

# Climate transition risk and credit risk modelling: evidences from Italy

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## Overview

### Questions: Does climate risk affect credit risk?

- Key questions for **banks**, **credit agencies** and **risk management**
- Focus on **Paris Agreement (PA)** and **transition risk (GhG)**

### Data:

- quarterly ratio between the flow of new non-performing loans and the stock of **non-performing loans** (i.e., past due, unlikely, and doubtful loans) at the end of the previous quarter at **Italian banks** from 2005Q3-2020Q4 for **all NACE Sector**
- quarterly greenhouse gas (GHG) emissions in the European Union (EU) by emitting economic sector (ATECO 2007)
- Macroeconomics and financial variables from Eurostat and Bloomberg

### Coverage: Italy

**Methods:** Regression Discontinuity Design (RDD) (Thistlethwaite and Campbell, 1960)

**Results:** evidence or several effects related to 2015 PA

- Overall, high emissions are to some extent associated with higher default risk under the 2015 Paris Agreement (COP21).

**Implications:** The increase in non-performing loans (NPLs) could lead to credit rationing by banks with a credit banking business model.

Figure 1: Italian Default Rate by NACE Ateco 2007

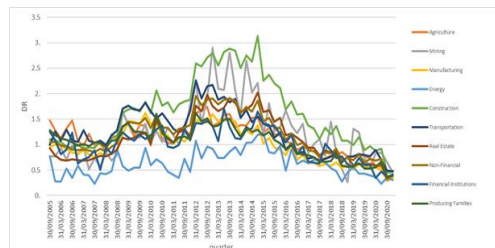
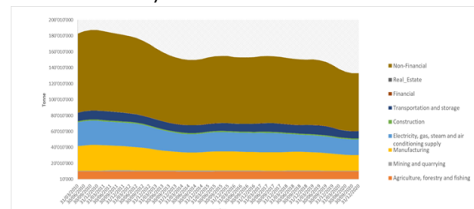


Figure 2: Italian GhG emissions by NACE activity



## Methods

- To test our hypothesis, **Regression Discontinuity (RD)** (Thistlethwaite and Campbell, 1960) was deemed appropriate because this methodology considers the discontinuity of a series of data upon the occurrence of an event that structurally changes the trend. Such an event or cut off point would be, in our study, **the Paris Climate Agreement (PA)**.
- Using and solving the **Merton-Vasicek model**, according to Monnin (2021), we account for **transition risks** in a **top-down approach**.
- Therefore, we develop a specific **satellite credit risk model** that links the default rate (DR), macro variables, and climate proxies
- For robustness purpose we also run the model to the **financial sector (IF)**, to the **non-financial sector (NF)** as a whole, and finally to **producer households (FP)**.

## Results

- As expected, GHG emissions from Italy's "brown" sectors are significantly and **positively correlated** with their **default rate (credit risk)**
- There is a **positive** relationship **between transition risk, as proxied by sectorial GHG, and sectorial credit risk, as proxied by sectorial default rate**.
- For **all sectors** considered, except **mining**, there isn't an improvement in credit risk from 2015 (PA).

## Discussion

- Since the Paris Agreement, the default rate of Italian companies has deteriorated.
- A default rate driven by a stressed climate and macroeconomic scenario implies a **lower DtD** than the original one and thus a **higher credit risk**.
- Banks or credit agencies should incorporate **transition risk considerations** - to some extent - in their **credit risk models (STA or A-IRB/F-IRB)**.

## Policy Implications

- Although carbon-intensive sectors are the first to feel this effect, credit rationing could affect all sectors regardless of their carbon intensity. This could translate into higher interest rates or quantitative rationing of credit.
- Finally, we encourage the role of central banks in the adoption of important climate policies, due to the consequences in terms of revision of the credit policy aimed at containing regulatory costs and reducing credit risk.