

Discussion

The Road to Paris: stress testing the transition towards a net-zero economy

By Emambakhsh, Fuchs, Kördel, Kouratzoglou, Lelli, Pizzeghello, Salleo, Spaggiari

The dual face of carbon emissions: transition risk-adjusted probability of default

By Cugliari, Iannamorelli, Vassalli

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** The opinions presented in these slides are those of the author and do not involve Banca d'Italia.*

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Research question, data and empirical setting

- **Research question:** *impact assessment of different transition paths towards firms, households and financial intermediaries (banks & non-banks)*
 - **Data:** *unique granular dataset with the merge of several data sources.*
(Orbis, iBACH, Urgentem, AnaCredit, NGFS, BMPE macroeconomic projections, IRENA (2021), IPCC (2022), Eurostat)
 - **Empirical setting:** *medium-term scenarios focusing on transition risk and energy developments over the next 8 years*
- ➔ *Models to derive firms' probability of default (PD) and households' credit quality deterioration (CQD)*

$$\bar{PD}_t^{i,s} = \alpha + \beta_1 \text{Leverage}_t^{i,s} + \beta_2 \text{Profitability}_t^{i,s} + \epsilon_t^i$$

$$CQD_t^e = \beta_0 + \beta_1 \text{Interest rate}_t^e + \beta_2 \text{Residential real estate price}_t^e + \beta_3 \log(\text{Total debt}_t^e) + \beta_4 \log(\text{Discretionary income}_t^e)$$

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Main results

- 1. Credit risk increases due to the transition for firms and households. Highest risk in the late-push scenario but with a decreasing trend*
- 2. Accelerated and delayed transition lead to similar risk level by 2030, but with a decreasing trend in the former case*
- 3. Heterogeneity across sectors: mining, manufacturing and electricity sectors the most affected*
- 4. In 2030, increase in the annual expected losses for banks driven by both macro developments and climate transition scenarios*

The dual face of carbon emissions: transition risk-adjusted PD

Research question, data and empirical setting

- **Research question:** *impact assessment of carbon pricing on non-financial firms' creditworthiness*
 - **Data:** *unique dataset with firm-level emission from EU-ETS merged with financial statement from Cerved and credit relationship data from National Credit Register*
 - **Empirical setting:** *stochastic simulation of EU-ETS carbon price used to determine firms' PD with a full financial statements recalculation (baseline and stressed scenarios)*
- ➔ *Definition of extra costs (positive or negative) and use of the BI-ICAS model to estimate firms' PD*

$$EC_{i,t} = \text{ExtraEUA}_{i,t} \times (\hat{P}_{EU-ETS,t+1} - P_{EU-ETS,t}) >< 0$$

The dual face of carbon emissions: transition risk-adjusted PD

Main results

1. *Firm-level EU-ETS data allows for a more accurate transition risk analysis*
2. *Sectoral data often underestimate risks for high-emitting firms*
3. *Scenario analysis based on EU-ETS price volatility could be more sensitive than carbon tax simulation on firms' credit worthiness*
4. *The methodology allows for both rating upgrade and downgrade*





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Main contributions

1. *Huge combination of different data sources and scenarios (nice job!)*
 - ➡ *Combining latest macro-economic prediction with NGFS scenarios*
2. *From emission-based to energy based modelling of the transition*
 - ➡ *Considering energy mix and assessing impact of different energy sources pricing paths*
3. *Sectoral dynamics for the green transition (effect on revenues and value added)*
 - ➡ *Winners and losers*
4. *Bottom-up modelling of green investment using mitigation cost (IPCC 2022)*
 - ➡ *Very useful for financial statements forecast*

The dual face of carbon emissions: transition risk-adjusted PD

Main contributions

- 1. Different approach compared to traditional climate transition risk stress test*
 -  *Shocks on market carbon price different from carbon tax approach*
- 2. 12 months temporal horizon in line with standard credit scoring models*
 -  *Integration in banks' PD model?*
- 3. Sectoral data often not precise for individual-firm assessment*
 -  *Sectoral Nace 2-digits emission data underestimate emissions for high-emitting firms*
- 4. Firms could have financial benefits from trading ETS-EUA certificates (well done!)*
 -  *Winners and losers*

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Some suggestions

1. *Exploit EU-ETS to increase firm-level data and avoid potential double-counting*
➡ *Sectoral data often not-precise for high emitters (Cugliari et al)*
2. *Cost pass-through assumption too conservative (no pass-through of climate costs)*
➡ *Distinguish between short-term price shocks with no pass-through and long-term effects with pass-through to revenues (one-year lag in order to adequate revenues?)*
3. *Further elaboration on the firms' PD model*
➡ *Important risk dimensions not considered in the PD model (liquidity ratio, debt sustainability ratio)*
4. *Shouldn't green investments be considered also among firms' total assets?*
Relationship between Scope 3 and capex?

$$\text{Leverage}(t) = \frac{\text{Debt}(t) + \text{Green Investment}(t)}{\text{Total Assets}(t) + \text{Green Investment}(t)}$$

$$\begin{aligned} \text{Green Investment}(t) &= \text{Sum}(\text{Scope1}, \text{Scope2}, \text{Scope3})(t) * \text{IPCC}(2022) \end{aligned}$$

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Some suggestions

1. *Considering transition plans with a quantification of green investments to achieve emission reduction targets*
 - ➡ *Exploring ECB's green investment quantification methodology (Emambakhsh et al)*
2. *Use the observed price for EUA to align projections to the effective evolution of EUA price and consider the annual reduction of free allowances to anticipate the EU-ETS effect on the new firm's financial statement.*
 - ➡ *Useful for single-name rating and financial statement projection*
3. *Further elaboration on the EUA price determinants*
 - ➡ *From a volatility market based approach to a factor model approach*
4. *Using a factor model approach to investigate the effect of different transition scenario on EUA price and, consequently, on firms' credit worthiness*
 - ➡ *Integration of different energy price projections used by Emambakhsh et al*

Final remarks

General comments

- *Two very interesting, well written and original papers*
- *Important topic: climate stress testing and integration of transition risks in credit risk assessment models*
- *Both papers combine intuitions from theory with carefully executed empirical analysis*

Last consideration..

- *Key policy issue: who provides funding to brown firms that are responsible for the vast majority of carbon emissions?*
- *Both papers could help to identify the “right” brown firms (best-in-class approach)*

Thank you!

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