

# **Financial frictions, technological adoption, and corporate emissions**

Banerjee, Capelle, Kirti and Villegas-Bauer

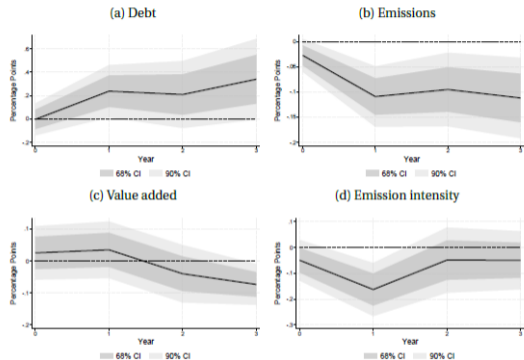
Discussion by Diego Känzig  
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*IMF Macro-Financial Research Conference*

## A quick summary

- How do **financial frictions** influence the effectiveness of **carbon pricing**?
- New evidence from large panel of European firms
  - 3,200 manufacturing firms subject to EU ETS from 2005-2021
- Develop **heterogeneous-firm model** with capital vintages and financial frictions
  - Match empirical evidence
  - Perform counterfactual analyses

# Main takeaways



After increase in carbon price

- **Unconstrained firms** reduce emissions more
- Increase their debt more
- Similar effect on value added

⇒ Model matches these implications via **pecking order** of vintages: constrained firms far away from optimal  $K$  prioritize more  $K$  over new, cleaner vintage

- **Great paper** on a very timely and important topic!
- **Complete package** with
  - novel micro-macro evidence
  - and carefully disciplined quantitative model
- Important **policy implications** given interest in green finance

## Overview of my comments

1. Measuring financial constraints and controlling for other heterogeneity
2. Direct evidence for model mechanism
3. Adoption vs. innovation

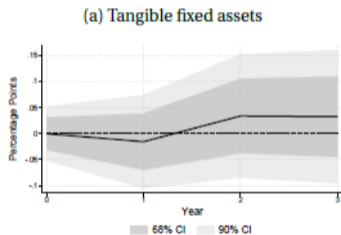
# Measuring financial constraints

- Financial constraints **difficult** to measure
  - Different proxies used in the literature: leverage, size, age, ...
  - Results based on leverage less clear cut, what about other proxies?
- Finding that productive firms have lower emissions intensity in line \w Kim (2025)
  - But how to reconcile that Kim finds (based on leverage) that more constrained firms are cleaner?
- Given focus on financial frictions, some **more robustness** helpful

## Accounting for other heterogeneity

- Are the results robust to accounting for **other heterogeneity**?
- Useful to run some triple interactions with **other** potentially relevant **variables**
  - One specific concern: firms differ in their **free allocation** of allowances
  - Firms with a large share of free allowances may reduce emissions by less
  - Potentially problematic if **correlated** with degree of financial frictions
  - Can be accounted for using data from ETS registry

# More direct evidence for model mechanism



- No differential impact on investment
- But may be masked by substitution between green and brown investment
- Would be nice to have some **direct evidence** on unconstrained firms upgrading their vintages
  - One idea: Look at firms' earnings conference calls and whether they discuss green investments more after carbon policy shock



## Adoption vs. innovation

- Model-implied costs of carbon price increases large!
  - Broadly consistent with estimates in Känzig (2023)
- But these are shorter-term impacts, in **longer term impacts** likely **lower** because of **green innovation**
- Beyond the scope of this paper, but maybe useful to discuss

- How are the confidence bands computed? Useful reference: Almuzara & Sancibrián (2024)
- A useful, more financy, reference to engage with: Pedersen (2025)
- Would be nice to tighten the connection between the empirical and model IRFs
  - From p.35 I understand you match the magnitudes broadly, but probably not the shape?

## To sum up

- **Great paper** improving our understanding of **carbon pricing** and **green finance**
- Interesting empirical results
- Convincing quantitative modeling effort with important policy implications