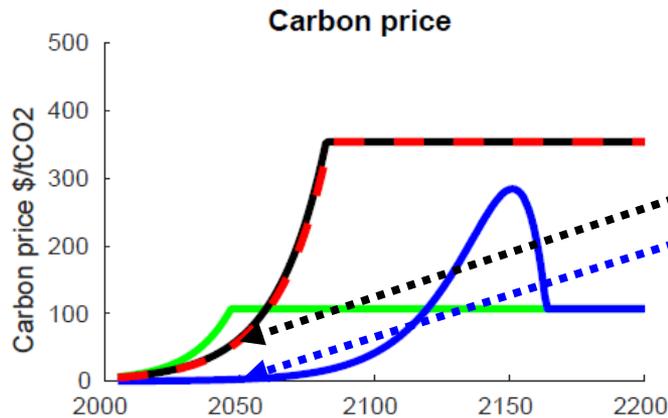
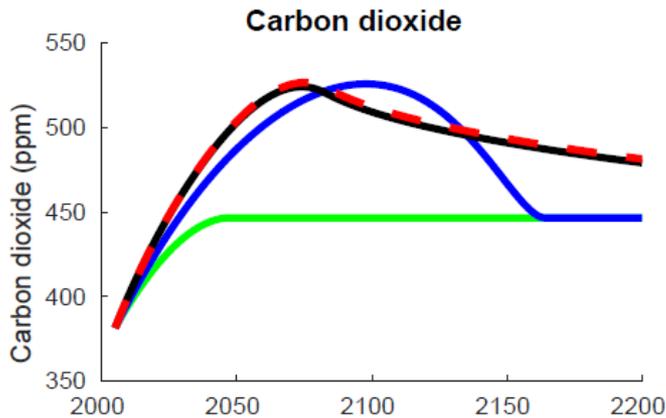
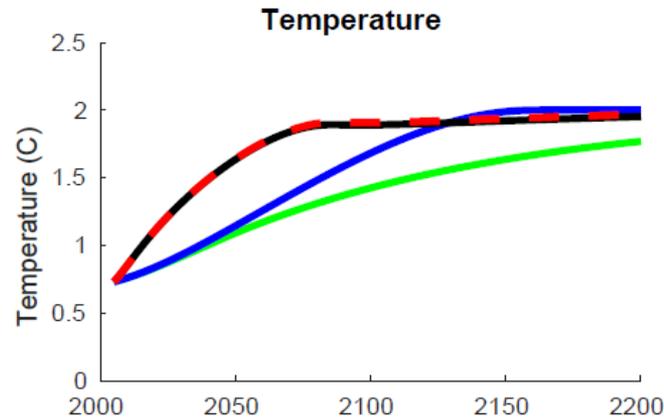
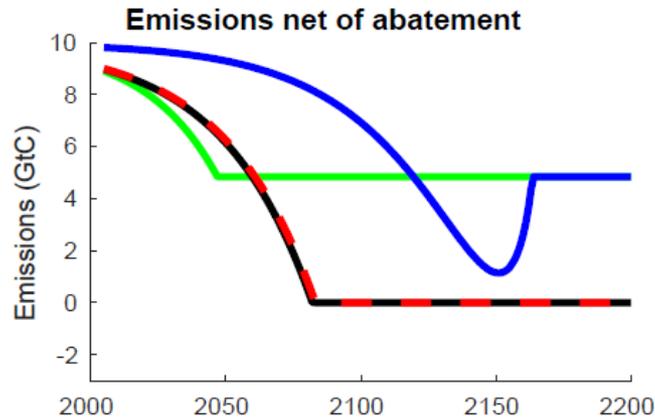


Optimal Global Warming



Source: Nordhaus (2018)

Scientific Discourse: A Policy Dilemma



2018:
*Different assumptions
 on climate dynamics*

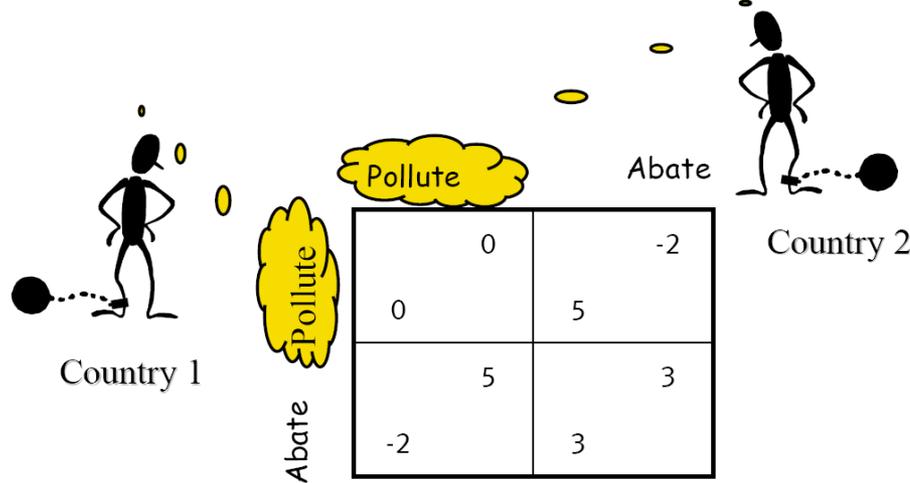
— L&R (2017) concentration
 — L&R (2017) temperature
 — IPCC AR5-IR (2013)
 - - - Carbon budget
 Source: Mattauch et al. (2018)

Responsible application of IAMs requires the detailed understanding of:

- economic theory
- climate dynamics
- energy system/technologies

The Tragedy of the Global Commons

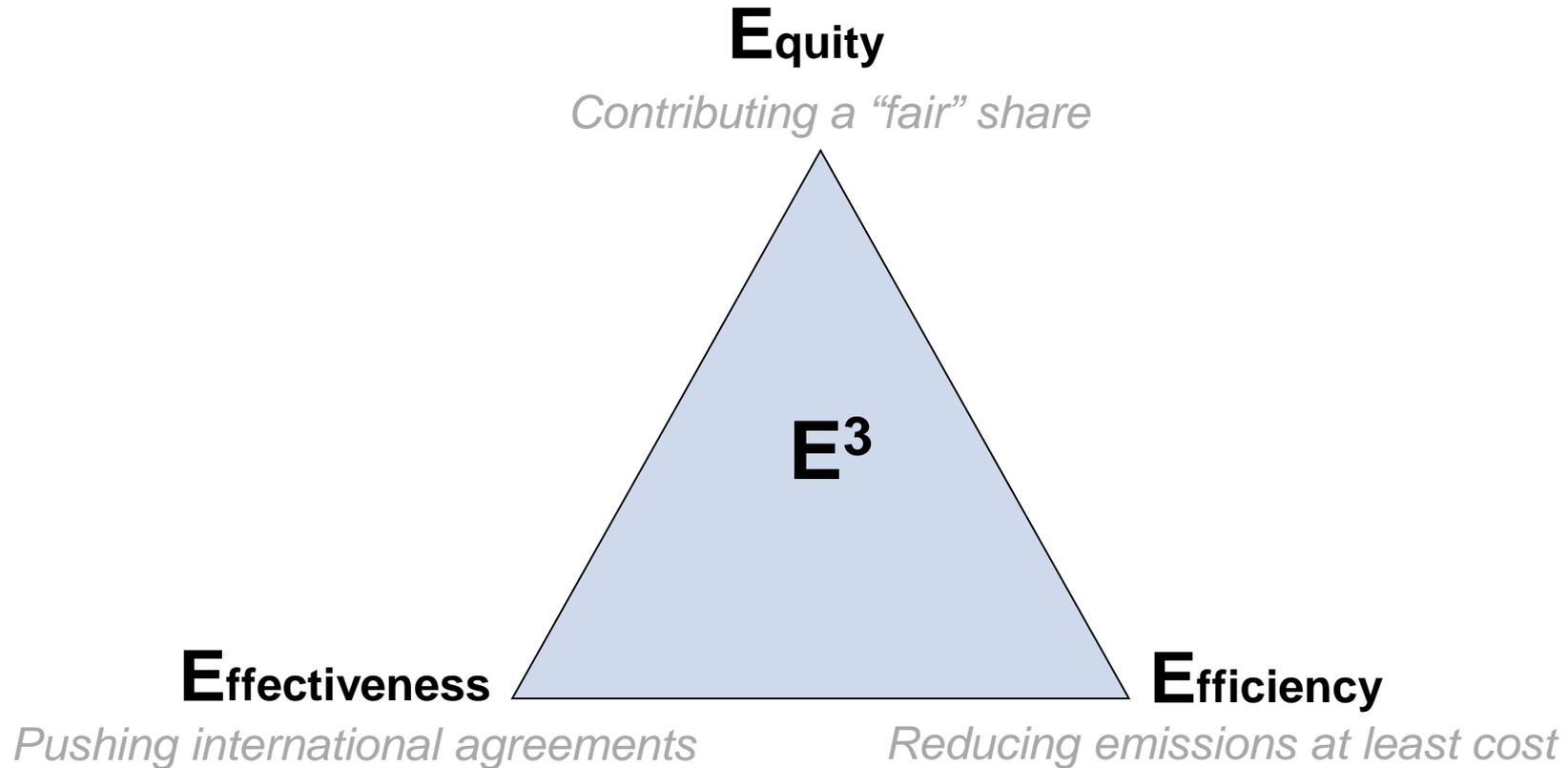
- Global cost-benefit analysis – Stern-Report (2006):
 - Cost of inaction: 5 – 20 % of global GDP/year
 - Cost of action (550ppmv): 1% of global GDP/year
- Self-interest impedes cooperation - prisoner's dilemma:



- Potential remedies in the absence of supranational authority:
 - Climate club (sanctions)
 - Public pressure („blame and shame“)



A Consensus View on “What is Needed”



- Economic efficiency as an enabler of equity and climate effectiveness
- Informed decision making: integrated assessment of trade-offs

4. Conclusions

Modeling for Insights Not For Numbers



- „Models as knowledge“ rather than „Models as symbols“
- Positive model results provide the basis for normative conclusions.

Areas of IAM Research

- Social cost of carbon
- Climate damages
- Technological abatement options:
 - Power-to-X (end-use decarbonization, sector coupling)
 - Geoengineering
 - Carbon dioxide removal
- Interplay between mitigation and adaptation
- Risk and uncertainty
- R&D policies

Le deseamos mucho éxito en su investigación!



I SEE TEMPERATURES RISING, ICE MELTING, CROPS FAILING, DISASTERS, DISLOCATION, DISEASE ... & A WHOLE BUNCH OF SCEPTICS STILL SAYING THE SCIENCE ISN'T IN...