

# The carbon content of Italian loans

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# Research question

- 1. What is the exposure of the Italian financial system towards transition risks?**
- 2. Which sectors are particularly at risk?**

- 1. Air emissions accounts (Eurostat):** GHG emissions for Kyoto gases (CO<sub>2</sub>, N<sub>2</sub>O, CH<sub>4</sub>, HFCs, PFCs, and SF<sub>6</sub>); residence principle; direct and indirect emissions from energy use (i.e. scope 1 + scope 2); no product-level emissions (very important but no up-to-date official estimates available plus issues with complexity and quality)
- 2. Gross value added (Eurostat);**
- 3. Central Credit Registry/Supervisory reports (Banca d'Italia):** granular data on all loans (including syndicated loans) to any institutional units (households and firms) operating in Italy from any bank (including > 80 foreign banks) or financial institutions operating in Italy (<> insurances, pension and investment funds);
- 4. Consolidated banking data 2 (ECB):** aggregate consolidated balance sheets of all EU banks, with details per NACE 1-digit sector

# Three methods to assess the exposure of loans to transition risk

1. loan carbon intensity (LCI);
2. carbon-critical sectors (CCrS);
3. climate-policy-relevant sectors (CPRS): see Battiston et al. (2017).

# Loan carbon intensity (LCI)

LCI answers a simple question:

“How many emissions are embedded in each euro that an average bank lends to a specific industry?”

$$\text{LCI}_{s,t} = \frac{E_{s,t}}{L_{s,t}}$$

where

$E_{s,t}$  Emissions of sector  $s$  at time  $t$

$L_{s,t}$  Outstanding loans of sector  $s$  at time  $t$

Btw 2010 and 2018, industries with an above-the-median LCI accounted for 34 per cent of all loans and 93 per cent of all emissions

# LCI varies greatly across industries...

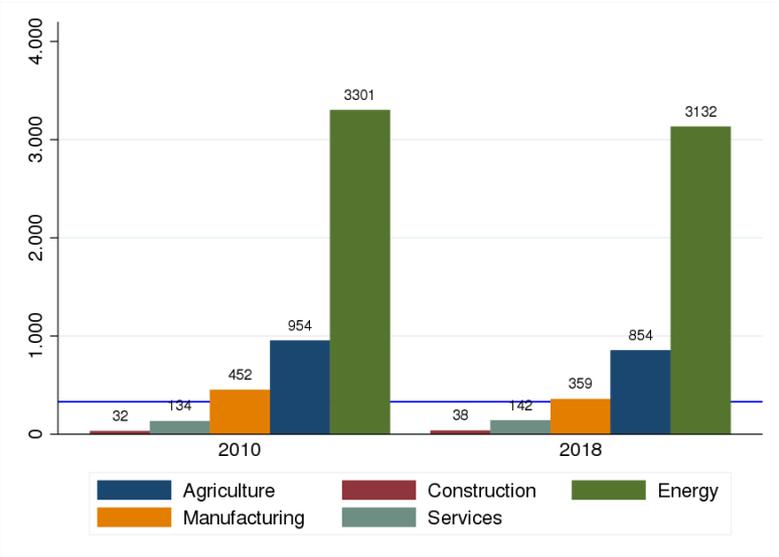
## Carbon intensity of the loans' portfolio of the 10 most emitting sectors

Sector	2010	2014	2018
Electricity, gas, steam and air conditioning supply (D)	3.773	2.510	3.444
Crop and animal production, hunting and related service activities (A01)	960	867	860
Manufacture of other non-metallic mineral products (C23)	2.307	2.082	1.914
Sewerage, waste collection, treatment and disposal activities; materials recovery and Remediation activities and other waste management services (E37-E39)	3.120	2.920	3.069
Water transport (H50)	1.851	1.562	2.831
Manufacture of coke and refined petroleum products (C19)	2.080	3.023	2.788
Land transport and transport via pipelines (H49)	910	973	792
Manufacture of chemicals and chemical products (C20)	1.340	1.351	1.411
Manufacture of basic metals (C24)	1.110	882	747
Wholesale trade, except of motor vehicles and motorcycles (G46)	118	135	126
<b>Total economy</b>	<b>351</b>	<b>318</b>	<b>327</b>

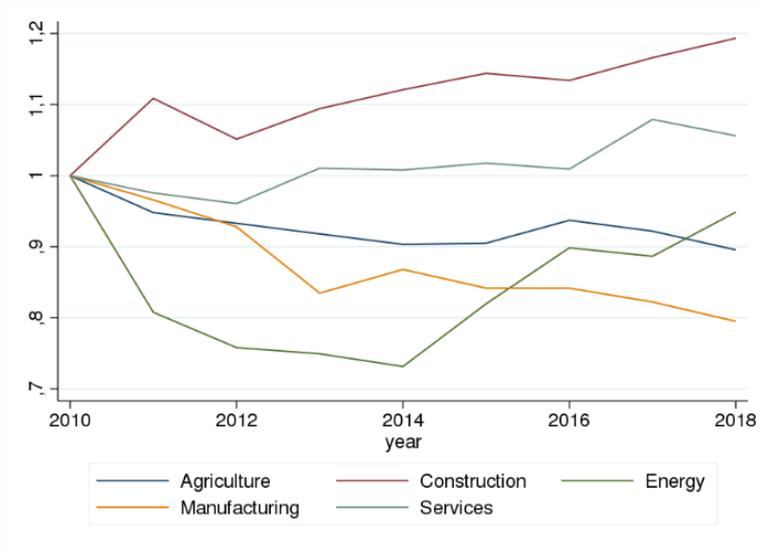
# ...and it is easy to compute and communicate

## LCI per main economic sector in Italy (gCO<sub>2</sub>e/€, base year 2010)

a) LCI in selected years



b) Trend 2010-18



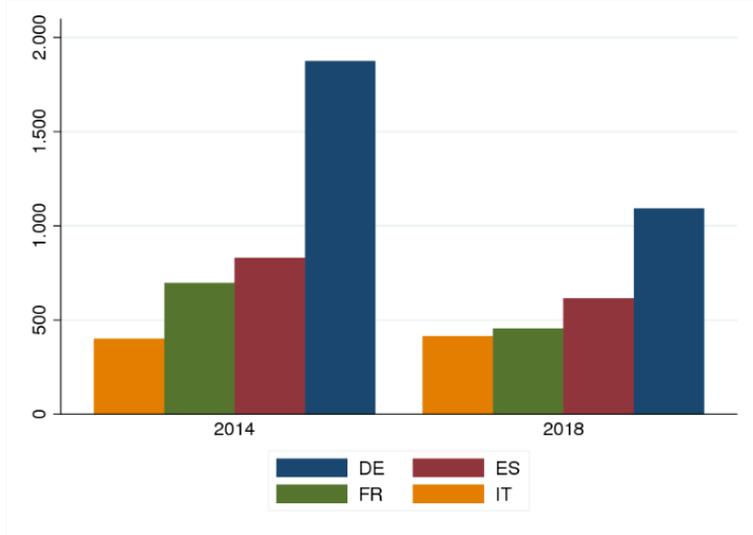
Sources: Based on Eurostat and Bank of Italy's Central Credit Register data.

LCI average in Italy between 2010-2018: **330 gCO<sub>2</sub>e/€**

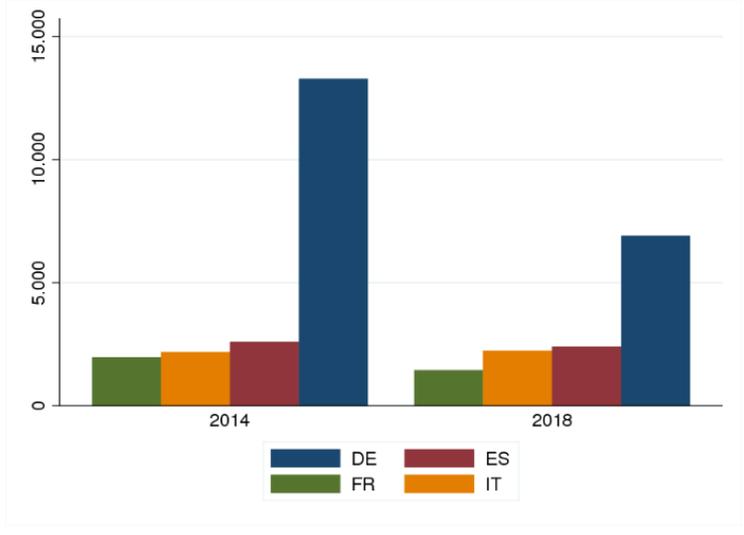
# ... allowing also international comparisons

## LCI of manufacturing in selected European countries (gCO2e/€, base year 2010)

a) Manufacturing



b) Agriculture

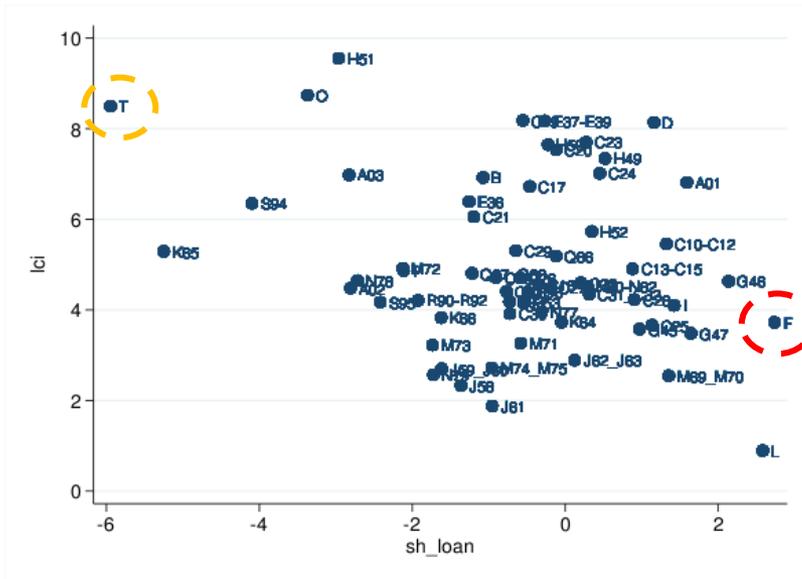


Sources: Based on Eurostat and ECB data

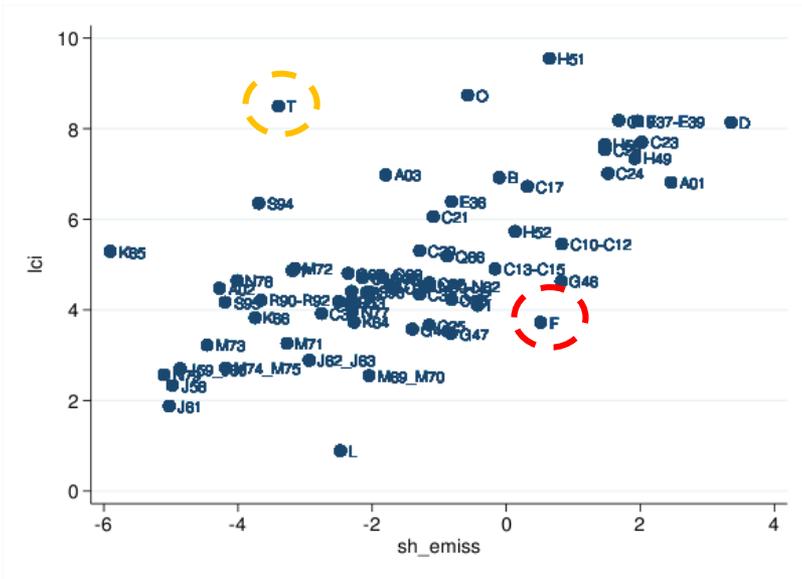
- the LCI of German manufacturing: 2X Spain, 4X Italy.
- differences decreasing due to a steep reduction of the LCI in Germany
- Similar evidence for the agricultural sector

# ... but it is far from perfect

a) Log LCI vs. log share of emissions



b) Log LCI vs. log share of loans



- Not all countries/sectors rely on loans in the same way
- it mixes up two phenomena (e.g. HHs as employers – T and construction - F)

# A possible alternative: carbon-critical sectors (CCrS)

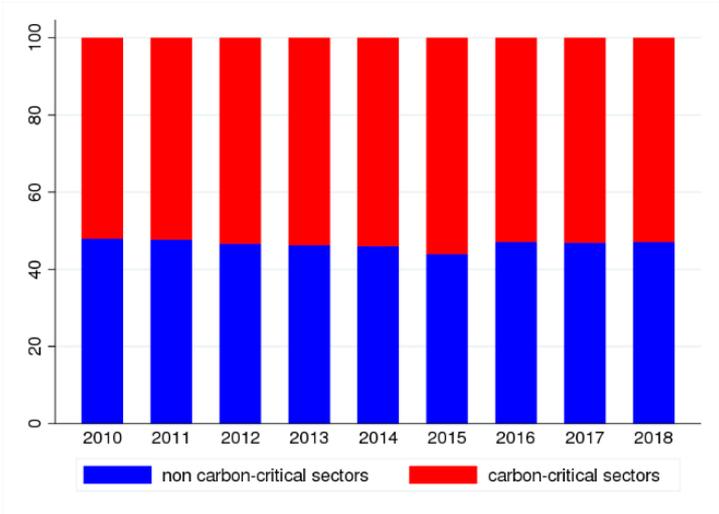
1. Create two separate **rank variables** that provide information on sectors' share of total emissions ( $E_{s,t}$ ) and on the share of total loans ( $L_{s,t}$ ).
2. Take the **simple average** of these ranks ( $avg\_rank_{s,t}$ ), obtaining a measure of the relevance of each sector in terms of emissions and exposition to the financial sector.
3. Define as carbon-critical sectors (CCrS) those whose average is in the **first fifth** ( $q_1$ ) of the distribution of  $avg\_rank_{s,t}$

$$CCrS_s = I\left\{\text{average}\left[rank_t\left(\frac{E_{s,t}}{E_t}\right), rank_t\left(\frac{L_{s,t}}{L_t}\right)\right] < q_1\right\}$$

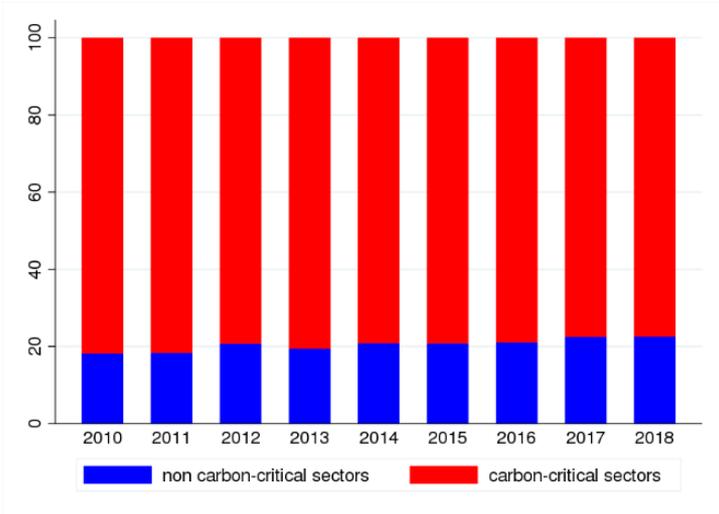
# CCrS account for a sizable part of loans and emissions

**Loans and emissions: CCrS vs. non-CCrS**  
(billions of euro and millions of tonnes of CO2 equivalent)

a) Loans



b) Emissions



Sources: Based on Eurostat and Bank of Italy Central Credit Register data.

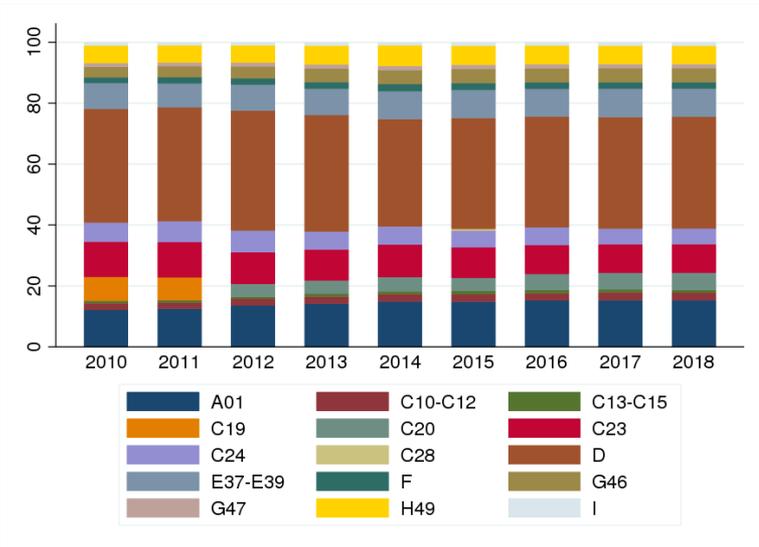
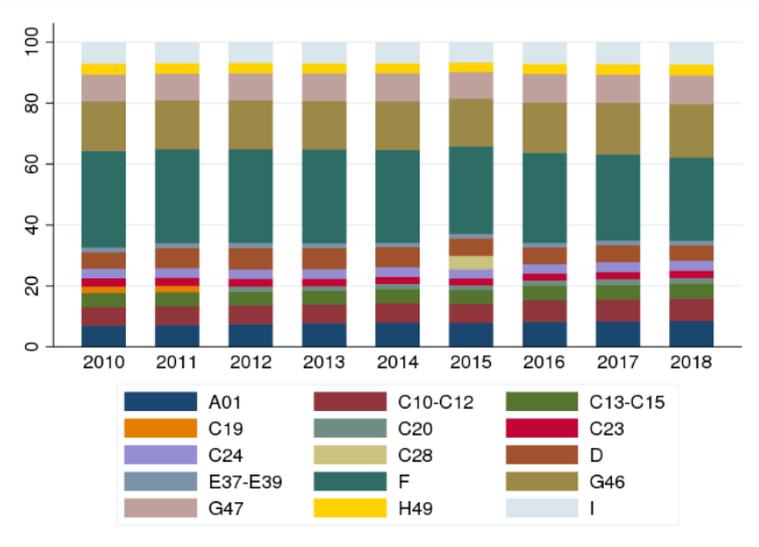
- Concentration: CCrS capture 53% of the loans and 80 per cent of emissions
- Analogue results using carbon GHG per unit of value added for ranking the emissions

# CCrS exposure by detailed sectors

## Loans and emissions: CCrS in detail (percentage points)

a) Loans

b) Emissions



Sources: Based on Eurostat and Bank of Italy Central Credit Register data. The legend of the sectors is in the Appendix.

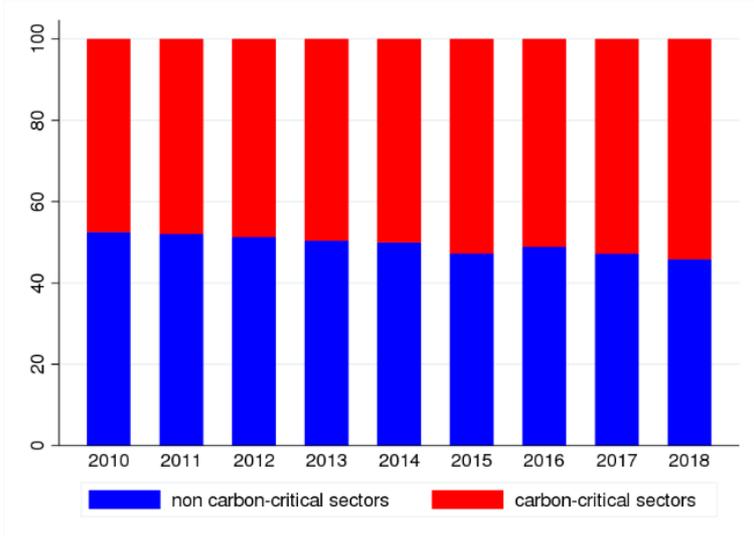
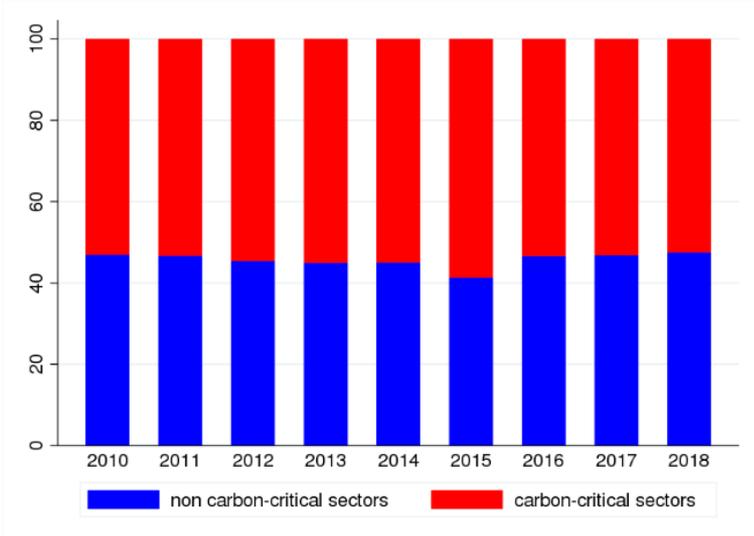
- Construction (F), Wholesale and retail trade (G46+G47) account for one-third of the loans but less than 6 per cent of GHG emissions
- the three most emitting sectors, i.e. energy (D), agriculture (A01) and the manufacture of other non-metallic mineral products (C23), account for half of the emissions but only a tenth of loans.

# CCrS sector exposure by type of intermediary

Exposure of the Italian financial system towards CCrS – by type of intermediary  
(percentage points)

a) Banks

b) Other financial intermediaries



Sources: Based on Eurostat and Bank of Italy Central Credit Register data.

- Slightly decreasing share for banks, increasing for other FIs
- No difference between the 5 biggest groups and other banks or financial institutions

# Summing up...

- Existing literature focuses on equity and bonds; **our work focuses on loans**
- We have devised a simple and transparent method to define an industry-level indicator for the exposure of firms' credit to transition risk.
  - **cons**: sectoral data is a second best;
  - **pros**: most of GHG; dynamic classification, includes loans, scalable to other countries, useful for modelling.
- Results:
  1. Avg. Exposition btw 38% (LCI) and 53% (CCrS);
  2. No difference between 5 biggest banking groups and other banks (or FIs) on average;
  3. sectors more exposed (CCrS): construction, machinery, wholesale and retail trade;
  4. Italy less exposed than other countries (partic. DE);

Ivan Faiella & Luciano Lavecchia (2020) The carbon content of Italian loans, Journal of Sustainable Finance & Investment, DOI: [10.1080/20430795.2020.1814076](https://doi.org/10.1080/20430795.2020.1814076)

# Thank you

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