Monetary policy stabilization in a new Keynesian model under climate change

Discussion of Economides and Xepapadeas (2023)

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Disclaimer: These remarks do not necessarily represent the views of the National Bank of Belgium or the Eurosystem. All views are my own.

This discussion

I really liked this paper

- Asks a policy-relevant questions
- Can provide quantitative answers
- Links tools from macro and climate economics

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What to expect from this discussion?

- I am a climate economist rather than a DSGE modeller
- Focus therefore on the climate side of the paper

One slide summary

Research question

- Big picture question: do climate change damages affect economic activity in a way that is relevant to how a central bank conducts monetary policy?
- Specifically: what are the implications for the business cycle if CB behaves as if climate change does not affect economic activity?

Methodology

- DSGE model with climate/energy component

Main findings

- If CB conducts monetary policy ignoring climate TFP damages, then volatility of output and prices increases
- Climate change as new propagation mechanism for economic shocks

Main comments 1: how to interpret the environmental shock?

Section 5.2 simulates the response of the economy following a "1% environmental shock"

- What factor in the economy does such an environmental shock correspond to?
- If greenhouse gas emissions, does it affect channels other than the temperature damages?
- How to interpret the 1% magnitude with respect to real-world climate policy?

Main comments 2: why model GHG emissions?

Main justification to model greenhouse gas emissions is

- emissions $\rightarrow$ temperature change $\rightarrow$ economic damages

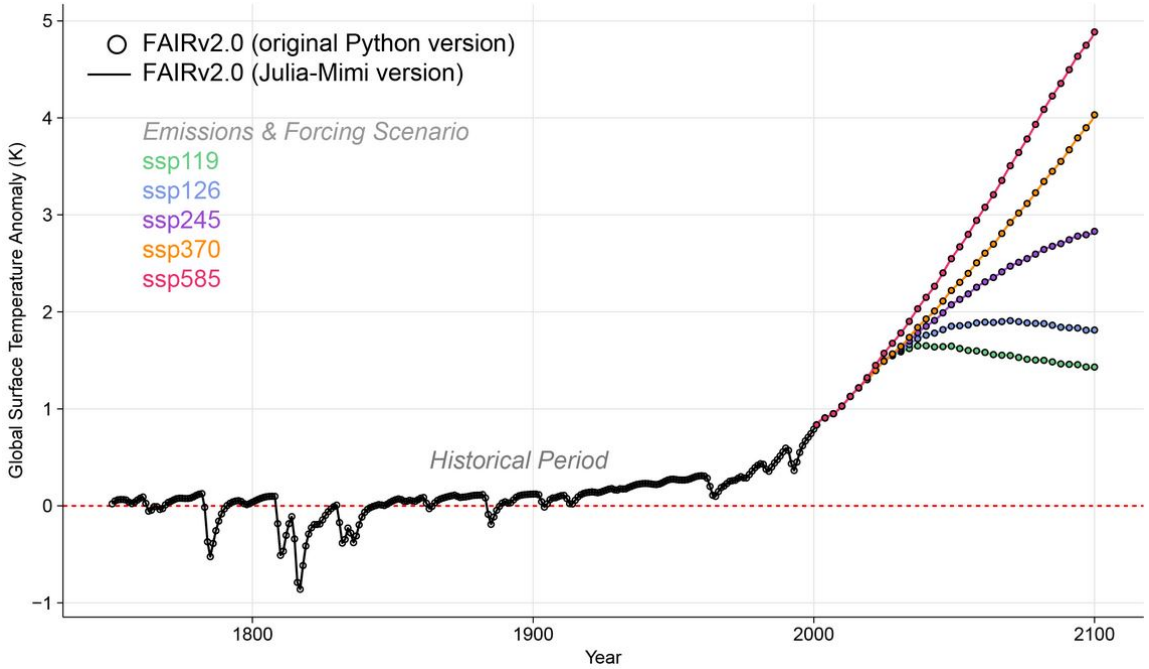
However: central bank action is unlikely to influence global climate

- A substantial amount of near-term climate change already locked in (stock)
- EU27 GHG emissions are $<$10% of global GHG emissions (flow) and
  - Fiscal policy (Fit for 55 package) much more influential in changing relative prices than any CB monetary action
  - Or is this a global economy?

Main comments 2: why model GHG emissions?

Proposal for simplification: study how economic damages from climate change under different exogenous warming scenarios would affect the workings of monetary policy

- Closer to how mitigation works around the world
- Plenty of ready-to-use scenarios in the climate literature to connect to (e.g., RCP-SSP scenarios used in the IPCC reports)



Source: https://github.com/FrankErrickson/MimiFAIRv2.jl

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- Closer to how mitigation works around the world
- Plenty of ready-to-use scenarios in the climate literature to connect to (e.g., RCP-SSP scenarios used in the IPCC reports)
- Reinterpret environmental shock: shock in temperature rather than emissions terms

Main comments 2: why model GHG emissions?

Question on whether to model greenhouse gas emissions in macro models goes beyond this paper

- Question for ECB climate modelling tools as well: needed to understand transition risk?
- Mitigation models provide much richer technology representation and abatement cost data - perhaps enough to extract (effective) carbon price paths from these models to study various transition risk scenarios?
- Arguments for both sides. E.g., IMF GMMET used to assess the near-term macroeconomic impact of decarbonization models GHG emissions

Main comments 3: calibration of the damage function?

Definition damage function: a mapping from physical change (e.g., Δ °C) to economic outcomes (e.g., Δ % GDP)

- Overall magnitude: from first principles (past) to climate econometrics and beyond (current)

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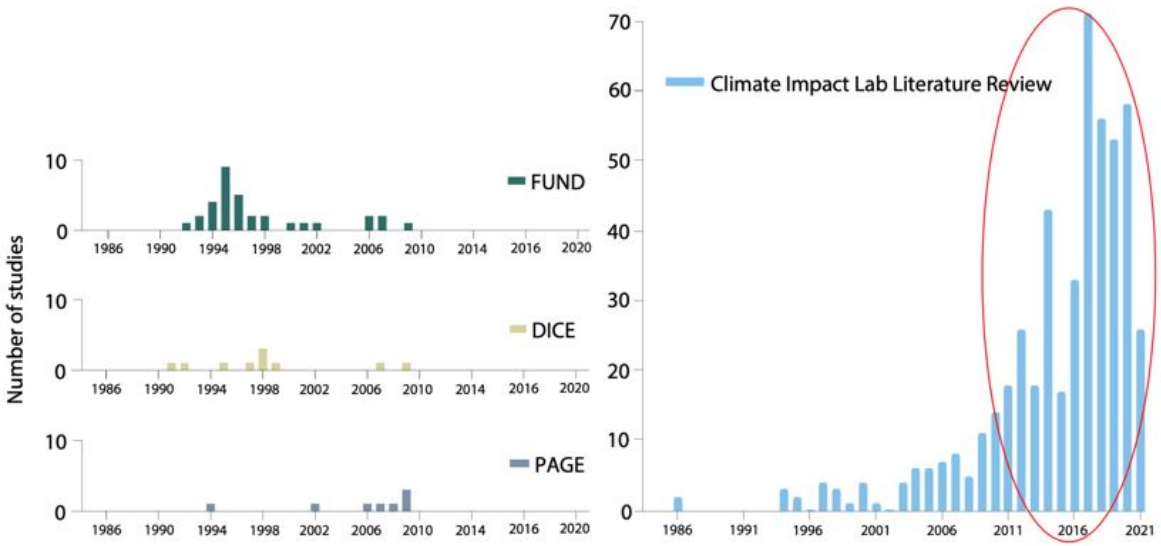
- "we follow the calibration approach of Golosov et al. (2014) which is based on Nordhaus (2008)"



Source: Cropper 2023, based on Climate Impact Lab

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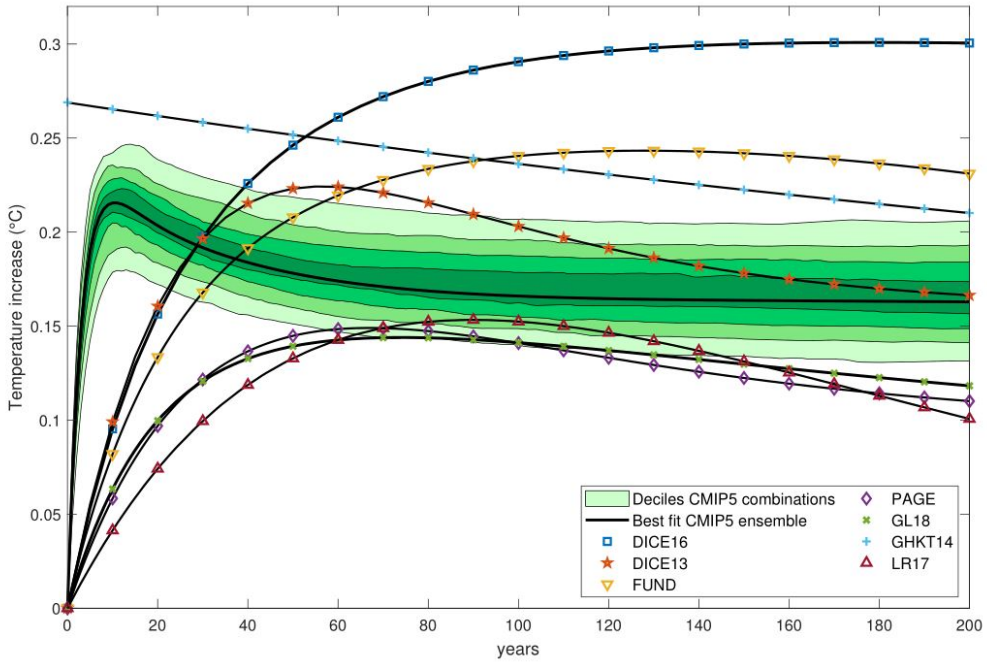
- Timing: correct that temperature effects are felt soon



Source: Dietz, van der Ploeg, Rezai and Venmans 2021 *JAERE*

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Definition damage function: a mapping from physical change (e.g., Δ °C) to economic outcomes (e.g., Δ % GDP)

- Overall magnitude: from first principles to climate econometrics and beyond
- Timing: correct assertion that temperature effects are felt soon
- Mechanism: levels vs growth debate from climate damages - how do we know whether damages mainly work through level or growth of TFP? (Burke, Hsiang, Miguel 2015 *Nature*; Casey, Fried, Good 2023 *IMF Economic Review*)

Smaller comments

Additional literature

- Diluiso, Annicchiarico,Kalkuhl and Minx 2021 *JEEM*
- Carattini, Heutel, and Melkadze 2021

Calibration

- Unclear if calibration to US economy, EU economy, or a stylized global setting

Model extensions

- What would be the impact of heaving decarbonized vs carbon-intense energy sectors?