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