Estimating the Social Cost of Carbon

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IAM is Critical Tool

- Integrates natural sciences and economics
- Captures key dynamic interactions
- Clarifies important links
- Clarifies scale

3) Desired aggregation?

- Best strategy is a diversity of IAM models
- Some models should focus on detailed account of natural science and impacts
- Other models should focus on aggregate accounts
- Each type of model more suited to answer different questions

4) All Modeling Requires Verification

- No verification- garbage in garbage out
- Assumptions need to be examined
- Calibration is required
- Model predictions need to be evaluated

Verification

- Controlled Experiments
- Cross Sectional Evidence
- Panel Data Evidence
- Paleo Evidence
- Look for consistent results across every method

Current Problems with IAMs

- Damage is not proportional to GDP
- Adaptation is undervalued
- Nonmarket effects poorly quantified
- Catastrophes are sometimes included but not quantified

Uncertainty Handled Poorly

- Studying uncertainty of damage caused by BAU is largely irrelevant
- If society is trying to determine whether long term goal is 2°-4°C, impacts of 5°-10°C do not matter
- Many forcing factors are correlated
  - Energy and GDP/capita
  - Growth in GDP/capita and interest rates

Discount rates

- Controversial but not uncertain
- Market rate forces greenhouse gas investments to be competitive with other investments
- Lower rate- lower rate of return for investing in climate change
- If use lower rate for climate, should use lower rate for all investments

Climate Sensitivity

- Climate sensitivity affects long run temperature proportionally
- Damage depends on transient temperature
- Need to be careful to properly translate climate sensitivity into changes in transient temperature path

Research Priorities

- Market impacts are well known
- Nonmarket impacts in health and ecosystems need to be quantified- likely to be small but IAMs currently assume large
- Catastrophe- most important
  - Current models may be off by orders of magnitude
  - Ecological collapse, melting ice sheets, ocean acidification, and slowing ocean circulation

Melting West Antarctica

- Fear-
  - Happens immediately- 5m SLR
  - NPV of damage is $1300 trillion
- More accurate physical model
  - Happens over 200 years
  - NPV of damage is $3.4 trillion
- With Adaptation
  - Protect valuable coastline
  - NPV of damage is $0.4 trillion