Comments on « Carbon pricing and credit reallocation »

by J. Arlinghaus, C. Bittner, M. Götz and N. Koch (2023)

Bundesbank Spring Conference, 11-12 May 2023

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Disclaimer: opinions expressed are the author's own and not necerssarily reflect the views of the Banque de France or the Eurosystem.

This paper

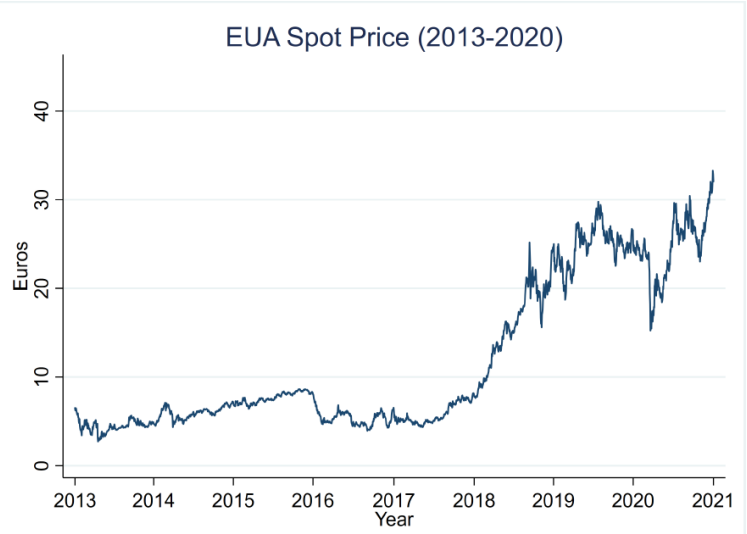
- Investigating interplay between reform of EU cap-and-trade scheme for carbon emissions (EU-ETS), credit demand by ETS participants and bank credit supply to ETS firms following ECB's NIRP.
- Simple partial equilibium model of firm profits: credit demand
  - firms covered by EU-ETS demand more credit in order to invest in low-carbon tech or purchase allowances upfront if rising carbon price expected
  - Investment in low carbon tech increases profitability of these firms
- Empirical test using German credit register (2013-2015Q1): credit supply
  - June 2014 NIRP used as instrument for identifying positive credit supply shock by high-deposit banks
  - DDD regressions: more credit for ETS firms (than for non-ETS firms) by high-deposit banks after NIRP. Rationale: ETS firms are *less* risky, cf. model.

Some context: EU-ETS Phase 3 and carbon pricing

- Exploratory phases (2005-2007, 2008-2012): price almost zero
- **Phase 3 (2013-2020)**
  - Cap in allowances decreases by 1,74% annually
  - Allowances distribution: auctions instead of free allotment
  - Free permits: from 80% to 30% in 2020 (manufacturing), no free permits for utilities (with exceptions)

➢ Many firms facing a permit shortfall (FA/VE<50%)

➢ **Rocketing carbon price in *2018***



Literature: impact of cap-and-trade and banks

- Bolton, Lam, Muûls (2022): carbon price increases during phase 3 (notably 2018-20) $\Rightarrow$ lower stock returns for firms with *permit shortfalls*.
  - but not much real effects (decrease in regulated emissions but not scope 1 or 2, no visible impact on investment and R&D)
- Colmer, Martin, Muûls and Wagner (2020): Phase 2 of EU-ETS induced a reduction in emissions by French regulated firms (DinD). Anti-pollution investments reduced carbon intensity of VA, not VA.
- Ivanov et al (2023): passage of cap-and-trade bill in California $\Rightarrow$ banks reduce their exposure to high-emitting firms (facing lower future profits) by cutting credit lines and granting shorter maturity loans.
- Degryse, Roukny, Tielens (2022): innovative green firms exert a negative externality on brown firms. Lenders with a large exposure to brown firms (legacy position at risk) ration credit to green firms.

Some context: Eurosystem's NIRP

ECB cuts DFR to -0,10% in June 2014. Available evaluations:

- Heider, Saidi, Scheppens (2019): NIRP induces high-deposit banks to lend *less* (syndicated loans) and to increase *risk shifting*.
- Bottero et al (2022): Italian banks with higher net interbank assets ex ante lend more to firms. Increased *risk taking* when the banks are lowly capitalized, but no zombie lending.
- Bittner et al (2022): high-deposits German banks *increase* their lending to *risky*, not safe firms.
- Altavilla et al (2022): euro area banks pass NIRP on to negative rates on (large) corporate deposits, prompting firms to invest more.

NB: here, German HD-banks *supposed* to lend more and suggestive evidence that take less risk when tilt lending towards EST firms. Consistent?

Main comment: what is the main research question?

- **Q1: does rising carbon price push ETS firms to invest in clean tech?**
  - Cf. theory part. Is borrowing always needed here?
  - Treated firms = ETS firms with ex ante permits shortfall (low annual ratio free allowances/emissions) vs Control firms = other ETS firms
  - Dependent variable: CAPEX/A, R&D/A, CO2 emissions…
  - Price shock:
    - 2013 = expected price increase (switch to phase 3)
    - 2018 = realized price increase

Caveat: done already to some extent, cf. Bolton, Lam and Muûls (2022), Colmer, Martin, Muûls and Wagner (2020)

Research question? (2)

- **Q2: do financial constraints impede decarbonization of (most) polluting firms in a (constraining) cap-and-trade scheme?**
  - Idea: possible conflict between incentives within ETS and credit rationing by some banks over some period of time
  - Most polluting ETS firms may be firms with permit shortfalls, more exposed to carbon price surge (lower profits). Hence, more difficult for them to raise money from banks (cf. Ivanov et al., 2023)
  - May explain why carbon price increases not associated with more investment by shortfall firms in Phase 3 (cf. Bolton et al, 2022)

Research question (3): tackling Q2 in three steps

- **Step 1: do "treated" (permit shortfall) ETS firms need more credit in phase 3 (when carbon price rises) ?**
  - DinD regression of bank-firm credit on dummy for permit shortfall (interacted with carbon price inflation or cross section around 2018), controlling for bank FE
  - Alternative DV: use credit rationing indicators from SAFE?
- **Step 2: are shortfall ETS firms financially constrained during phase 3?**
  - Standard firm-level metrics of FC: high leverage, no dividend payments, high KZ index…

Research question (3): tackling Q2 in three steps

- **Step 3: Does NIRP relax financial constraint to some exent by inducing positive credit supply shock?**
  - Idea: what if main bank = bank with high ratio of retail deposits to assets during NIRP (2014-2019)?
  - ➢ Run preliminary test of credit supply shock: Khwaja-Mian-type DinD regression of bank-firm credit on dummy for HD banks (All manuf and energy firms, ETS, non-ETS…)
  - ➢ Main test:

$$Y_{ft} = \beta . SHORTFALL_f . HDMAINBANK_f . POST_t + \cdots$$

where Y=[CAPEX, R&D, GHG emissions…]

  - Caveat: ex ante assortative matching between firms and banks?

Other comments

- Model:
  - Why impose clean-up costs on non-ETS firms?
  - Other modelling approaches may be better advised for credit supply: Holmström-Tirole (1997) set-up (cf. Degryse et al., 2022)?
- Descriptive stats on banks in your sample would be welcome
- Regressions:
  - Why don't you control for firm covariates in columns 1-2 of regression tables? Include also firm size. Industry FE > firm FE ?
  - Table 2, col. 1 (raw data): no average effect of *Post*D/A; lower* average credit exposure of high D/A banks to ETS firms… - Table 6, col. 1 (matched data): no average effect of NIRP, nor of *Post*D/A*…
  - Explain why such short-lived impact (2 quarters) in Figure 1

Conclusions

- A very stimulating project tackling a potentially important issue as EU-ETS faces new upcoming reforms
- Preliminary version at this stage: right time to sharpen main research question
- Would advise you to focus on empirics or split paper.

Thank you!