THE GRADUATE INSTITUTE GENEVA

CENTRE FOR INTERNATIONAL ENVIRONMENTAL STUDIES

Macroeconomic modelling, climate risks and stranded assets

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Policy Panel 1: Macroeconomic modelling of climate change: current situation and challenges

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Modeling climate risks and uncertainty

- Quantifying climate risks and their economic impact is critically important for policy decisions
  - Physical risks
  - Transition risks
- But modeling is very complex due to **pervasive uncertainty**
  - Climate tipping points
  - Policy and economic uncertainty
- Recent criticisms of standard IAMs measuring how climate damages affect economic welfare, as most IAMs are often deterministic
  - DICE-2016 by William Nordhaus, FUND, PAGE

Modeling climate risks and uncertainty

- Several models now allow for stochastics and include **climate system and policy risks and uncertainty.** These have huge implications for the size of the damages and carbon pricing policies (Cai et al, 2019, JPE)

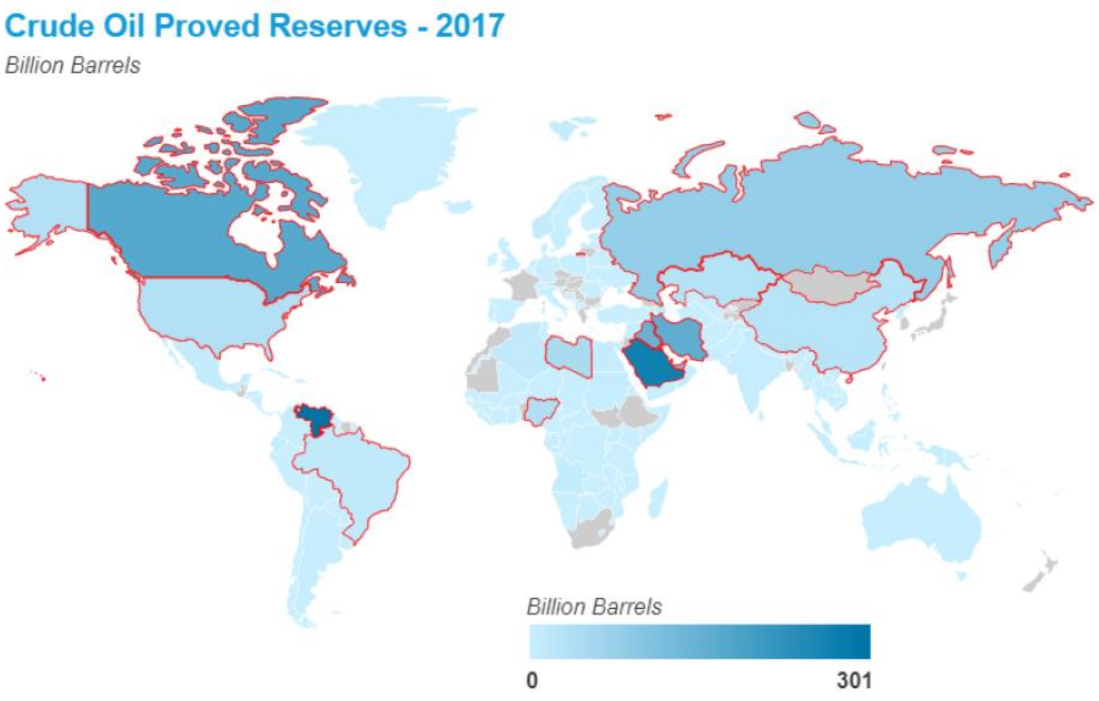
- Of particular relevance for emerging economies are **recent models linking climate policy uncertainty to stranded assets**
    - Risk that unanticipated climate policy could strand oil reserves
    - E.g. van der Ploeg and Rezai (2020): risks of climate policy tipping on market valuation of oil companies

Stranded assets

- Financial markets of oil, gas and coal-based economies are prone to instability emanating from policy-induced drop in market valuation of fossil-fuel based industries

- 4/5 of coal, 1/3 of oil and half of gas reserves must be kept in the ground to achieve the 2C target (McGlade and Ekins, 2015)

- $2.3 trillion of upstream projects in oil and gas industry (1/3 of business-as-usual projects in 2025) are inconsistent with current global climate commitments (Carbon Tracker, 2017)



Climate policy risk and stranded assets

- Theoretical and empirical insights on channels of policy-induced drop in market valuation of fossil-fuel companies (vdPloeg and Rezai, 2020; Barnett, 2020)
  - Costly adjustments of exploration capital stocks
  - Significant amount of fossil-fuels reserve may be worthless → «carbon bubble»
  - Green Paradox: «race to burn the last ton of carbon» → run on oil, falls in spot price, lower valuation of oil companies

- Future work?
  - Transmission channels of **climate policy risks to bank non-performing loans** in fossil fuel-exporting countries - as quality of bank loan portfolios is closely related to companies' performance.
  - Sectoral analysis useful to inform larger macro models