Discussion of

Global Economic Impacts of Physical Climate Risks

by R. Fernando and C. Lepore

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*The views expressed here do not necessarily represent those of the Bank of England or of any of its Committees.

This paper

Analysis:

1. **Estimate productivity impacts** of chronic and extreme physical risks using firm-level and geospatial data across multiple countries and sectors.
2. Assess the impact of floods on firms' physical capital and their persistent effects on total factor productivity (TFP).
3. Project sectoral productivity changes up to 2100 under SSP 1-2.6 and SSP 2-4.5.
4. **Quantify macroeconomic impacts** of TFP changes by accounting for regional/sectoral heterogeneity and general equilibrium (GE) effects using the G-Cubed model.

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Main Results:

- All sectors face losses from physical risks, with varying magnitudes across time and regions.
- Agriculture is the most vulnerable sector; services are the least affected.
- Global GDP losses in 2100: **2.4% under SSP 1-2.6; 6.4% under SSP 2-4.5**. Europe experiences the least impact, while Canada is the most affected.

My comments

- **Damage estimates and GDP impacts**:
  - Place these results in the context of existing literature.
  - Test the robustness of the identification strategy and disentangle the impact of different channels.

- **Macroeconomic simulations**:
  - Clarify the role of anticipated vs. unanticipated shocks and the role of expectations.
  - Clarify assumptions post-2100 and transition toward a new steady state.
  - Focus on the economic mechanisms beyond macroeconomic impacts.

Previous literature

Large variations in damage estimates:

- Strand 1: follows from Nordhaus (1992): around 3% GDP loss by 2100.
- Strand 2: follows from Burke et al. (2015): 20–30% GDP loss by 2100.

Key Channel: The divergence arises from **whether damages affect GDP levels or growth rates.**

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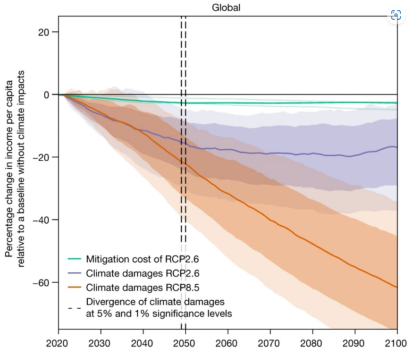
Recent evidence - Two additional channels:

- *Kots et al., 2024:* **Accounting for additional climatic indicators** (beyond temperature) increases estimates by around 50% and leads to stronger regional heterogeneity.
- *Bilal and Kaenzig, 2024:* **Global temperature shocks** have far greater impacts than local ones on productivity (-4% vs. -0.25%) and capital depreciation.

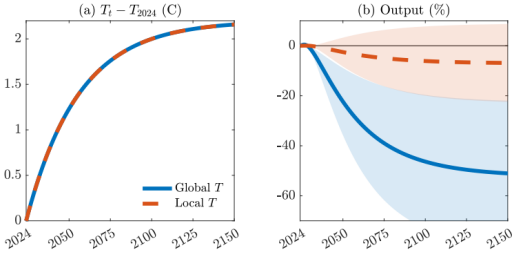
Previous literature

In 2100: 19% GDP losses



Source: Kots et al., 2024

In 2100 under global temperature damage functions: 46% GDP losses, 34% productivity losses



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- Justify the choice of including floods while excluding all other natural disasters and show results without the impact of floods.
- Discuss potential missing channels (e.g. tipping points) and the validity of extending historical climate-economic relationships into long timescales.

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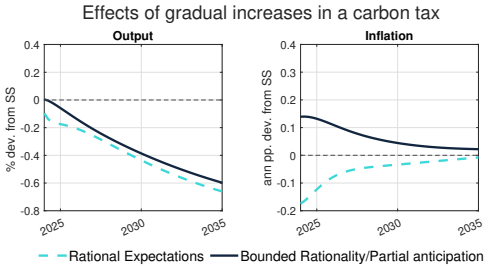
Why this matters:

- Anticipation of future shocks plays a significant role in DSGE models:



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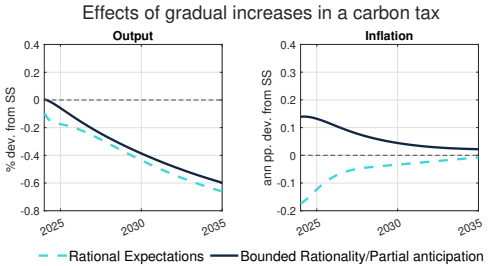

Suggestion:

- Clarify if shocks are expected, how the model is solved, and how expectations are defined.

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Key questions:

1. Is it realistic to consider climate shocks—especially chronic risks—as temporary?
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Suggestion:

- Explore if feasible to converge to new equilibria under each SSP scenario instead of assuming a return to the baseline.

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- **Stranded assets:** Define "stranded assets" in this context and better describe the feedback mechanisms through which they affect investments and GDP.
- **Trade patterns and spillovers:** Exploit the multi-region model to delve deeper into the role of trade dynamics and cross-regional spillovers in shaping the quantitative results.

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This paper:

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Overall, strong foundations for a promising publication. Best of luck!

Additional (minor) comments

- **Sector Classification:** The construction sector is classified as *services* in the empirical estimates but as *mining* in the model. Clarify the rationale behind these classifications for consistency.
- **IAM Classification:** The categorization of Integrated Assessment Models (IAMs) into three groups is not widely accepted. Is this classification necessary? If so, examples for *biophysical impact models* and *policy guidance IAMs* should be provided.