

Policy Challenges Posed by Climate Change Uncertainty

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NY Fed Climate Change: Implications for Macroeconomics

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Confronting policy uncertainty

Tension:

- ▷ **limited understanding** of the mechanism by which policy influences economic outcomes
- ▷ **demand for precise answers** by the public

Important Considerations

- ▷ **historical measurement** alone has **limited value** - push advanced economies in realms that we have yet to experience.
- ▷ hastily devised policies unsupported by **credible** quantitative modeling could backfire, **harming reputations** of central banks
- ▷ stated **climate change ambitions** may generate unwarranted confidence in the abilities of central banks to address this important problem

Uncertainty tradeoffs

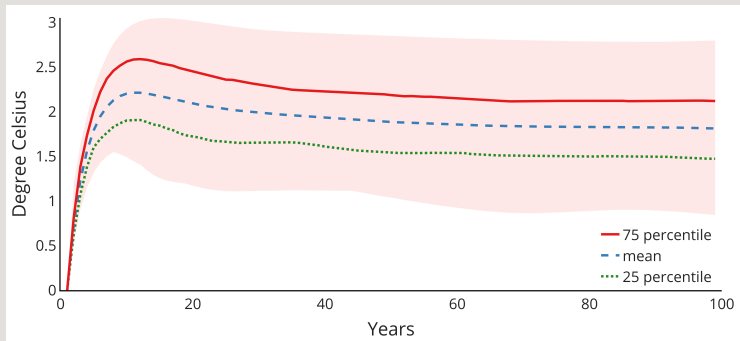
- ▷ How much weight do we assign to:
 - best guesses
 - potentially bad outcomeswhen designing policy?
- ▷ Do we **act now**, or do we **wait** until we learn more?

Decision theory under uncertainty

- ▷ allows for a **broad perspective** on uncertainty
 - **risk** - unknown outcomes with known probabilities
 - **ambiguity** - unknown weights to assign to alternative probability models
 - **misspecification** - unknown ways in which a model might give flawed probabilistic predictions
- ▷ includes formulations that are **dynamic** and recursive

Better ways to do **uncertainty quantification** for **dynamic** economic models used for **private sector planning** and **governmental policy analysis**

Ambiguity: Divergent climate model predictions



Percentiles for temperature responses to emission impulses. The emission pulse was 100 gigatons of carbon (GtC) spread over the first year. The temperature units for the vertical axis have been multiplied by ten. The boundaries of the shaded regions are the upper and lower envelopes based on 144 models.

Uncertain climate economics

- ▷ **physical risk**
 - **climate sensitivity** - the temperature responses to changes in emissions
 - **environmental tipping points** - consequences triggered after crossing a temperature anomaly threshold
- ▷ **transition risk**
 - **damages and adaptation** - economic and social consequences of climate change
 - **green technology** - development of new “clean” technologies
 - **policy** - private sector exposure to uncertain government actions

Given difficulties in **quantification**, replace **risk** with **uncertainty**.

Tilting portfolios green I

Green mandates as climate change policy

Recent investigation

- ▷ Hong, Wang, and Yang (2021) “Welfare Consequences of Sustainable Finance”

They show the potentially important role for policies that **tilt towards green production**. But ...

Tilting portfolios green II

- ▷ The “risk-adjusted” expected return loss to ESG investing has been **notoriously hard to estimate** with substantially different findings across alternative studies (substantial literature has emerged)
 - Pedersen, Fitzgibbons and Pomorski, “Responsible Investing: The ESG-efficient Frontier” (JFE, 2021) - provide a **heterogeneous investor** theory but find a small empirical cost
 - Pastor, Stambaugh and Taylor, “Dissecting Green Returns” (2021) - important differences between **subjective expected returns** and *ex post* average performance
 - Lindsey, Pruitt and Shiller, “Cost of ESG Investing” (2021) - small cost to investors to tilt portfolios green - potentially **redundant attributes** and **diverse ESG standards**

Tilting portfolios green III

- ▷ The **real impact** of ESG investing has been challenging to uncover. See Elmalt, Igan and Kirta “Limits to Private Climate Change Mitigation” (2021)
- ▷ Substantial **green patenting** done by firms with low ESG scores. See Cohen, Gurun and Nguyen “The ESG-Innovation Disconnect” (2021)

Conclusion/Summary

- ▷ The **time horizon** over which climate change uncertainty plays out is different than in other forms of turbulence on the radar screen of central banks creating unique challenges for policy making.
- ▷ **Quantifying uncertainty** in climate change creates **special challenges** that are missed by commonly-used “risk-based” methods.