

Uncertainty, Social Valuation, and Climate Change Policy

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*“The economic consequences of many of the complex risks associated with climate change **cannot**, however, currently **be quantified**. ... These unquantified, poorly understood, and often **deeply uncertain** risks can and **should be included** in economic evaluations and decision-making processes.”*

Rising, Tedesco, Piontek, Stainforth, Nature, 2022

- **Carbon taxation** — climate change as a Pigouvian externality
- **Net-zero** or green energy mandates
- **Carbon budgets**

Subsidizing research and development directed at developing new, clean technologies in the future has received considerably less attention.

Big Project, Highly Uncertain Technology Advances

- Carbon removal
- Nuclear fusion
- Solar geoengineering

Potential role for government and/or private sector investments

Our initial research shows that:

- The unknown timing of the success of **R&D investment** is the most potent contributor to uncertainty for climate-economics policy.
- This source of uncertainty leads to doing **more** green R&D investment.
- **Reducing emissions** in the short term allows **R&D** time to succeed, even though this response is less sensitive to uncertainty.

Why is R&D investment more attractive?

There are **offsetting impacts** of uncertainty aversion that we study with our **asset pricing representation**:

- The **uncertainty-adjusted** probability measure **pushes** the prospects for **successful R&D** into the **more distant future**.
- The change in continuation values associated with the technology jump becomes **substantially larger** because an important source of uncertainty is resolved at the time of the discovery.

This **second impact** dominates across the range of uncertainty aversion levels that we find most interesting.

A complementary research agenda: Preserving the Amazon rainforest

- We build a **spatial dynamic** model of land allocation. We consider two land uses:
 - Agriculture
 - Forest growth that absorbs carbon
- We investigate the **uncertainty** in the land-use **productivities** for the alternative activities.
- We measure the **economic cost** of preserving rainforests and find it to be relatively **low**.
- We are currently exploring tractable and revealing ways to incorporate **biodiversity** considerations.