Credit Supply and Green Investments[1]

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[1]The views expressed in the paper are entirely the responsibility of the authors and should not be attributed to the Bank of Italy or Norges Bank.

Research question and motivation

- To avert the most catastrophic effects of climate change, GHG emissions have to be reduced by about 60% relative to 2010 levels by year 2030 (IPCC, 2021)

- To achieve this objective, firms, households and governments need to massively invest in clean technologies to substitute emission-intensive ones

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Does credit supply affect firms' investment in green technologies?

Unclear predictions

- Investment affected by credit supply (Holmstrom and Tirole, QJE 97; Peek and Rosengren, AER 2000; Duchin et al JFE 2010; Cingano et al, RFS 2016; Ferrando et al., JMCB 2019)

- Unclear predictions for *green* investments:
  - Externalities vs profits (Friedman, 1970)
  - Require interventions (Acemoglu et al. AER 2012; 2016)

Unclear predictions

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- Unclear predictions for *green* investments:
  - Externalities vs profits (Friedman, 1970)
  - Require interventions (Acemoglu et al. AER 2012; 2016)
  - Entrepreneurs and investors derive utility or internalize externalities (Bénabou and Tirole, 2006; Hart and Zingales, 2017; Oehmke and Opp, 2020; Pastor et al., JFE 2021; Krueger et al., RFS 2020; Ceccarelli et al., 2021)
  - Regulatory / transition risk (Dechezleprêtre and Sato, 2017; Ramodarai and Zeni, 2021)
  - Evidence that credit supply reduces pollution (Levine et al., 2018; Goetz, 2019; Kim and Xu, 2021)

What we do

- Data on a sector particularly reliant on bank credit: **SMEs**
  - Use textual algorithms to extract **actual investments** from comments to financial statements of Italian SMEs, 2015-2019
  - **Loan-level data** from the Italian Credit Registry
  - We estimate the **elasticity** of green investment to credit supply
- **Challenge**: Loans are endogenous to investment
- **Identification** with an IV approach:
  - We estimate bank lending policies purged of local and sector loan demand using nationwide lending
  - Our firm-year level instrument is weighted average of lending bank policies across firm lenders (Berton et al. RFS 2018; Greenstone et al. AEJ:EP 2020)
- We exploit **heterogeneity** across firms, industries, and geographies to study the drivers of elasticity

Preview of results

- SMEs' likelihood to invest in green technologies responds positively to credit supply:

$$\uparrow \sigma(\text{credit supply}) \Rightarrow \text{P}\{\text{green}\} \uparrow \text{1.9pp - 3.4pp}$$
$$\sigma(\text{green}) = 0.239$$
$$\mu(\text{green}) = 0.064$$

- Effect is concentrated on the best firms and coincides with investment peaks $\Rightarrow$ role of **capital intensity** and **upfront capital**
- Largely driven by high **environmental awareness**
- **Government subsidies** and **market competition** increase responses only if reinforced by **environmental awareness**
- No evidence of regulatory / transition risk driving the results

Contribution

- Real effects of credit supply
  - Investment (Peek and Rosengren, 2000; Duchin et al. 2010; Almeida et al. 2011; Cingano et al. 2016; Berg, 2018...; De Jonghe et al., 2020, ...); Employment (Berton et al. 2018; Chodorow-Reich 2013; Huber 2018, ...); Valuations (Gan, 2017); Productivity (Duval et al., 2020)
  - We find a positive effect of credit supply on **green transition**
- Role of banking sector in the green transition
  - Focus on how **banks** allocate credit: Q (Kacperczyk and Peydró, 2021; Reghezza et al., 2021; Mueller and Sfrappini, 2021; Giannetti et al., 2023); P (Delis et al., 2021; Degryse, Goncharenko et al. 2021); leakage (Beyene et al. 2021)
  - We find that credit affects **firms'** green investments.
- Credit and green investments for SMEs (De Haas et al., 2022)
  - We estimate the **elasticity** of green inv to credit supply
  - We exploit firm, industry, geographic, and bank **heterogeneity** to understand the drivers of this elasticity

Data

- Italian Chamber of Commerce (Infocamere): Text information from notes to firms' financial statements ("note integrative")
  - Available for firms filing most complete type of balance sheet ("bilancio di esercizio"). Excludes smallest firms filing simplified balance sheets
  - Focus: Text comments about tangible and intangible assets. ("Introduzione & commento – immobilizzazioni materiali & immateriali")
- Cerved: Balance sheet and other firm-level information
- Italian Credit Register: Loan-level information (lender, amounts)
- Final sample: 113,841 firm-year observations, 2015-2019

Identifying green investments

1. We define a set of ≈ 80 "green" words or tags ("Dictionary"). Sources:
   - The EU taxonomy for environmentally sustainable activities
   - Dictionary in Sautner, van Lent, Vilkov and Zhang (2020)
   - Sustainability reports (Bilancio di Sostenibilità) for very large firms (Enel, Unicredit, Generali, Coop, ENI, Atlantia, Benetton e Webuilt - Impregilo among them).

2. Let $W_{i,t}$ be the set of words in the notes to the balance sheet items that we analyze for firm i in year t.

3. We define a green investment dummy for firm i in year t as follows :

$$Green_{i,t} = \mathbb{1}_{Dictionary \cap W_{i,t} \neq \emptyset} \cdot \mathbb{1}_{CapExp_{i,t} > 0}$$

[Dictionary] [Examples] [Validation]

Sample construction: Observations by year

	Green		Total	%
Year	0	1	(0+1)	Green
2015	21,321	1,473	22,794	6.5
2016	23,911	1,568	25,479	6.2
2017	23,365	1,626	24,991	6.5
2018	21,974	1,486	23,460	6.3
2019	16,016	1,101	17,117	6.4
Unique	26,486	2,876	29,362	9.8

[Unique firms by size] [Unique firms by sector] [Geographic location]

Empirical model

$$\text{Green}_{i,t} = \beta \Delta \text{Loan}_{i,t} + \delta X_{i,t} + \mu_i + \gamma_{s(i)\times\tau_t} + \eta_{c(i)\times\tau_t} + \theta_{p(i)\times\tau_t} + \epsilon_{i,t}$$

Identification challenges:

- Loans obtained are equilibrium outcomes (supply, demand)
- Inverse causality

Control for demand factors:

$X_{i,t} = \{\text{size, age, debt, cash, PPE, profitability, rating}\}$
μ_i: time-invariant firm characteristics
FE: innovation shocks; demand shifters
Most saturated specifications: $s(i) \times c(i) \times p(i) \times \tau_t$

Identifying credit supply

We instrument $\Delta \text{Loan}_{i,t}$ using a credit supply index $\text{CSI}_{i,t}$:

1. Estimate credit supply from bank b in year t to firms in sector s and province p using all loans disbursed by b to s in p:

$$\Delta \text{Loan}_{bpst} = \delta_{bt} + \gamma_{pst} + \epsilon_{bpst}$$

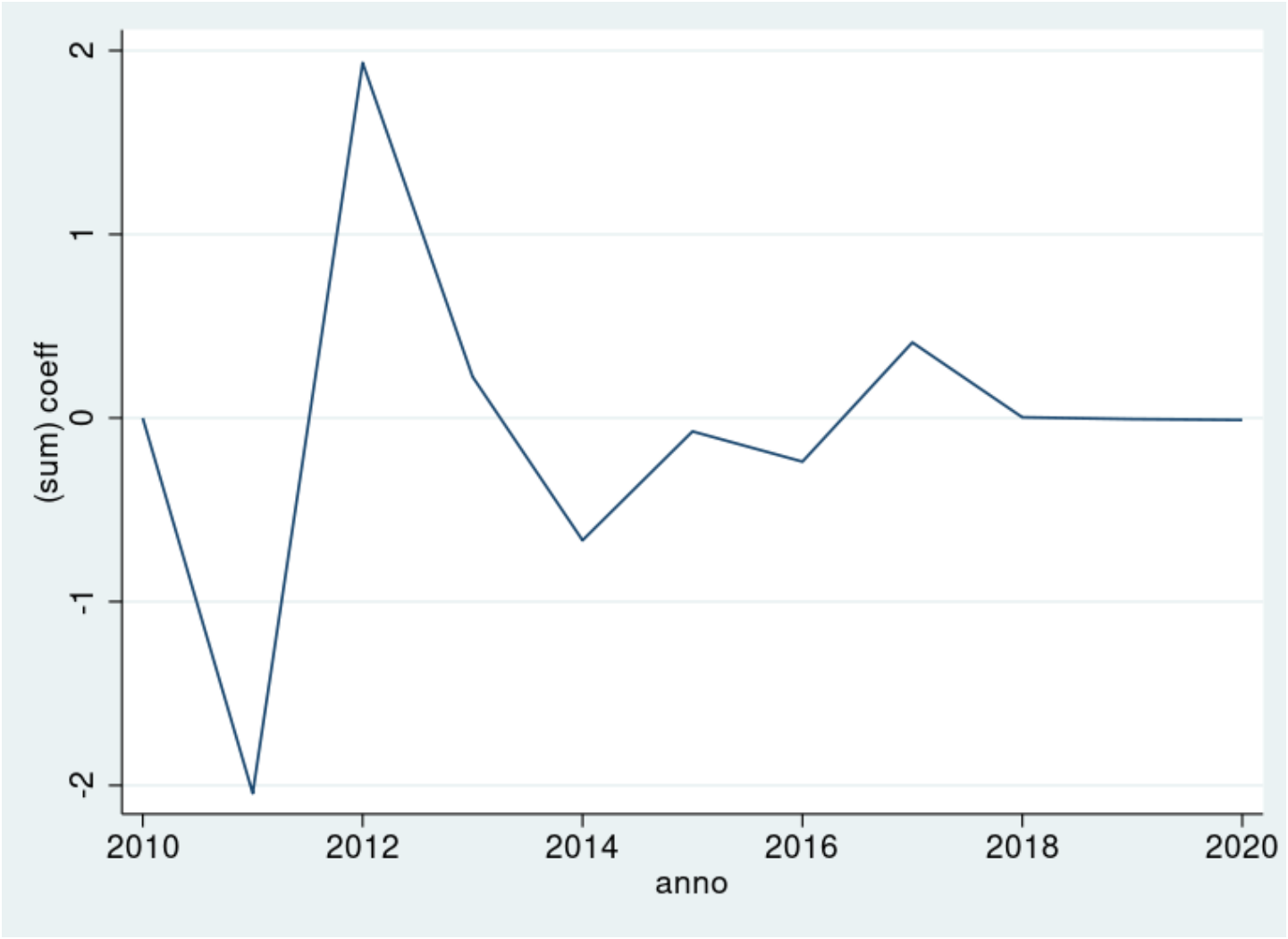
2. $\text{CSI}_{i,t}$ is the weighted average of estimated credit supply ($\hat{\delta}_{bt}$) of all banks lending to i at the start of the period:

$$\text{CSI}_{i,t} = \sum_b w_{b,i,2014} \times \hat{\delta}_{bt};$$

$$w_{b,i,2014} = \frac{\text{Loan}_{i,b,2014}}{\sum_b \text{Loan}_{i,b,2014}}$$

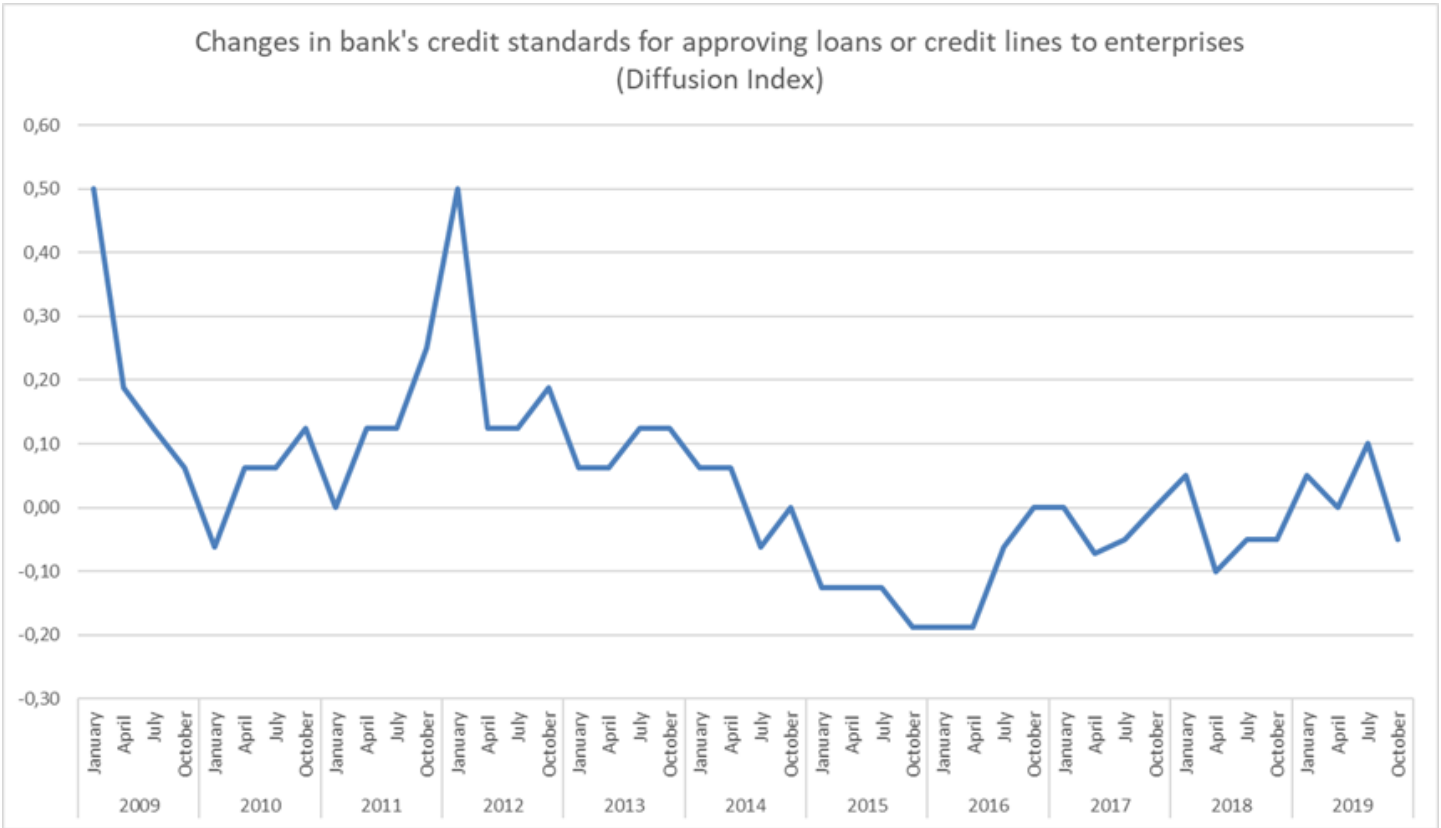
[IA]

Average CSI



[Variation]

CSI validation: Changes in bank lending standards



Credit supply increases probability of green investments

Dep. Var.: Green	(1)	(2)	(3)	(4)
ΔLoan	0.0264*	0.0272*	0.0286*	0.0482**
	(1.694)	(1.702)	(1.775)	(2.320)
Firm controls	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y
Province-Year FE	Y	Y	Y	.
Sector-Year FE	.	Y	Y	.
Size-Year FE	.	.	Y	.
Province-Sector-Size-Year FE	.	.	.	Y
Observations	113841	113841	113841	113841
R-squared	0.738	0.739	0.738	0.782
F-statistic weak instruments	178.4	170.4	168.4	114.8
First-stage:				
CSI	0.285***	0.280***	0.279***	0.252***
	(8.276)	(8.077)	(8.028)	(6.612)
Observations	113841	113841	113841	113841
R-squared	0.276	0.279	0.279	0.403

[All-EM] [All-IM]

What drives the positive response to credit supply?

- High costs of environmental investments (Fowlie et al., 2018)
  - Heterogeneity in firm's availability of internal resources (Holmstrom and Tirole, 1997)
- Environmental preferences (Hart and Zingales, 2017)
  - Geographic heterogeneity in environmental awareness
- Government subsidies (Acemoglu et al., 2012; 2016)
  - Geographical heterogeneity in subsidies and incentives
- Market competition (Aghion et al., forthcoming)
  - Industrial heterogeneity in competition
- Regulatory / transition risk (Ramadorai and Zeni, 2021)
  - Industrial heterogeneity in emissions

High upfront costs explain findings

	High		Low	
	β (t-stat)	R^2 F	β (t-stat)	R^2 F
Profitability	0.101**	0.757	0.0285	0.833
	(2.346)	38.73	(0.679)	34.76
Liquidity	0.0775**	0.774	0.00875	0.821
	(2.281)	40.64	(0.193)	32.16
Size	0.0592*	0.788	0.0131	0.819
	(1.875)	66.68	(0.442)	35.67
Age	0.0815**	0.774	0.0156	0.810
	(2.364)	57.11	(0.467)	35.59

- Results driven by best firms

[Constraints] [All-EM] [All-IM]

Green investments coincide with investment peaks

	Investment Growth (1)	Investment Peak (2)
Positive investment	2.612***	0.418***
	(164.44)	(54.67)
Green word	-0.126*	-0.045
	(-1.69)	(-1.24)
Green investment	0.183**	0.068*
	(2.54)	(1.91)
Firm Controls	Y	Y
Firm FE	Y	Y
Province-Sector-Size-Year FE	Y	Y

- Confirms that high upfront costs play a role

Environmental awareness explains findings

	Env. Protection		Climate Change	
	Low	High	Low	High
ΔLoan	0.00721	0.0855***	0.0309	0.106**
	(0.262)	(2.660)	(1.355)	(2.057)
Firm Controls	Y	Y	Y	Y
Observations	57737	55824	91497	22181
R-squared	0.796	0.756	0.788	0.743
Firm FE	Y	Y	Y	Y
Province-Sector-Size-Year FE	Y	Y	Y	Y
F-statistic weak instruments	51.39	66.01	84.69	31.24

- Results driven by provinces with high environmental awareness
- Refinement: Results driven by upstream sectors in provinces with high environmental awareness (entrepreneurial preferences matter)

[Geo variation] [Entrepreneurs] [Placebo]

Green subsidies do not explain findings

			Green subsidies			
			Low		High	
	Green subsidies		Environmental protection			
	Low	High	Low	High	Low	High
ΔLoan	0.0403	0.0499**	0.0120	0.0449	0.00528	0.111**
	(1.060)	(2.008)	(0.180)	(0.990)	(0.175)	(2.488)
Firm Controls	Y	Y	Y	Y	Y	Y
Observations	32655	81027	9015	23537	48706	32237
R-squared	0.783	0.782	0.812	0.767	0.792	0.746
Firm FE	Y	Y	Y	Y	Y	Y
Province-Sector-Size-Year FE	Y	Y	Y	Y	Y	Y
F-statistic weak instruments	35.11	79.48	16.03	22.54	39.04	44.70

- Government subsides per se not sufficient to drive the positive response to credit supply
- Subsidies most effective when combined with environmental awareness

Market competition does not explain findings

	Competition		Competition: Low, Environmental Protection		Competition: High, Environmental Protection	
	High	Low	High	Low	High	Low
	(1)	(2)	(3)	(4)	(5)	(6)
ΔLoan	0.0579**	0.0506	0.237	0.00697	0.0653**	0.0249
	(2.009)	(1.412)	(1.090)	(0.221)	(2.218)	(0.381)
Observations	62,299	47,614	22,466	24,995	31,488	30,698
R-squared	0.638	0.606	0.558	0.796	0.767	0.800
Firm Controls	Y	Y	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y	Y	Y
Province-Sector-Size-Year FE	Y	Y	Y	Y	Y	Y
F-statistic weak instruments	58.91	44.53	4.155	47.41	69.21	7.988

- Competition helps when combined with environmental awareness

Regulatory and transition risk does not explain findings

	CO_2-e Emissions	
	Low	High
	(1)	(2)
ΔLoan	0.0436*	0.0647
	(1.928)	(1.305)
Observations	85621	28151
R-squared	0.776	0.793
Firm Controls	Y	Y
Firm FE	Y	Y
Province-Sector-Size-Year FE	Y	Y
F-statistic weak instruments	84.9	29.31

- No evidence that regulatory risk is driving the results

Conclusions

- Firms' decision to invest in green technologies responds positively to credit supply;
  - ... largely driven by firms with high internal resources, suggesting high upfront costs
  - ... largely driven by local preferences for a greener economy (environmental awareness)
  - ... subsidies and market competition help, but are most effective if there is environmental awareness in the population
  - ... no evidence that regulatory risk matters
- Policy implications:
  - Policies that incentivize lending to green projects (i.e. targeted green discount rates) can accelerate the green transition
  - Such initiatives are more effective if accompanied by campaigns raising environmental awareness

Firm characteristics

Variable	Green = 0			Green = 1				Norm.
	μ_0	σ_0	N_0	μ_1	σ_1	N_1	p-value	Diff.
Age (years)	29.64	16.62	106,587	31.90	16.70	7,254	0.00	-0.10
No. of employees	104.86	598.78	106,456	114.04	320.47	7,228	0.03	-0.01
log(Assets)	9.51	1.19	106,587	9.95	1.10	7,254	0.00	-0.27
log(Revenues)	9.59	1.32	106,587	9.80	1.45	7,254	0.00	-0.10
Risk: Low	0.72	0.45	76,674	0.79	0.41	5,701	0.00	-0.11
Risk: Medium	0.20	0.40	21,058	0.16	0.36	1,142	0.00	0.07
Risk: High	0.08	0.28	8,855	0.06	0.23	411	0.00	0.07
Cash/Assets[1]	0.01	0.01	102,304	0.01	0.01	7,093	0.00	0.16
Tangibles/Assets[1]	0.20	0.18	103,010	0.27	0.20	6,995	0.00	-0.28
Intangibles/Assets[1]	0.03	0.05	95,290	0.03	0.04	6,731	0.00	0.05
Debt/Assets[1]	0.27	0.18	99,658	0.28	0.18	6814	0.00	-0.05
Cash flow/Assets[1]	0.06	0.06	103,647	0.07	0.05	7,159	0.00	-0.06
Net Income/Sales[1]	0.04	0.08	103,460	0.05	0.08	6,819	0.21	-0.01
ROA[1]	0.05	0.06	103,563	0.05	0.06	7,159	0.66	0.00
ROE[1]	0.10	0.22	103,861	0.09	0.18	7,141	0.00	0.06
Assets growth[1]	0.04	0.14	74,680	0.03	0.12	5,309	0.00	0.03
Sales growth[1]	0.03	0.17	102,728	0.03	0.15	7,080	0.43	-0.01
ΔLoan[1]	0.01	0.58	101,466	0.01	0.51	7,012	0.26	0.01
CSI[1]	-0.01	0.18	103,649	-0.01	0.19	7,051	0.69	0.00

[1] Winsorized between 1 and 99%

Sample construction

	Green dummy is missing			Green dummy is available				Norm.
Variable	μ_0	σ_0	N_0	μ_1	σ_1	N_1	p-value	Diff.
Age (years)	19.15	14.94	129,705	25.67	17.14	195,556	0.00	0.29
No. of employees	30.27	187.59	125,951	88.79	494.88	193,020	0.00	0.11
Assets	9,554	137,993	129,705	26,260	134,675	195,556	0.00	0.09
Revenues	8,450	66,132	129,705	28,942	159,863	195,556	0.00	0.12
Assets growth[1]	0.04	0.21	100,886	0.04	0.17	136,040	0.00	0.01
Sales growth[1]	0.00	0.34	113,636	0.02	0.25	183,174	0.00	0.04
Leverage[1]	0.75	0.26	122,991	0.70	0.23	189,599	0.00	-0.13
ROA[1]	0.01	2.75	129,705	0.04	0.97	195,556	0.00	0.01
Tangibles/Assets[1]	0.19	0.21	112,476	0.20	0.20	186,164	0.00	0.01
Intangibles/Assets[1]	0.05	0.08	83,046	0.04	0.07	162,430	0.00	-0.11

[1] Winsorized between 1 and 99%

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Green dictionary (excerpt)

Rank	Keyword	Rank	Keyword
1	fotovoltaic	21	tutela ambiental
2	eolic	22	recuper. energ
3	cogenera	23	isolament termic
4	idrolettric	24	gestione ambiental
5	risparmi(o)* energetic	25	auto elettric
6	investiment. ambiental	26	diagnosi energetic
7	impatt. ambiental	27	certificazion. energetic
8	efficienz. energetic	28	rinnovabil. solar
9	efficientament. energetic	29	ecosostenibil
10	qualificazion. energetic	30	anidride carbonica
11	riqualificazion. energetic	31	geotermic
12	font. rinnovabil.	32	sicurezza ambiental
13	consum. energetic	33	stazion. di ricarica
14	certificazion. ambiental	34	impiant. ambiental
15	energi. rinnovabil.	35	energi. solar
16	pannell. solar	36	sostenibilit. ambiental
17	trigenera	37	audit energetic
18	veicol. elettric	38	monitoraggi(o)* energetic
19	um. nociv	39	aspett. ambiental
20	impiant. solar	40	fin. ambiental

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Green investments (examples)

#	Text
1	Spese di progettazione per l'ampliamento delle celle frigo e l'installazione di un **impianto fotovoltaico** (€ 5.148) e interventi generici di manutenzione straordinaria (€ 24.800), presso il settore del Mattatoio.
2	Attività di sviluppo precompetitivo finalizzate all'individuazione di nuove soluzioni tecniche e tecnologiche per la messa a punto di soluzioni innovative di packaging totalmente riciclabile e provenienti da **fonti ecosostenibili**.
3	Tali investimenti hanno valenza a **fini ambientali** in quanto lo scopo dell'investimento è di produrre energia elettrica mediante impianto alimentato da **fonte rinnovabile solare** e nel contempo di ridurre la domanda di energia da altre fonti tradizionali.
4	I modesti incrementi dell'esercizio sono riferiti all'aggiornamento della certificazione SOA e ad oneri connessi con la ricerca nel campo delle **fonti rinnovabili**.
5	Si ricorda che all'interno della categoria Impianti e macchinariâ sono compresi gli **investimenti ambientali** realizzati dalla società negli esercizi precedenti, costituiti da **impianti fotovoltaici** destinati alla produzione di energia elettrica da **fonti rinnovabili** da impiegare nel ciclo produttivo.
6	Le aliquote di ammortamento mediamente applicate sono le seguenti: FABBRICATI 3% MOBILI E ATTREZZATURE 10% MACCHINE D'UFFICIO 12% ATTREZZATURA GENERICA 12,5% ATTREZZATURA SPECIFICA 12,5% BIANCHERIA E LANERIA 20% **IMPIANTO FOTOVOLTAICO** 15% IMPIANTO ANTINCENDIO 10% IMPIANTO DI RISCALDAMENTO 12%

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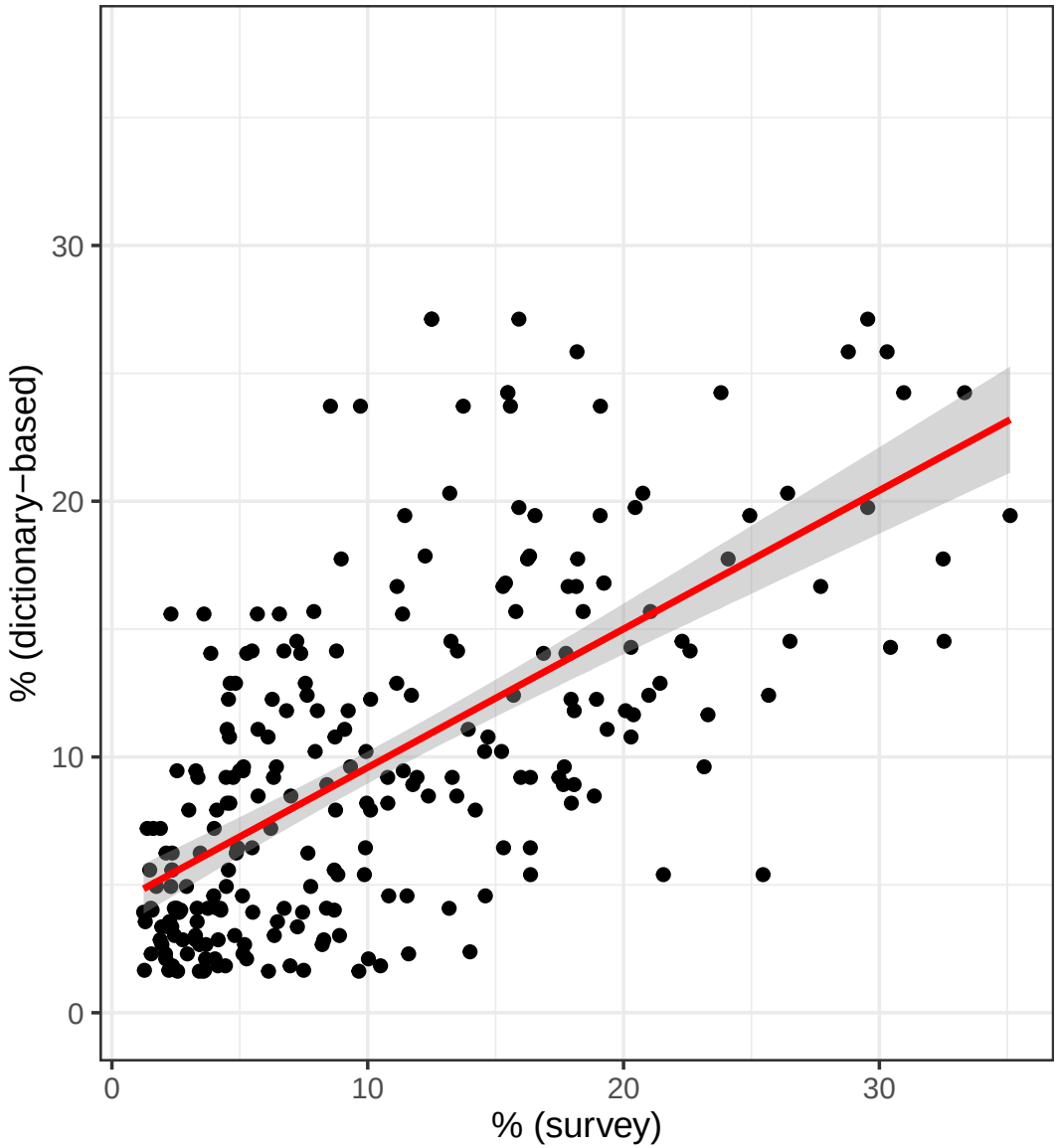
Green classification: Validation



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Green investments and emission abatement

	(1)	(2)	(3)	(4)
	Emission Level		Emission Intensity	
	NO_x	CO_2	NO_x	CO_2
$Green_{t-s}$	-0.349***	-0.318***	-2.615***	-2.056**
	(-6.356)	(-2.997)	(-2.693)	(-2.713)
Observations	176	96	176	96
R-squared	0.922	0.970	0.902	0.860
Firm FE	Y	Y	Y	Y
Year FE	Y	Y	Y	Y

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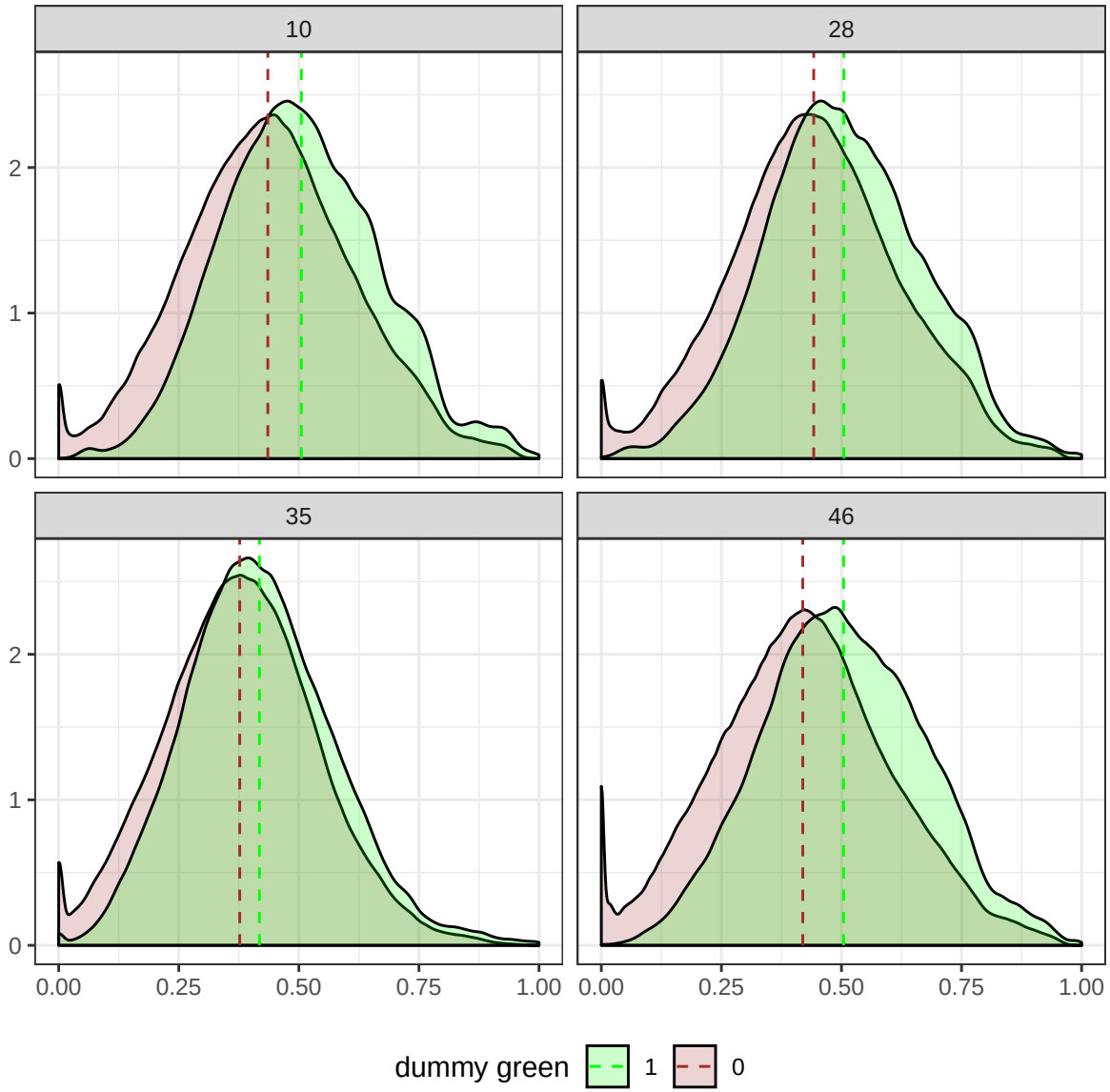
Cosine similarity of financial statements



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Common words in brown firms (excerpt)

1	trasparent	26	ord	51	parol	76	sintet
2	mass	27	pegn	52	notebook	77	snc
3	superammort	28	firenz	53	condominial	78	complementar
4	edizion	29	tant	54	incertezz	79	esposit
5	iperammort	30	sintetizz	55	cod	80	giustif
6	mett	31	proprietàl	56	aud	81	system
7	rich	32	dovess	57	calc	82	rinomin
8	dottrin	33	tribunal	58	esperient	83	tgli
9	inosserv	34	margin	59	contrar	84	patt
10	almen	35	alberg	60	omolog	85	inf
11	evinc	36	produrrann	61	caparr	86	marginal
12	rad	37	esplicit	62	riassum	87	televis
13	revisor	38	alberghier	63	algebr	88	torn
14	transizion	39	altriment	64	pubblicità	89	espong
15	essend	40	vendibil	65	fotograf	90	remot
16	napol	41	descrizionecoefficient	66	evit	91	app
17	catalog	42	perfett	67	raggiunt	92	postul
18	prend	43	sussistent	68	fisiolog	93	denar
19	cndc	44	europ	69	completezz	94	pianif
20	esigu	45	promozion	70	elettrom	95	approfond

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Unique firms by size

	Green			Fraction
Size	0	1	Total	Green
Large	2,691	469	3,160	14.8
Medium	13,956	1,691	15,647	10.8
Small	8,087	597	8,684	6.9
Micro	1,752	119	1,871	6,4

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Unique firms by sector

Sector	Green 0	Green 1	Total	% Green
A - Agriculture, forestry and fishing	371	67	438	15.3
B - Mining and quarrying	40	2	42	4.8
C - Manufacturing	11,055	1,475	12,530	11.8
D - Electricity, gas, steam supply	213	184	397	46.3
E - Water supply; sewerage, waste management	448	90	538	16.7
F - Construction	1,648	131	1,779	7.4
G - Wholesale and retail trade	8,116	680	8,796	7.7
H - Transportation and storage	1,327	109	1,436	7.6
I - Accommodation and food service activities	464	23	487	4.7
J - Information and communication	640	11	651	1.7
L - Real estate activities	35	4	39	10.3
M - Professional, scientific and tech. act.	576	30	606	5.0
N - Admin. and support activities	674	20	694	2.9
P - Education	57	1	58	1.7
Q - Human health and social work	661	39	700	5.6
R - Arts, entertainment and recreation	104	6	110	5.5
S - Other service activities	57	4	61	6.6

Identifying assumptions

$$\text{Green}_{i,t} = \beta \Delta \text{Loan}_{i,t} + \delta X_{i,t} + \mu_i + \gamma_{s(i)\times\tau_t} + \eta_{c(i)\times\tau_t} + \theta_{p(i)\times\tau_t} + \epsilon_{i,t}$$

$$\Delta \text{Loan}_{bpst} = \delta_{bt} + \gamma_{pst} + \epsilon_{bpst}$$

$$\text{CSI}_{i,t} = \sum_b \frac{\text{Loan}_{i,b,2014}}{\sum_b \text{Loan}_{i,b,2014}} \times \hat{\delta}_{bt};$$

1. Firm unobserved heterogeneity driving demand for green investments is time invariant
2. Firms in same sector, province, and class size face same demand for green investments / same productivity shock in each time period
3. No differential supply of credit for green projects / firms
4. No bank lending specialization into green firms

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No differential supply of credit for green firms / projects

UN environment programme
finance initiative

Results for: *Italy, Principles for Responsible Banking*

Bank	Country	Date signed	Reports
Banca Monte dei Paschi di Siena S.p.A.	Italy	Sep 19	Oct 20, Dec 21
BPER Banca S.p.A.	Italy	Jun 21	
FinecoBank S.p.A.	Italy	Nov 20	
Intesa Sanpaolo	Italy	Sep 19	Nov 20, Oct 21
Mediobanca	Italy	May 21	
UniCredit	Italy	Oct 19	Mar 21

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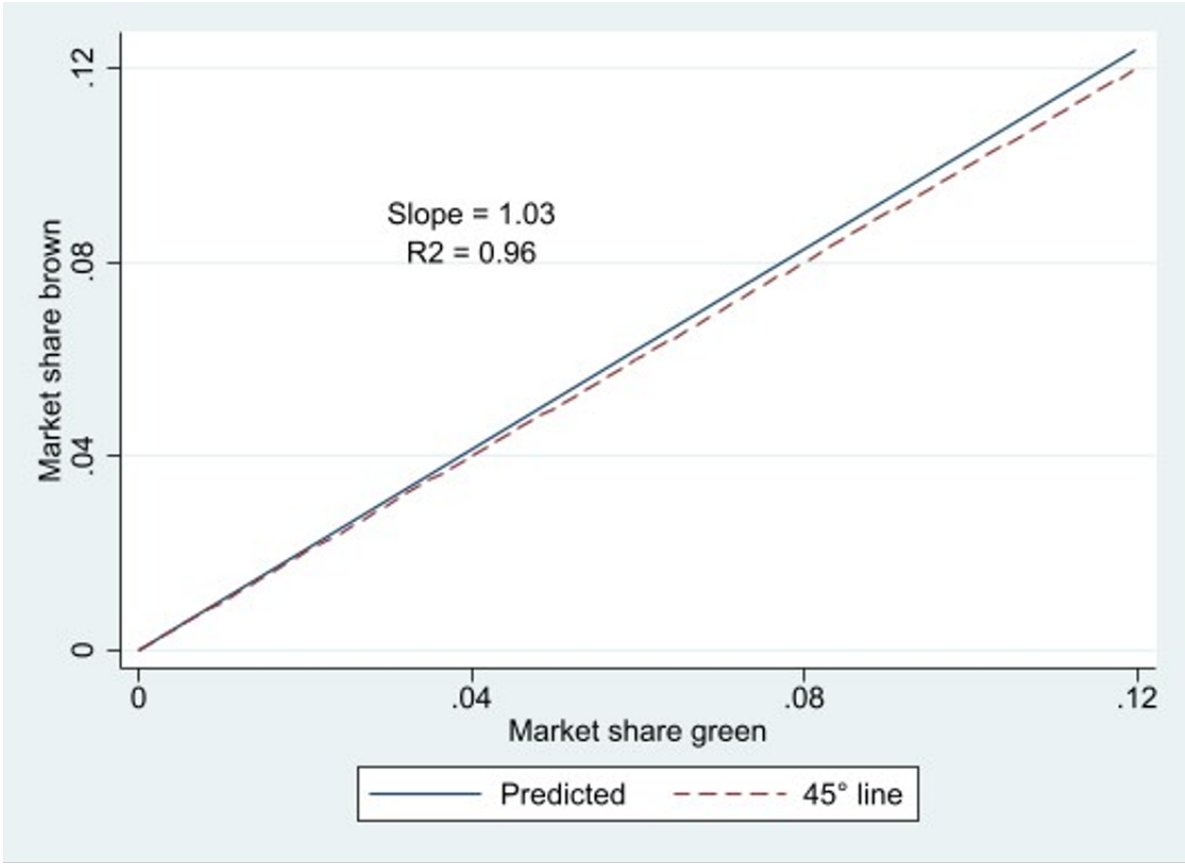
No bank specialization to green firms



	mean	sd	p1	p10	p25	p50	p75	p90	p99
residuals	0.00000	0.00177	-0.00317	-0.00019	0.00004	0.00006	0.00012	0.00030	0.00281

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Green vs brown banks

	PRB Signatory		Share High CO_2-e	
	No	Yes	High	Low
ΔLoan	0.0353	0.0115	0.0763	0.0182
	(1.414)	(0.404)	(1.272)	(0.896)
Firm Controls	Y	Y	Y	Y
Observations	58754	33133	29668	64342
R-squared	0.818	0.838	0.813	0.816
Firm FE	Y	Y	Y	Y
Province-Sector-Size-Year FE	Y	Y	Y	Y
F-statistic weak instruments	132.1	44.01	19.98	144.7

- Coefficients not different for green vs. brown banks

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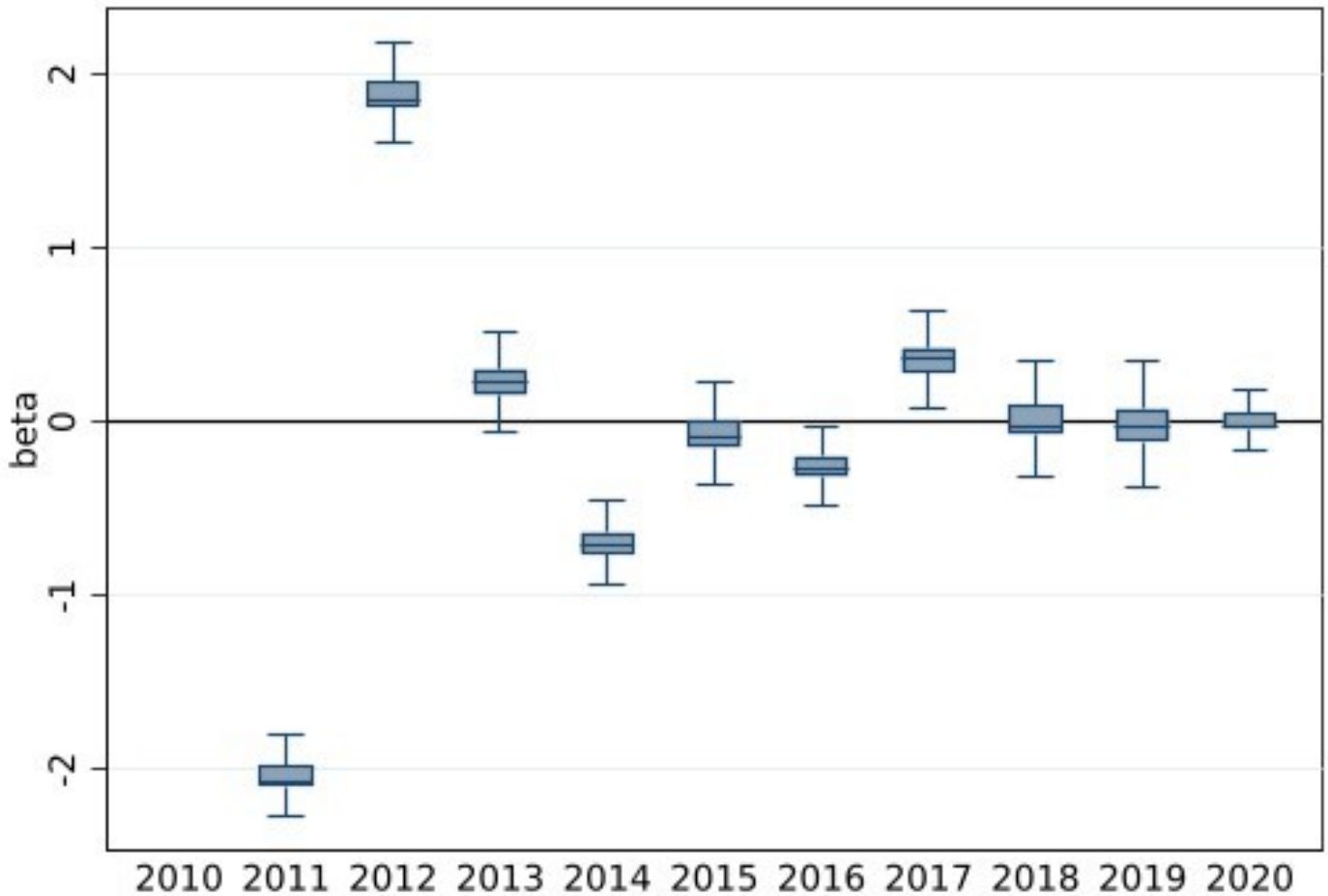
Variation in CSI



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No effect of credit supply on likelihood of investing

Dep. Var.: $\mathbb{1}_{CapEx>0}$	(1)	(2)	(3)	(4)
ΔLoan	0.00967	0.00847	0.0105	0.0190
	(0.347)	(0.297)	(0.366)	(0.560)
Observations	113841	113841	113841	113841
R-squared	0.446	0.448	0.449	0.557
Firm controls	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y
Province-Year FE	Y	Y	Y	.
Sector-Year FE	.	Y	Y	.
Size-Year FE	.	.	Y	.
Province-Sector-Size-Year FE	.	.	.	Y
F-statistic weak instruments	178.4	170.4	168.4	114.8
First-stage:				
CSI	0.285***	0.280***	0.279***	0.252***
	(8.276)	(8.077)	(8.028)	(6.612)
Observations	113841	113841	113841	113841
R-squared	0.276	0.279	0.279	0.403

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... but positive effect on quantity (instrument validation)

$\frac{CapEx}{Assets}$ (2SLS)	(1)	(2)	(3)	(4)
ΔLoan	0.0123**	0.0130**	0.0129**	0.0175**
	(2.217)	(2.295)	(2.265)	(2.521)
Firm controls	Y	Y	Y	Y
Observations	113,841	113,841	113,841	113,841
R-squared	0.572	0.573	0.573	0.651
Firm FE	Y	Y	Y	Y
Province-Year FE	Y	Y	Y	.
Sector-Year FE	.	Y	Y	.
Size-Year FE	.	.	Y	.
Province-Sector-Size-Year FE	.	.	.	Y
F-statistic weak instruments	178.4	170.4	168.4	114.8
First-stage:				
CSI	0.285***	0.280***	0.279***	0.252***
	(8.276)	(8.077)	(8.028)	(6.612)
Observations	113841	113841	113841	113841
R-squared	0.276	0.279	0.279	0.403

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Upfront costs and financial constraints, green investments

	Constrained		Unconstrained	
	β (t-stat)	R^2 F	β (t-stat)	R^2 F
Whited-Wu	-0.0429 (-0.572)	0.828 6.93	0.0797*** (3.049)	0.773 102.20
ASCL	-0.0942 (-0.660)	0.833 6.678	0.0614** (2.866)	0.779 109.30
FCP	0.0950 (0.692)	0.822 6.023	0.0972** (2.089)	0.769 34.49
Musso-Schiavo	-0.0306 (-0.535)	0.835 12.03	0.0578** (2.142)	0.795 77.58

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No differential effects for normal investments (EM)

	High		Low	
	β (t-stat)	R^2 F	β (t-stat)	R^2 F
Profitability	-0.0116	0.568	-0.0122	0.634
	(-0.241)	38.73	(-0.154)	34.76
Liquidity	-0.0353	0.583	0.0552	0.600
	(-0.760)	40.64	(0.613)	32.16
Size	-0.0273	0.518	0.0384	0.584
	(-0.775)	66.68	(0.551)	35.67
Age	0.0126	0.547	-0.0241	0.599
	(0.305)	57.11	(-0.358)	35.59

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No differential effects for normal investments (IM)

	High		Low	
	β (t-stat)	R^2 F	β (t-stat)	R^2 F
Profitability	0.0176*	0.717	0.0174	0.716
	(1.660)	37.93	(0.955)	24.13
Liquidity	0.0101	0.694	0.00552	0.722
	(1.158)	37.48	(0.254)	22.61
Size	0.0200**	0.666	0.0119	0.710
	(2.128)	67.66	(0.903)	28.68
Age	0.0125	0.681	0.0180	0.704
	(1.425)	50.24	(1.150)	27.09

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Results high in upstream sectors: Entrepreneur preferences

	Upstreamness		Upstreamness: High, Environmental Protection		Upstreamness: Low, Environmental Protection	
	Low	High	High	Low	High	Low
	(1)	(2)	(3)	(4)	(5)	(6)
ΔLoan	0.0236	0.0688**	0.164**	0.0244	0.0496	-0.0496
	(0.751)	(2.381)	(1.999)	(0.912)	(1.473)	(-0.534)
Observations	56059	57131	26933	29427	27888	27225
R-squared	0.793	0.771	0.664	0.798	0.785	0.779
Firm Controls	Y	Y	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y	Y	Y
Province-Sector-Size-Year FE	Y	Y	Y	Y	Y	Y
F-statistic weak instruments	42.37	70.76	18.65	57.01	44.76	5.22

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Environmental awareness: Placebo EM

	Env. Protection		Climate Change	
	Low	High	Low	High
ΔLoan	0.0128	0.0243	0.0142	0.0249
	(0.272)	(2.500)	(0.380)	(0.629)
Firm Controls	Y	Y	Y	Y
Observations	57737	55824	91497	22181
R-squared	0.556	0.557	0.551	0.528
Firm FE	Y	Y	Y	Y
Province-Sector-Size-Year FE	Y	Y	Y	Y
F-statistic weak instruments	51.39	66.01	84.69	31.24

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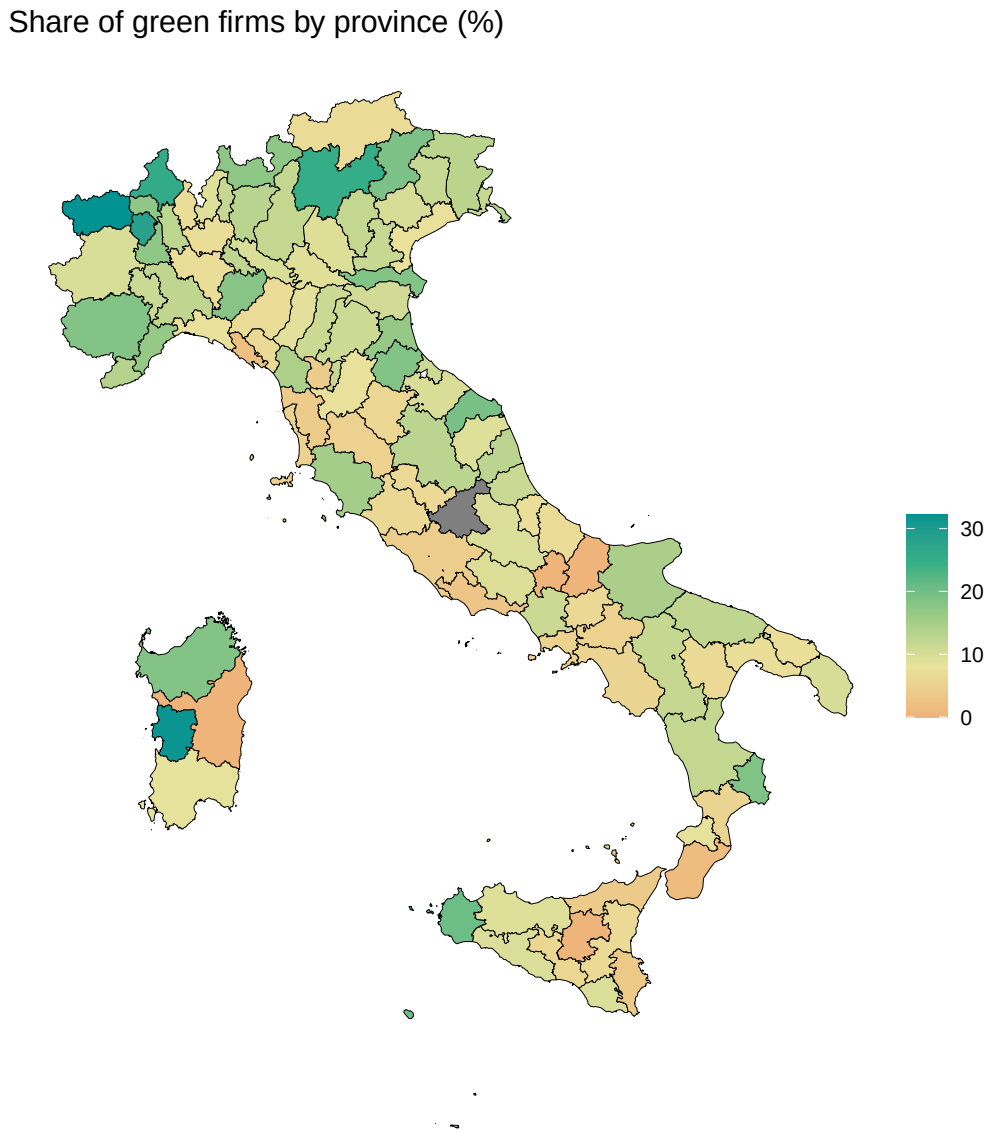
Geographic location of green firms



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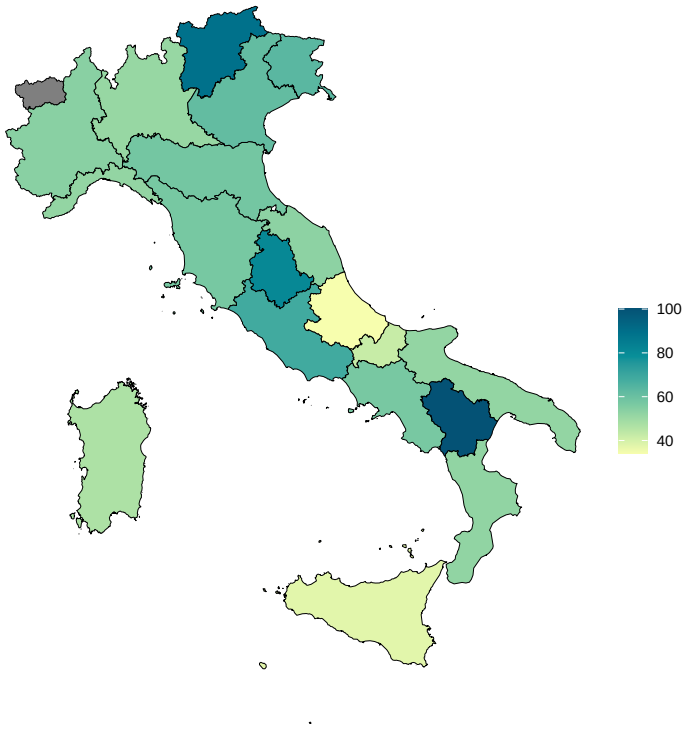
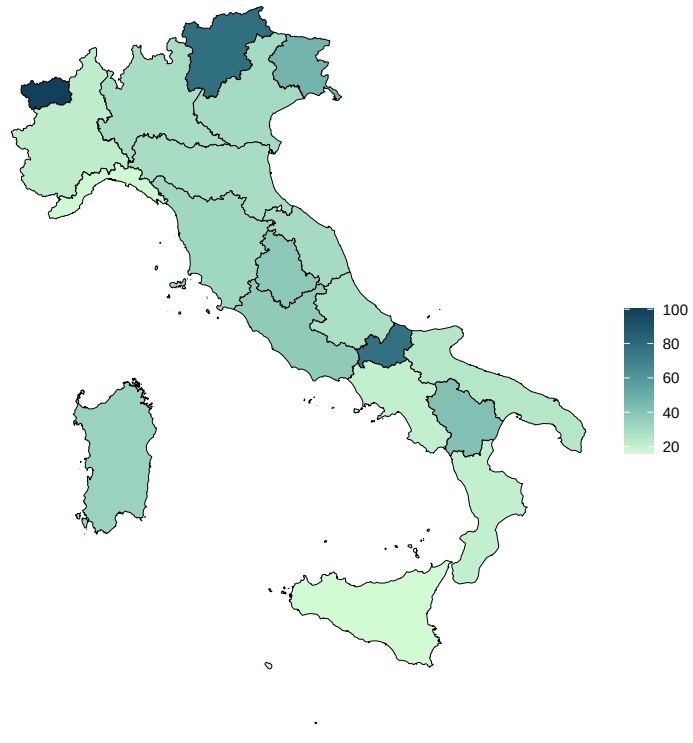
Environmental awareness

Environmental awareness (European Value Survey)



Climate change awareness (Google searches)



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Environmental variables

- High Protection: Italian regions where a higher fraction of individuals answered "yes" to the question of whether they prefer protecting the environment to economic growth. (Basilicata, Trentino-Alto Adige, Umbria, Lazio, Friuli-Venezia Giulia, Veneto, Emilia-Romagna, Toscana, Campania). Source: European Value Study.
- High Climate (Change): Italian regions where Google searches for the term "climate change" (cambiamento climatico) are highest (Valle D'Aosta, Trentino-Alto Adige, Molise, Friuli-Venezia Giulia, Basilicata, Umbria, Lazio, Sardegna, Toscana). Source: Google Trends.
- High CO_2 sectors: Electricity supply, agriculture, metallurgy, transportation, manufacturing of chemicals. (Source: Greenhouse Gas Air Emissions by sectors, Italy, World Input Output Data, 2013)

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Subsidies

- High Green Subsidies: Italian regions where the total number of subsidies for green investments is higher than the median. (Piemonte, Sicily, Toscana, Emilia-Romagna, Liguria, Friuli Venezia Giulia, Umbria, Lombardia, Trentino-Alto Adige, Campania). Source: Italian permanent census of enterprises, 2019, ISTAT + own calculations based on the "green dictionary")

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