

# The pricing of green bonds: are financial institutions special?

Serena Fatica, Roberto Panzica, Michela Rancan

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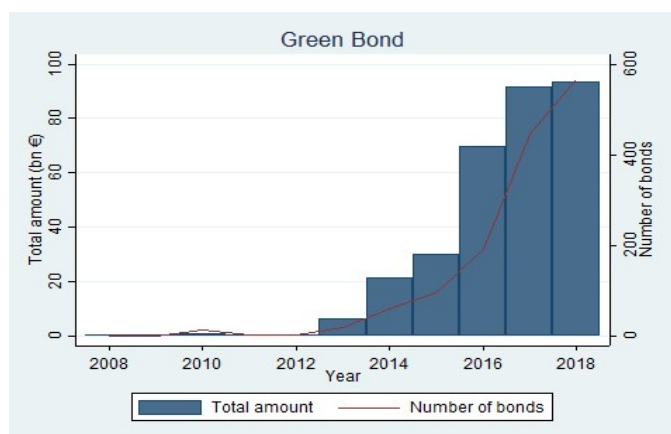
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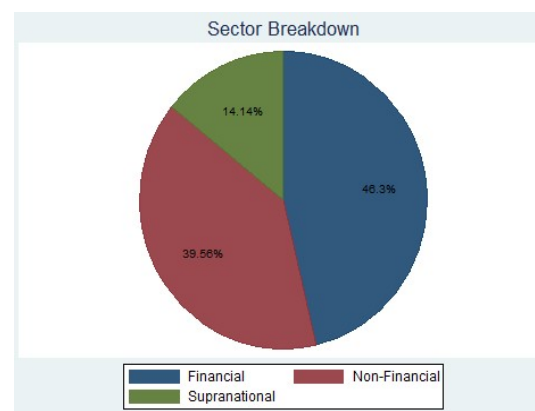
# Motivation

- Paris Agreement, art.2 "aims to strengthen the global response to the threat of climate change... by making finance flows consistent with a pathway towards low greenhouse gas emissions and climate-resilient development"
- One possibility is the **Green Bond Market**, which started in 2007
- Green Bond Principles (ICMA) are voluntary process guidelines that recommend transparency and disclosure and promote integrity in the development of the Green Bond market
- Despite the growing trend, the green bonds account for a tiny fraction of the overall bond market (2.42% in 2018). Different type of issuers are raising money in the green bond market

Total amount and number of green bonds



Total amount by issuer type



# Green bond pricing

- Are green bonds priced differently than ordinary bonds?
  - ✓ Sample: bond issuance data for supranational institutions, financial institutions, corporates from all over the world, period 2007-2018 (Dealogic-DCM)
  - ✓ Econometric model to explain the bond yield at issuance, which allow us to identify the value of the 'green label' (green bond vs an ordinary bond)
  - ✓ Results: Green bonds are issued at a significantly lower yield compared to standard bonds when issuers are supranational institutions or non-financial corporations. But we do not find a premium for financial institutions, including banks. Results are robust to several robustness checks
- Why do we find this heterogenous effect?
  - ✓ In the green bond market signaling matters (additional certification from a second party, repeat issuance...)
  - ✓ Greenwashing vs pure green investment

***Do banks after issuing green bond change their lending decisions?***

# Financial issuers and lending decisions

Bank <i>b</i>	
Assets	Liabilities
Cash	Bond issued
Bonds, Equities	Other debt
Loans	
	Capital

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We test whether banks after issuing a green bond have changed their lending towards less polluting activities. How?

- ✓ Merge bond issuance data with syndicated loan data
- ✓ Exploit data on Greenhouse Gases available at sector-country level (we do not have data at firm level!)
- ✓ Apply a diff&diff setting

# Econometric strategy

- Specification:

$$Y_{bjct} = \alpha + \beta Green\_issuer_{bt} + \lambda Emission\_intensities_{jct} + \gamma Green\_issuer_{bt} * Emission\_intensities_{jct} + u_{bjct}$$

- $Y_{bjct}$ : log(tot. loan volume) industry  $j$  in country  $c$  attains from bank  $b$  in period  $t$
- $Green\_issuer_{bt}$ : dummy variable equal 1 from the time  $t$  bank  $b$  has issued a green bond onwards, zero otherwise
- $Emission\_intensities_{jct}$ : ratio between greenhouse gasses and the value added
- $\gamma$ : parameter of interest
- Set of fixed effects:
  - ✓ Supply side: Bank×Industry, Bank×Country, Bank×Year
  - ✓ Demand side: Industry×Country, Country×Year, Industry×Year
- $u_{bjct}$ : standard errors clustered at bank level

# Data

- Dealscan: syndicated data at loan level indicating the lender(s) and the borrowers (industry and country)
- Eurostat (Air emissions accounts and intensities): data by NACE Rev. 2 activity (64) and country (EU member states, EFTA countries, and candidate countries)
- Dealogic-DCM: green bond data
- Sample:
  - ✓ Extract syndicated loans for the period 2007-2018 extended to borrowers located in the relevant countries
  - ✓ Identify the syndicated structure (lead and participant banks)
  - ✓ Merge bond issuers with lenders by bank names
  - ✓ Merge borrowers with Emission intensities by industry and country
  - ✓ Aggregate the lending amount of each *lead* bank by industry, country, and time
  - ✓ Sample limited to bank-industry-country with non-zero loans in at least two years

# Additional specifications

- Overall lending vs domestic lending: we exclude domestic lending as it could be driven by other factors
- Supply side factors: bank controls (Bank Focus)
  - ✓ Size
  - ✓ Equity/total assets
  - ✓ Ebit/total assets
  - ✓ Long-term funding/total liabilities
  - ✓ Impaired loans/total equity
- Demand side factors:
  - ✓ Country controls (WD): GDP per capita and GDP growth
  - ✓ Industry controls (Orbis): debt to total assets, cash to total assets, intangible assets to total assets, Ebit over total assets

# Results I

	All			Excluding domestic		
Panel A: Amount	(1)	(2)	(3)	(4)	(5)	(6)
Green issuer	0.2958 (0.186)	0.1570 (0.150)		0.3793* (0.205)	0.2528 (0.173)	
Emission intensities	-0.0714** (0.028)	-0.0854** (0.035)	-0.1105* (0.061)	-0.0842*** (0.029)	-0.0837** (0.036)	-0.1925*** (0.068)
<b>Green issuer* Emission intensities</b>	<b>-0.1254*** (0.030)</b>	<b>-0.1492*** (0.031)</b>	<b>-0.0686** (0.034)</b>	<b>-0.1383*** (0.038)</b>	<b>-0.1783*** (0.038)</b>	<b>-0.0952** (0.040)</b>
Observations	65,021	57,066	64,715	49,875	44,108	49,457
R-squared	0.1118	0.2130	0.3367	0.1093	0.1850	0.3156
Adjusted R-squared	0.108	0.163	0.266	0.105	0.131	0.236
Bank FE	Yes	Yes	No	Yes	Yes	No
Country FE	Yes	Yes	No	Yes	Yes	No
Industry FE	Yes	Yes	No	Yes	Yes	No
Year FE	Yes	Yes	No	Yes	Yes	No
Bank-Industry FE	No	Yes	Yes	No	Yes	Yes
Bank-Country FE	No	Yes	Yes	No	Yes	Yes
Bank-Year FE	No	No	Yes	No	No	Yes
Country-Year FE	No	No	Yes	No	No	Yes
Country-Industry FE	No	No	Yes	No	No	Yes
Industry-Year FE	No	No	Yes	No	No	Yes
Bank controls	No	Yes	No	No	Yes	No
Country controls	No	Yes	No	No	Yes	No
Industry controls	No	Yes	No	No	Yes	No

- After having issued a green bond banks decrease their lending toward more polluting activities
- A one standard-deviation increase in the emission intensities yields a **10%** reduction of lending volumes by banks active on the green bond market
- Our evidence complements previous works that investigate the cost of loans (Chava 2014; Delis et al., 2018)



## Results II

Results are confirmed:

- Dependent variable: average amount and dummy variable of lending
- Emission intensities 2: ratio between greenhouse gasses and the output
- Climate-policy-relevant sectors (classifications from Battiston et al., 2017)
- Excluding public-service and financial services industries
- Excluding M&A loans

## Results III

- Results are *not* confirmed when we consider the amount granted both as lead and *participant* bank

	All			Excluding domestic		
Panel A: Any role	(1)	(2)	(3)	(4)	(5)	(6)
Green issuer	0.2585 (0.168)	0.1328 (0.153)		0.3296* (0.185)	0.2218 (0.173)	
Emission intensities	-0.0524** (0.021)	-0.0488* (0.026)	0.0030 (0.048)	-0.0604** (0.024)	-0.0480* (0.029)	-0.0394 (0.047)
<b>Green issuer*</b>	<b>-0.1133***</b>	<b>-0.1264***</b>	<b>-0.0233</b>	<b>-0.1221***</b>	<b>-0.1558***</b>	<b>-0.0449</b>
<b>Emission intensities</b>	<b>(0.029)</b>	<b>(0.025)</b>	<b>(0.027)</b>	<b>(0.034)</b>	<b>(0.028)</b>	<b>(0.030)</b>
Observations	85,751	75,575	85,594	67,640	60,011	67,434
R-squared	0.1014	0.2134	0.3391	0.0996	0.1849	0.3168
Adjusted R-squared	0.0983	0.165	0.274	0.0960	0.133	0.244
Bank FE	Yes	Yes	No	Yes	Yes	No
Country FE	Yes	Yes	No	Yes	Yes	No
Industry FE	Yes	Yes	No	Yes	Yes	No
Year FE	Yes	Yes	No	Yes	Yes	No
Bank-Industry FE	No	Yes	Yes	No	Yes	Yes
Bank-Country FE	No	Yes	Yes	No	Yes	Yes
Bank-Year FE	No	No	Yes	No	No	Yes
Country-Year FE	No	No	Yes	No	No	Yes
Country-Industry FE	No	No	Yes	No	No	Yes
Industry-Year FE	No	No	Yes	No	No	Yes
Bank controls	No	Yes	No	No	Yes	No
Country controls	No	Yes	No	No	Yes	No
Industry controls	No	Yes	No	No	Yes	No

- Are changes in lending behaviour happening too slowly?
- Financial stability requires a smooth transition (i.e. contagion effects from brown companies)