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CORPORATE SUSTAINABLE FINANCE IN RECENT YEARS: INSIGHTS FROM ITALY

by Valentina Nigro* and Sabrina Pastorelli*

Abstract

This paper investigates corporate sustainable finance in Italy between 2021 and 2024, using firm-level and bank-level data drawn respectively from Banca d'Italia's Survey of Industrial and Service Firms (INVIND) and the Regional Bank Lending Survey (RBLs). In the study, a green investment is defined as a project aimed at improving energy efficiency and/or increasing the use or production of renewable energy. Just over one quarter of firms reported having undertaken such investment over this period, with a strong positive correlation with firm size. Financing relies mainly on internal resources, while bank credit plays a more significant role for smaller firms; the use of market-based instruments remains marginal. The estimates confirm that larger companies are more likely to finance these investments from their own resources than both similarly sized non-green firms and smaller companies undertaking environmentally sustainable projects. The banks surveyed indicate that green loans still account for a limited share of bank credit to companies. This may reflect the difficulties faced by intermediaries in incorporating firms' environmental sustainability objectives into their credit risk assessment models.

JEL Classification: D22, D25, Q56.

Keywords: green finance, sustainable investment, survey data.

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* Banca d'Italia, DG Economics, Statistics and Research.

Introduction¹

In recent years, growing concerns about the impact of climate change have drawn attention to environmental and social risks. Rising investor demand for better use of non-financial information to reflect sustainability issues has driven the development of environmental, social and governance (ESG) approaches.

Sustainable finance, increasingly recognised for its potential to deliver financial returns while contributing to societal values and climate goals, integrates ESG factors into financing decisions. In particular, the ‘E’ pillar encompasses all financing that considers environmental performance as a criterion in the financing decision, and it is progressively being used as a tool to align investment with a low-carbon transition. Despite the lack of internationally agreed standards and the emergence of different taxonomies to define green and sustainable activities, ESG criteria are widely adopted to select investments in sustainable projects.

Companies and investors need to consider and manage the risks and opportunities associated with the transition to sustainability. Doing so can enhance the resilience of corporations and the economy as a whole (OECD, 2022; OECD, 2023). The sustainable finance ecosystem is broad and complex, and includes several actors: lenders, ESG intermediaries – such as rating agencies or ESG-related service providers – regulators and policymakers. Among lenders,² banks play a major role. Public financial institutions are also important in fostering firms’ access to sustainable finance through the provision of government-guaranteed or subsidised loans, and can act as advisors to companies that lack the knowledge or skills to expand their green investment. Against this backdrop, regulators can encourage firms and financial intermediaries to integrate ESG factors into investment analysis and decisions (so-called ‘ESG integration’), for example by setting corporate reporting requirements, defining sustainable activities, and regulating ESG data and ratings.

A major concern relates to sustainability reporting, which has been mandatory in the European Union only for large listed companies since 2024 and will be extended to other firms in the coming years, with unlisted small and medium-sized enterprises (SMEs) reporting on a voluntary basis.³

¹ We would like to thank Emilia Bonaccorsi di Patti, Alessio De Vincenzo and participants at the 10th Research Banking Network Workshop. The views expressed herein are those of the authors and do not necessarily reflect those of Banca d’Italia.

² Several financial instruments can be used to meet companies’ green financing needs. Green loans, specifically intended to finance green investment, are provided mainly by banks. They may be backed by credit guarantees from public institutions applying specific environmental criteria. Alternatively, green bonds can be issued by a range of players (including financial intermediaries and non-financial firms), typically large and well established in the market. On the equity side, green finance may include both venture capital for climate-friendly early-stage projects and private equity for later-stage firms. Other instruments may include grants, supply chain finance and hybrid financing programmes (combining equity and debt).

³ Notably, the Corporate Sustainability Reporting Directive (CSRD) (Directive 2022/2464/EU), which revised and strengthened the rules previously introduced by the Non-Financial Reporting Directive (NFRD) (Directive 2014/95/EU), was transposed in Italy by Legislative Decree No. 125/2024. The original timetable envisaged: 1) from 1 January 2024, large public-interest entities already subject to the NFRD (more than 500 employees), reporting in 2025; 2) from 1 January 2025, other large undertakings (exceeding at least two of the following thresholds: 250 employees, EUR 50 million in turnover, EUR 25 million in total assets), reporting in 2026; 3) from 1 January 2026, listed SMEs and certain smaller financial entities, reporting in 2027 with an opt-out for SMEs until 2028. Directive (EU) 2025/794 (the “Stop-the-Clock” Directive) subsequently postponed the deadlines under 2) and 3) by two years. However, recent regulatory developments linked to the Omnibus package (Directive 2026/470/EU) have led to an agreement to narrow the scope of the CSRD (to entities with more than 1,000 employees and turnover above EUR 450 million).

Papers in the green finance literature have examined the relationship between firms' environmental performance, green investment and access to credit from different perspectives. For example, Kacperczyk and Peydró (2024) study how firms' carbon emissions affect bank lending and, through this channel, real and financial outcomes, showing that firms with a higher carbon footprint receive less bank credit and reduce their investment. De Haas et al. (2024) find that firms pollute more in areas where a larger share of companies are credit constrained and weakly managed; Degryse et al. (2023) use survey data to show that green banks charge lower interest rates on loans to green firms. For Italy, Accetturo et al. (2024) document a positive relationship between green investment and credit supply between 2015 and 2019, concentrated among more profitable firms, drawing on information extracted from the notes to the financial statements.⁴

Despite the growing literature on sustainable finance, little is known about firm-level green investment patterns and their funding sources in Italy, especially for small and unlisted companies.⁵ However, unlisted SMEs – at least those embedded in the value chain – are likely to come under increasing pressure from large corporate clients to improve their sustainability performance and to provide reliable data.⁶ Against this backdrop, this paper presents new evidence on corporate green investment in Italy between 2021 and 2024, using firm-level data from Banca d'Italia's Survey of Industrial and Service Firms (INVIND). We define green investments as projects aimed at improving energy efficiency and/or increasing the use or production of renewable energy. We also investigate the main funding sources, with a focus on bank loans, and assess banks' propensity to grant green loans drawing on Banca d'Italia's Regional Bank Lending Survey.

According to our data, on average 27 per cent of firms reported having made sustainable investment between 2021 and 2024. A further 11 per cent or so stated that they have made such investment before 2021. The share is significantly higher among large companies (49 per cent in 2021-24), roughly twice that of small enterprises. The gap across size classes is significantly larger for green projects than for investment overall: the share of large companies with positive total investment (green or otherwise) was around 11 per cent higher than that of small firms. Activities eligible under the EU Taxonomy⁷ display marked heterogeneity: firms in eligible-transitional sectors are about 9 percentage points more likely to invest than others, even after controlling for size, sector and geography. On the financing side, firms relied mainly on internally generated resources and, to a lesser extent, on loans from banks and other financial intermediaries. Multinomial logit estimates indicate that large firms are more likely to use internal funds and less likely to borrow, while smaller firms rely relatively more on bank credit.

From the intermediaries' perspective, the RBLs shows that approximately 40 per cent of the banks surveyed in 2024, particularly the larger ones, consider corporate green targets relevant to the granting of a loan.

One of the main reasons why banks do not take corporate environmental targets into account when granting loans is the difficulty of integrating such information into their evaluation models; other reasons include a lack of information and the absence of green targets at the company level. The share of green loans (i.e. those financing environmentally sustainable investment) to enterprises reported by banks is quite limited (4 per cent of disbursed amounts between 2021 and 2023 and about 3 per

⁴ For a general discussion of the drivers and potential benefits of corporate environmental engagement, see Gilchrist et al. (2021).

⁵ For a comprehensive analysis of the sustainability data gap in Italy, see Lavecchia et al. (2022).

⁶ See also Angelini (2023).

⁷ For further details, please refer to the first section.

cent of outstanding amounts in 2023, with higher outstanding shares among medium-sized firms). Green loans typically carry more favourable conditions, primarily lower interest rates, and public measures often play a role in their granting.

The remainder of the paper is organised as follows. The first section describes the data and presents the descriptive statistics. The second section discusses the financing of green investment and illustrates the results of the empirical analysis. The third section focuses on green loans to enterprises as reported by banks. The final section draws conclusions and outlines policy implications. Further details on the questionnaire and descriptive statistics are provided in the Appendix.

1. Data and descriptive statistics

1.1. Data

This analysis draws on data from the Survey of Industrial and Service Firms (INVIND), carried out by Banca d'Italia, which covers approximately 4,000 firms with at least 20 employees operating in the industrial and service sectors.⁸ The questionnaire is carried out annually between February and May and includes a general part covering the economic and financial dynamics of companies (e.g. turnover, employment, credit demand) and some monographic sections on specific topics that may change over time.

The 2022 wave introduced some questions on environmentally sustainable investment (hereinafter referred to as *sustainable investment* or *green investment*), focusing on timing, expenditure and financing (Appendix A). Sustainable investment is defined in the survey as investment '*with the specific aim of improving energy efficiency and/or increasing the use or production of renewable energy*'. This narrow definition of green investment aims to enhance the quality of the responses.⁹ Similar questions were included in 2023 and 2024 waves.

The validity of this green variable is qualitatively supported by another question included in the 2023 wave, as there is a strong positive correlation between firms engaged in sustainable investment and firms that monitor their annual greenhouse gas emissions.

The study reports the results of the questionnaire and integrates them with supplementary information drawn from the Cerved archives on firms' balance sheet data to construct detailed firm-level indicators of liquidity, profitability, and financial structure. In addition, companies are classified in accordance with the EU 2020 Taxonomy, which identifies a list of economic activities that contribute to the European Union's environmental objectives.¹⁰

In the final part, we analyse the responses from the Regional Bank Lending Survey (RBLs), conducted by the Banca d'Italia on a sample of around 240 banks for the first half of 2024 and 2025. The survey examines households' and firms' demand for loans, as well as banks' supply policies. In

⁸ For details on the sample and key survey findings, see Banca d'Italia (2023).

⁹ Examples of investment expenditures specifically aimed at improving energy efficiency and/or increasing the use or generation of renewable energy include thermal insulation measures, the adoption of energy-efficient lighting, and the installation of photovoltaic panels and/or other renewable-energy systems. The definition is consistent with the EU's objective of climate change mitigation, which refers to reducing greenhouse gas concentrations in the atmosphere.

¹⁰ Regulation (EU) 2020/852, which entered into force in July 2020, on the establishment of a framework to facilitate sustainable economic investment.

these two waves, some question on green loans were introduced to explore their use and the obstacles faced by banks.

1.2. Descriptive statistics

Table 1 reports some summary statistics on the characteristics of the firms investing in green projects. According to our data, on average, 27 per cent of firms reported having made sustainable investment between 2021 and 2024. In addition, around 11 per cent indicated they have made such investment before 2021.

The proportion is significantly higher among large companies (49 per cent in 2021-24, about twice the share of small enterprises).¹¹ The gap across size classes is considerably greater for green projects than for overall investment: the share of large companies with total positive investment (green or otherwise) was around 11 per cent higher than that of small firms (Table 1, col. 4).¹² The positive relationship with firm size is consistent with the hypothesis that larger firms have greater capacity – in terms of funding, planning, and managerial skills – to undertake sustainable investment, typically riskier and with a long cycle, while small firms tend to be both less aware of and less equipped to develop environmental strategies. Assuming a monotonic relationship between investment propensity and company size, sustainable investment is expected to be particularly limited among companies with fewer than 20 employees, which are excluded from the survey sample by construction.

During this period, firms have also benefited from energy efficiency measures. Tax deduction mechanisms account for the largest share of savings relative to other instruments (ENEA, 2025). In particular, corporate deductions include the ‘Ecobonus’, in place since 2007, for the energy retrofit of existing business properties. Since 2024, tax credits under the ‘Transizione 5.0’ scheme, operational since August, have been introduced for projects that reduce energy consumption at the facility and production process level.

Firms in the energy sector have also benefitted from incentives linked to renewable energy generation; they account for only 3 per cent of those engaged in green investment in our sample (Appendix B, Table B2).

¹¹ The percentages exclude non-responding firms, which represent roughly 17 per cent of the sample.

¹² Notably, for nearly all companies, undertaking green investment did not involve cancelling or deferring other planned expenses for 2024.

Table 1. Sustainable and total investments
(percentage of firms)

	<i>Sustainable investment</i>			<i>Gross fixed investment</i>	
	<i>2021 - 2024</i>	<i>Before 2021</i>	<i>Total</i>	<i>2021 - 2024</i>	
				<i>of which: tangible</i>	
<i>Number of employees</i>					
20-49	24	12	35	89	84
50-99	27	11	38	94	91
100-249	34	8	42	97	95
at least 250	49	9	58	98	97
<i>Firm sector</i>					
Food products	46	8	54	95	94
Textiles	27	15	41	96	87
Chemical and plastic products	36	17	53	98	96
Non-metallic mineral products	26	9	35	93	91
Machinery	29	15	44	94	90
Other manufacturing	32	14	46	92	88
Energy	32	12	44	95	93
Trade	25	11	36	86	81
Accommodation and food	35	6	41	91	90
Transportation	22	11	33	89	84
Real estate and IT	13	3	16	88	82
<i>EU Taxonomy</i>					
non-eligible	27	11	38	91	87
eligible and non-transitional	20	10	31	89	83
eligible and transitional	40	10	50	95	94
<i>Riskiness in 2019</i>					
Safe	29	13	42	94	91
Sound	28	10	38	92	87
Vulnerable	26	10	36	88	83
Risky	18	15	33	85	79
Total	27	11	38	91	87

Source: Authors' calculations based on INVIND and Cerved data. Firm riskiness is assessed using the Cerved score.

Among the main reasons for not investing or not planning to invest between 2021 and 2023, only 4 per cent of firms reported that they had found this type of investment less profitable than others or that they didn't get sufficient funds to cover the costs (Appendix B, Table B1). A large share of enterprises (35 per cent) did not provide a specific reason; this incidence is higher among small firms, which may not have green targets in their strategic plans.¹³ The low share of companies reporting a lack of financial resources is likely due to the survey sample excluding companies with fewer than 20 employees, which are typically more financially constrained.

¹³ The ECB's Survey on the Access to Finance of Enterprises shows that firms have identified several obstacles that hamper their access to finance for green investment, such as high funding costs and insufficient fiscal support measures (Nerlich et al., 2025).

Looking at firms' sectors of activity, those in manufacturing – particularly food, chemicals and plastics – are more likely to undertake green investment. In contrast, overall investment is more evenly distributed across sectors (Table 1).¹⁴

The variability in green investment across economic sectors may stem from multiple factors. Firms operating in segments with higher environmental impact are likely to face greater regulatory risk, as potential target of sector-specific reforms. Such companies may therefore have stronger incentives to reduce their environmental footprint. To account for this, we use a classification of activities developed by Cerved (2020) on the basis of the EU Taxonomy, which identifies the segments that could contribute most to improving environmental sustainability (Appendix A, Table A1 reports the ATECO classification).¹⁵ For the purposes of the analysis, firms are grouped into three categories: 'non-eligible' (activities excluded from the EU Taxonomy), 'eligible and transitional', and 'eligible and non-transitional'. In particular, 'eligible and transitional' sectors are those that can make a significant contribution to reducing greenhouse gas emissions by mobilising investment for industrial conversion; 'eligible and non-transitional' activities are those that already exhibit low greenhouse gas emissions, or whose diffusion limits negative environmental impacts or improves the environmental performance of other sectors.

The share of 'eligible and non-transitional' firms in our sample is 10 per cent, while the share of 'eligible and transitional' companies is 2 per cent (6 and 7 per cent in terms of turnover and 23 and 6 per cent in terms of total fixed investment, respectively). Table 1 shows that the incidence of companies reporting to have made green investment between 2021 and 2024 is much higher for enterprises classified as 'eligible and transitional' (40 per cent) than for those classified as 'non-eligible' (27 per cent) and 'eligible and non-transitional' (20 per cent), whereas the difference is much smaller when considering total investment. These figures hold even after controlling for composition effects related to firm size, 2-digit sector, and geographic area. The results of a linear regression (Appendix B, Table B3) confirm that firms classified as 'eligible and transitional' are significantly more likely (by 9 percentage points) to undertake such investment, suggesting that these companies may have stronger incentives to improve their environmental footprint, either to adapt to regulatory requirements or to remain competitive in the market.

Descriptive statistics based on balance sheet characteristics (Table 2) show that enterprises undertaking green investment tend to be more highly capitalised and hold a greater level of tangible assets than both those that do not undertake such investment and those that undertake non-green tangible investment;¹⁶ overall, they appear financially sounder than the others. Conversely, there are no significant differences in terms of liquidity, profitability, and intangible assets. Notably, we do not observe pronounced non-linearity when considering the subsample of firms with a high level of green investment (i.e. a ratio of sustainable investment to turnover above the median).

¹⁴ We verify that our measure of green investment does not capture investment in high-tech technologies by comparing the two questions; results show a low correlation between the propensity to make or plan green investment and the propensity to invest in advanced technologies.

¹⁵ The target sectors of the EU Taxonomy were identified by the Technical Expert Group by considering sector-level CO₂ emissions and the extent to which investment in a particular activity can enable greenhouse gas emission reductions in other sectors. On the possible impact of EU Taxonomy, see also Lucarelli et al. (2023).

¹⁶ Bottone and De Masi (2025) show that the adoption of environmentally sustainable investments is associated with an increase in capital expenditures and in the selling prices of firms' products, while no significant short-run effects on revenues and costs emerge.

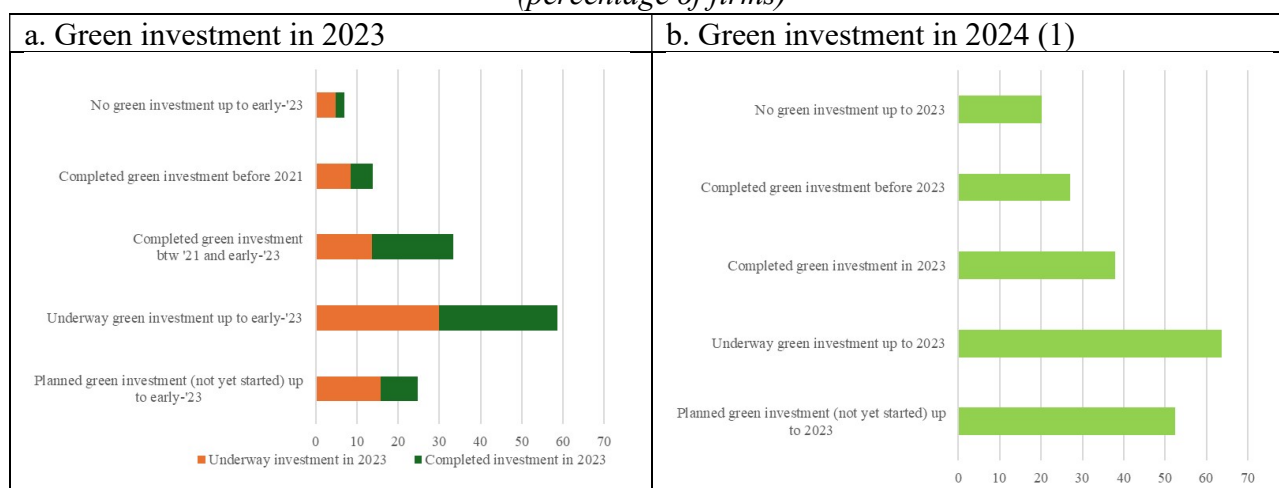
Table 2. Sustainable and total investment by firms' balance sheet characteristics
(median values in percentages)

	<i>Liquidity</i>	<i>Profitability</i>	<i>Equity</i>	<i>Tangibles</i>	<i>Intangibles</i>	<i>Soundness</i>
Sustainable investment						
No	7.8	7.4	35.8	18.1	0.6	66.2
Yes	7.9	8.2	42.3	27.0	0.7	73.4
High level of sustainable investment						
	8.3	7.8	43.7	31.9	0.7	71.3
Non-green tangible investment						
No	6.0	6.0	28.5	14.1	0.5	55.6
Yes	8.2	7.6	37.2	18.9	0.7	68.0

Source: Authors' elaboration based on INVIND and Cerved. Sustainable and non-green tangible investments refer to the period 2021-2024. A high level of sustainable investment is defined as a sustainable investment-to-turnover ratio above the median (calculated by firm size, sector, and survey wave). All balance sheet indicators refer to the year prior to the investment period: 2019 for investment in 2021-22, 2022 for investment in 2023, and 2023 for investment in 2024; they are expressed as ratios to total assets, with the exception of the *soundness* variable: firms are classified as sound if they have a Cerved score within rating classes 1-4.

In our sample, we also observe a strong degree of persistence: firms that previously undertook green investment remained actively engaged in sustainability efforts in both 2023 and 2024 (Figure 1). For instance, among those that completed a green investment in 2023, around 38 per cent also made this type of investment in 2024. A possible explanation is the need to spread the high fixed costs of the initial green investment over more than one year. Persistence is particularly pronounced among larger firms. Nevertheless, a non-negligible share of firms report having initiated green investment in 2024 (20 per cent).

Figure 1. Time persistence in sustainable investment
(percentage of firms)



Source: Our elaboration based on INVIND.

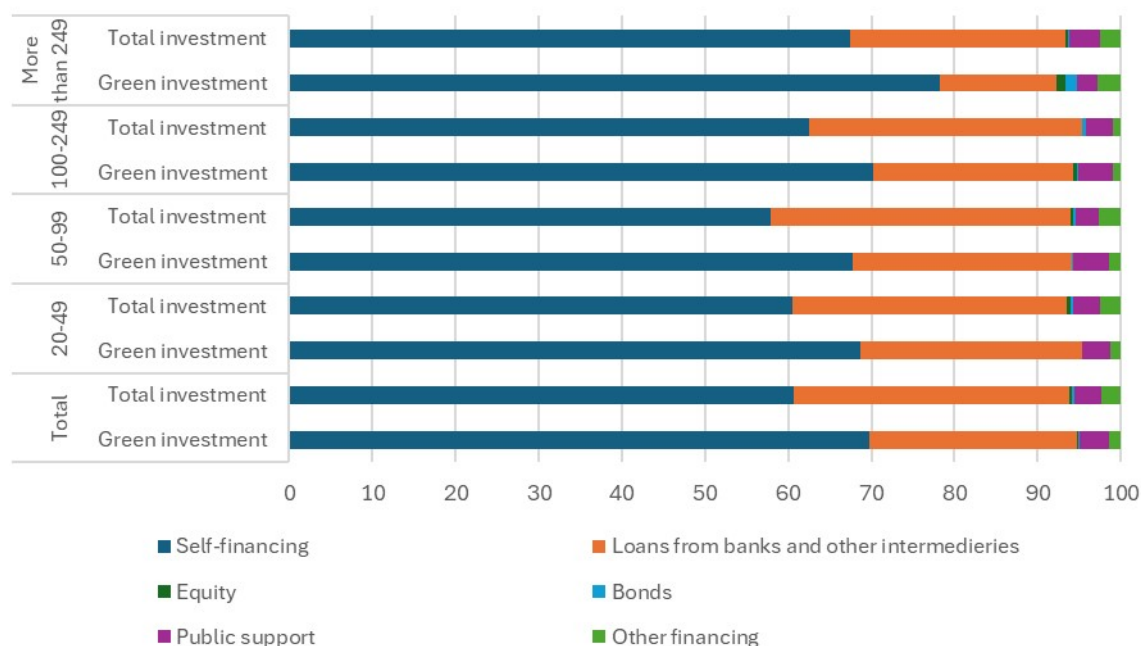
(1) Share of firms reporting positive expenditure on green investment in 2024.

2. Financing sustainable investment

Enterprises reported that they mainly funded sustainable investment through self-financing (70 per cent on average over the three years 2021-2023), followed by loans from banks or other financial intermediaries (25 per cent; Figure 2). Very few firms reported public financing (4 per cent) or equity and bond issuance (0.2 per cent) as their main sources of funding. Large companies make relatively greater use of self-financing, and also of equity and bonds, while small enterprises rely more on bank loans and public support, which can presumably help to alleviate their financial constraints. When compared to the main sources of funding for overall investment, firms rely, on average, less on self-financing (61 per cent) and more on loans (33 per cent) across all firm size classes.

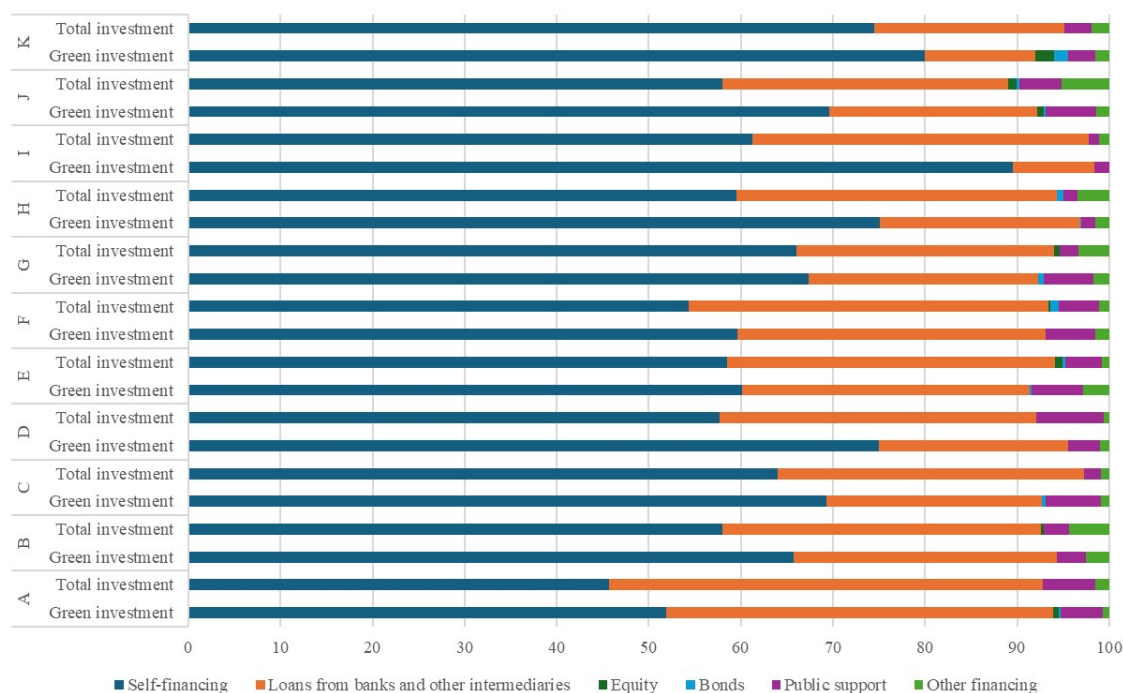
In addition, firms in the service sectors rely more heavily on self-financing to fund green investment than those in other sectors (Figure 3), probably owing to the lower availability of tangible assets that can be used as collateral. This difference does not emerge when considering the financing of overall investment.

Figure 2. Main source of funding for sustainable investment, by firm size
(percentage of firms)



Source: Authors' elaboration based on INVIND. The table reports the distribution of firms' responses to the question "What are the two main sources of funding for this type of investment?". For green investment, the results refer to the period 2021-2023 (waves 2022 and 2023); for overall investment, they refer to the years 2023-2024 (wave 2024). Statistics are weighted by sample weights.

Figure 3. Main source of funding for sustainable investment, by firm sector
(percentage of firms)



Source: Authors' elaboration based on INVIND. The table reports the distribution of firms' responses to the question "What are the two main sources of funding for this type of investment?". For green investment, the results refer to the period 2021-2023 (wave 2022-2023); for overall investment, they refer to the years 2023-2024 (wave 2024). Statistics are weighted by sample weights. Sectors: A (food), B (textiles), C (chemical and plastics), D (non-metallic

mineral), E (machinery), F (other manufacturing), G (energy), H (trade), I (accommodation and restaurants), J (transportation), K (real estate and IT).

2.1. Empirical analysis

To investigate how the choice of funding source is correlated with observable covariates, we estimate a multinomial logistic regression model with four possible outcomes: *self-financing* (base category), *loans* (from banks or other intermediaries), *public funds*, and *other financing* sources. Let $\pi_j(\mathbf{X}) = p(Y = j|\mathbf{X})$ denote the probability of observing response category j relative to the baseline J , as follows:

$$\log \frac{\pi_j(\mathbf{X})}{\pi_J(\mathbf{X})} = \alpha_j + \beta'_j \mathbf{X}, \quad j=1, \dots, J-1. \quad (1)$$

Table 3 reports the estimated marginal effects for the sample of firms undertaking green investment during the period 2021–2023, controlling for firm size, sector, and a set of balance sheet indicators (liquidity, profitability, capitalisation, tangible and intangible assets, risk). The main findings confirm the descriptive patterns: relative to micro firms, large corporates exhibit a higher probability of financing green investment through internal funds (cols. 1-2), and a lower likelihood of relying on loans from banks or other intermediaries (cols. 3-4). These results are consistent with the stronger self-financing capacity typical of larger firms and their broader access to alternative financing channels.

Table 3. Marginal effects of a multinomial logit

	<i>Self-financing</i>		<i>Loans</i>		<i>Public support</i>		<i>Other financing sources</i>	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
50-99 employees	0.027	0.030	-0.033	-0.040	0.005	0.009	0.000	0.001
100-249 employees	0.060*	0.056	-0.059*	-0.058*	0.001	0.003	-0.002	-0.000
More than 249 employees	0.140***	0.154***	-0.144***	-0.159***	-0.015	-0.012	0.020*	0.018*
Sector dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Balance sheet variables	No	Yes	No	Yes	No	Yes	No	Yes
Liquidity		+ ***		- **				
Profitability		+ *				- **		
Capitalisation		+ **		- *				- *
Tangibles								
Intangibles		- **		+ **				
High risk		+ ***		- **				
No. Observations	2,173	2,121	2,173	2,121	2,173	2,121	2,173	2,121

Source: Authors' elaboration based on INVIND and Cerved data. Dependent variable: categorical indicator of the source of funding for green investment in 2021–2023 (1: Self-financing; 2: Loans; 3: Public funds; 4: Other). All balance sheet indicators refer to 2019 and are expressed as ratios to total assets, except for the *High risk* variable. For the latter, firms are classified as financially sound if their Cerved score falls within rating classes 7 to 10. Statistics are weighted by sample weights.

Regarding balance sheet characteristics, more profitable and liquid firms tend to rely more heavily on self-financing, as expected. This pattern is consistent with the pecking order theory, according to which firms prefer internal funds to avoid the costs associated with external financing. Likewise, firms with stronger capitalisation display a higher probability of using internal resources and fewer loans. Riskier firms are also more likely to depend on internal funding, possibly reflecting their lower chances of obtaining external credit. Conversely, less profitable firms are more likely to seek public support, as they may also face limited access to private credit markets.

In Table 4 we estimate a multinomial logit model that includes both firms undertaking green investment in 2023 and those that did not, to compare their choice of funding sources. We focus on the interaction between firm size and green investment, as follows:

$$\log \frac{\pi_j(\mathbf{X})}{\pi_1(\mathbf{X})} = \alpha_j + \gamma_j Dim \times Green + \beta'_j \mathbf{X}, \quad j=1, \dots, J-1 \quad (2)$$

where *Dim* denotes a set of dummies for firm size (with micro firms as the baseline category) and *Green* is a dummy variable indicating whether the firm undertakes green investment. We control for sector and balance sheet variables as in equation (1).

Table 4. Marginal effects from a multinomial logit

	<i>Self-financing</i>		<i>Loans</i>		<i>Public support</i>		<i>Other financing Sources</i>	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
50-99 employees	0.027	0.030	-0.033	-0.040	0.005	0.009	0.000	0.001
100-249 employees	0.060*	0.056	-0.059*	-0.058*	0.001	0.003	-0.002	-0.000
More than 249 employees	0.140***	0.154***	-0.144***	-0.159***	-0.015	-0.012	0.020*	0.018*
Green	0.100***	0.135***	-0.092***	-0.122***	0.012	0.006	-0.020	-0.019
[More than 249 employees] & Green	0.134***	0.106**	-0.110***	-0.092**	-0.018	-0.008	-0.007	-0.006
Sector dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Balance sheet variables	No	Yes	No	Yes	No	Yes	No	Yes
Liquidity		+ ***		- ***				
Profitability								- **
Capitalisation		+ ***		- **				- *
Tangibles		- *		+ *				
Intangibles								
High risk								- *
No. Observations	3,140	3,039	3,140	3,039	3,140	3,039	3,140	3,039

Source: Authors' elaboration based on INVIND and Cerved data. Dependent variable: categorical indicator of the source of funding for green investment (1: Self-financing; 2: Loans; 3: Public funds; 4: Other). Funding sources for overall investment refer to 2023–2024 (wave 2024); those for green investment refer to 2024 (wave 2023). All balance sheet indicators refer to 2019 and are expressed as ratios to total assets, except for the *High risk* variable, for which firms are classified as financially sound if their Cerved score falls within rating classes 7 to 10. The other firm size interactions with *Green* are omitted from the table. Statistics are weighted by sample weights.

The marginal effects indicate that the interaction term for large firms engaged in green investment is the only statistically significant effect (for simplicity, the other size interactions are omitted from the table). The results show that large firms undertaking green investment display a higher probability of relying on self-financing and a lower probability of using bank loans or public funds, compared with non-green firms of similar size and with smaller green firms. This evidence suggests that firm size amplifies the relationship between green investment and financing choices: larger firms not only have greater internal financial capacity but also appear to draw on this advantage when investing in environmentally sustainable projects, thereby reducing their reliance on external credit markets. Such behaviour is consistent with the view that financial autonomy and scale facilitate the green transition, particularly in contexts where access to external funding for green projects remains limited or costly.

3. Evidence from the Regional Bank Lending Survey

In this section we present evidence on banks' corporate lending strategies towards green firms. The data are drawn from the RBLs, carried out by the regional branches of Banca d'Italia in early 2024 and 2025. The survey covered a sample of 244 banks, representing approximately 80 per cent of the total assets of the Italian banking system.

In 2024, banks were asked whether corporate green objectives were relevant to their lending activities, and were invited to estimate both the share of sustainable new loans granted between 2021 and 2023 and the share of such loans outstanding at the end of 2023.¹⁷ The survey also examined the reasons given by banks for not incorporating green targets into their lending decisions.

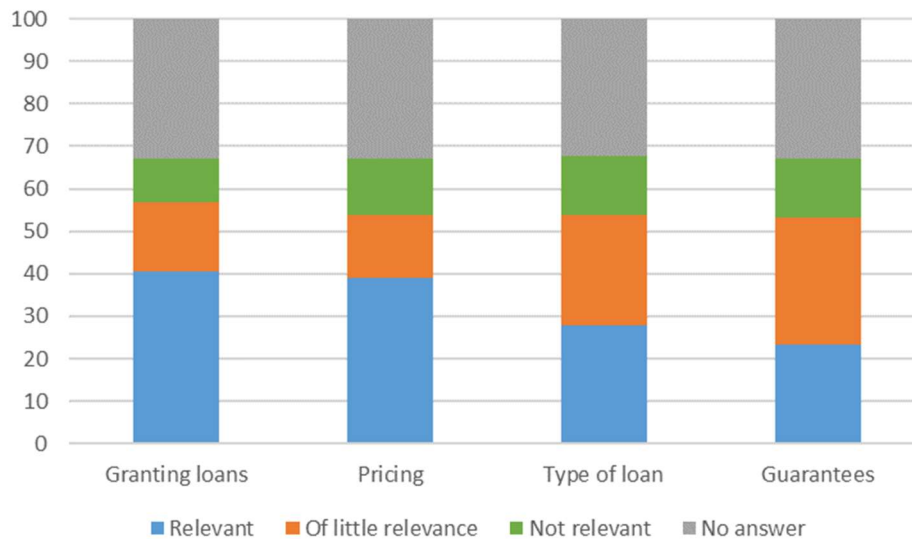
In 2025, an additional question was introduced concerning the types of sustainable products offered to firms (i.e. financing for the purchase of highly energy-efficient properties and/or renovations aimed at improving the energy efficiency of existing buildings; the acquisition of capital goods or the financing of other projects designed to enhance a firm's sustainability profile; and non-purpose loans granted to companies classified as green). Banks were also asked whether green loans were offered on more favourable terms compared with other loans and whether any public support measures (mainly guarantees) were relevant to the granting of such loans.

Around 40 per cent of the banks surveyed in 2024 considered corporate green objectives relevant to loan granting; 16 per cent reported a low degree of relevance, while 10 per cent did not consider them at all (Figure 4). Similar proportions were observed in loan pricing. When weighted by loan shares, the proportion of banks that considered firms' green footprint relevant to credit decisions almost doubled, and increased by 14 percentage points in the case of pricing, indicating greater adoption among larger intermediaries. These findings were confirmed in 2025: around 42 per cent of banks

¹⁷ The definition of green or sustainable loans used in the 2024 wave of the RBLs is consistent with the definition of sustainable investment adopted in INVIND, namely "loans specifically aimed at improving energy efficiency and/or increasing the use or production of renewable energy". In the 2025 wave, the question was expanded to cover other types of green loans, while keeping the 2024 definition separate.

(accounting for 87 per cent of loans) reported having granted at least one type of green loan, particularly for the purchase of capital goods or for investment aimed at improving a firm’s sustainability profile.¹⁸

Figure 4. Relevance of firms’ green objectives in bank activities
(percentage of banks)



Source: Authors’ elaboration based on the RBLS. Responses refer to new loans granted during the period 2021–23.

Green loans accounted, on average, for approximately 4 per cent of total disbursements to firms between 2021 and 2023,¹⁹ while their share of outstanding business loans stood at 3 per cent in 2023.²⁰ Notably, the latter share was higher for medium-sized firms, suggesting that large companies tend to rely more heavily on self-financing or alternative sources of funding.

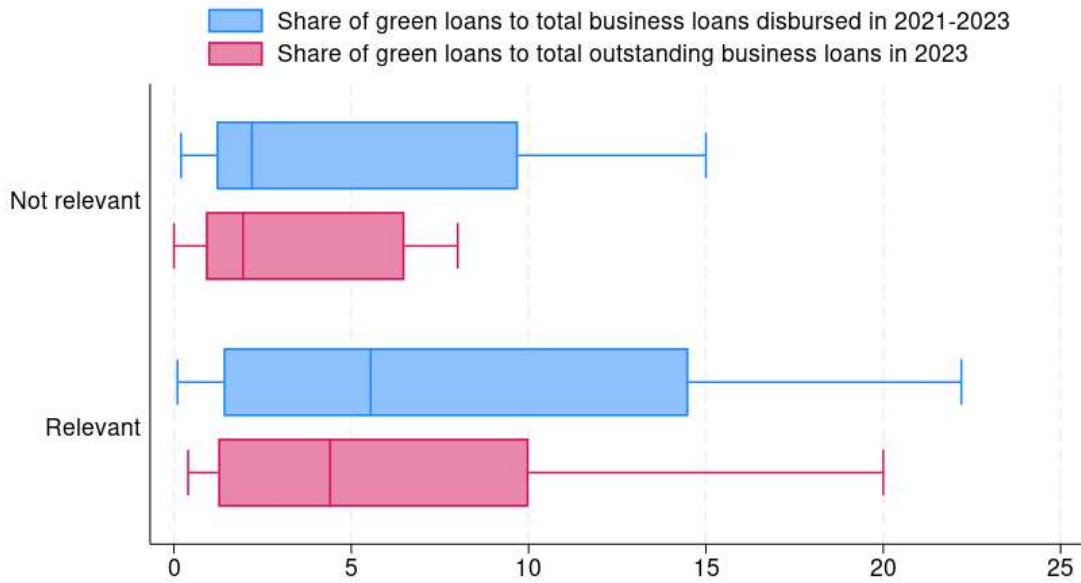
However, the distribution of loans varies across banks. As expected, banks that consider a company’s green targets relevant to lending decisions exhibit a higher incidence of sustainable loans – both in terms of disbursements and outstanding amounts – than the other intermediaries (Figure 5). Moreover, the higher share of disbursements relative to outstanding amounts may indicate an increase in green lending in recent years.

¹⁸ Angelico et al (2025) also show that Italian banks have begun to set long-term strategic goals to reduce greenhouse gas emissions, in line with international and national targets.

¹⁹ The banks that reported data on the incidence of green loans accounted for around 75 per cent of total business loans in the RBLS sample. The average is weighted by each bank’s total outstanding loans.

²⁰ According to the European Banking Authority survey (EBA, 2023), green loans to non-financial corporations accounted for more than 2 per cent of total lending by participating European banks in 2022.

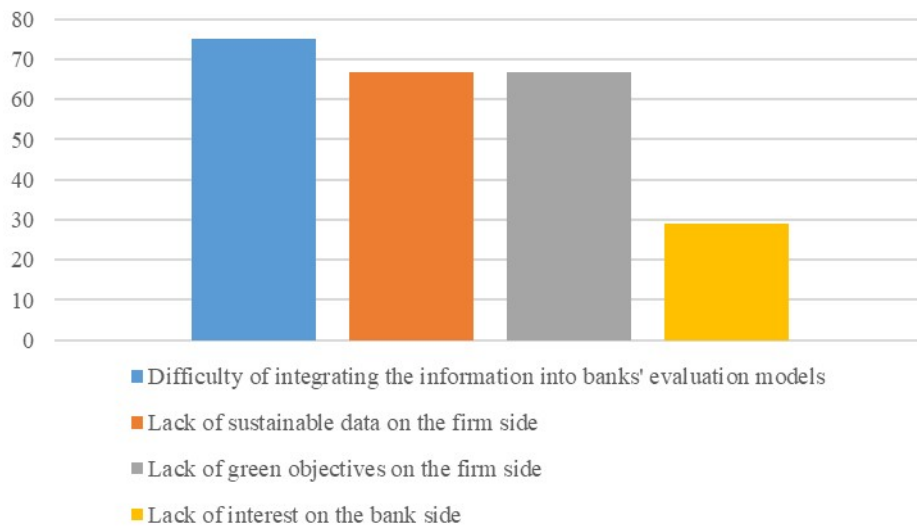
Figure 5. Box-plot of green loan shares by relevance of firms' sustainable goals
(percentages)



Source: Authors' elaboration based on RBLS.

One of the main reasons banks do not take firms' green objectives into account when granting loans is the difficulty of integrating such information into their evaluation models; other reasons include a lack of information and the absence of green targets among companies (Figure 6).

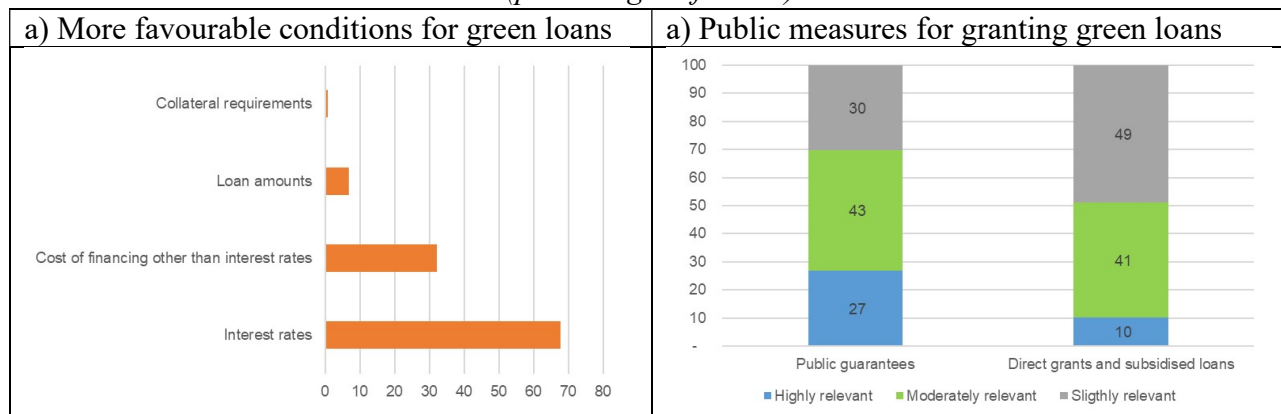
Figure 6. Reasons given by banks for not considering firms' green objectives in their lending activities
(percentages of banks)



Source: Authors' elaboration based on the RBLS. Responses refer to new loans granted during the period 2021–23.

When granted, green loans benefit from more favourable conditions, primarily in the form of lower interest rates.²¹ Furthermore, approximately one third of banks report that public support measures are highly relevant for the granting of these loans (Figure 7).

Figure 7. Terms and conditions of green loans
(percentages of banks)



Source: Authors' elaboration based on the RBLs. Responses refer to new loans granted in 2024.

4. Conclusions and policy implications

Our analysis shows that, on average, 27 per cent of firms undertook environmentally sustainable investment aimed at improving energy efficiency and/or increasing the use or production of renewable energy between 2021 and 2024. A further 11 per cent reported having done so prior to 2021. Participation rises with firm size and is particularly high among activities eligible as transitional under the EU-Taxonomy. Financing remains predominantly internal, though bank credit plays a more significant role for smaller firms; however, the share of green lending by banks remains limited and heterogeneous across intermediaries. The main operational challenge reported by banks is integrating firm-level sustainability information into credit risk models, a difficulty compounded by data scarcity.

These findings carry relevant policy implications. Firms play a crucial role in global efforts to tackle climate change, not only as drivers of technological innovation but also as adopters of green business practices aimed at reducing their environmental footprint. Yet, our evidence suggests that environmentally sustainable investment remains limited, particularly among small and medium-sized firms.

A wide range of actors must be involved to support the green transition of companies, including policymakers, public and private financial institutions, regulators, and others.

Public and private financial institutions are key players in fostering the sustainable finance ecosystem, particularly by supporting SMEs' transition to green practices and by providing non-financial assistance to address the awareness and resource gaps businesses face when seeking out sustainable

²¹ Bartocci et al (2024) use three theoretical models to demonstrate that intermediaries' portfolio decarbonisation strategies, which provide incentives for polluting firms to invest in green technologies, are preferable to a generalised tightening of financing conditions for polluting firms.

finance. Adequate funding can offset the high upfront costs and lengthy payback periods typically associated with resource-efficient processes. Financial support may be provided directly by public entities through loans and equity, or indirectly through guarantees and other instruments that can crowd in private financing.

However, public and private financial institutions face significant challenges in promoting the sustainable transition, particularly for small and medium-sized enterprises. Limited reporting requirements make it difficult to obtain accurate and comparable data on firms' environmental performance. The lack of standardised methodologies and frameworks for integrating ESG factors into investment strategies, combined with the difficulty of incorporating corporate green targets into banks' internal models, adds a further layer of complexity.

Regulatory frameworks should incentivise financial institutions to green their products and portfolios, while ensuring that non-financial disclosure requirements do not place undue burdens on small and medium-sized enterprises, which typically have fewer resources than large companies to devote to compliance. More broadly, regulatory stability and harmonisation can reduce uncertainty, encouraging firms of all sizes to invest in sustainable activities and the financial system to provide adequate funding.

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Appendix A – INVIND questionnaire and EU Taxonomy

Questions in INVIND (waves 2022 and 2023)

Q1. "Between 2021 and early-2023 (/2023) has your company made or planned to make investment with the specific aim of improving energy efficiency and/or increasing the use or production of renewable energy?"

Answers: 1:=yes, but the investment have not yet started; 2:= yes, and the investment are underway; 3:=yes, and the investment have been completed; 4:=no, because these investment have been made in the past; 5:= no, because we consider this type of investment less profitable than other; 6:= no, because we have not found sufficient funds to cover expenses; 7:= no, for other reasons.

Q2. What was the total expenditure on this type of investment in 2021-2022 (/2023)?

Q3. What are the two main sources of funding for this type of investment in 2021-2022 (/2023)?

Answers: 1:=self-financing; 2:= loans from banks or other intermediaries; 3:=equity; 4:=bonds; 5:= public support; 6:= other sources.

Questions in INVIND (wave 2024)

Q1. What was the total expenditure on with the specific aim of improving energy efficiency and/or increasing the use or production of renewable energy in 2023?

An additional tick box is included: “*We made this type of investment, but we are unable to quantify them*”.

Table A1. Activities included in the EU Taxonomy (2020)

<i>Ateco and sector</i>	<i>Transitional flag</i>
AGRICULTURE, FORESTRY AND FISHING	
02.4 Support services to forestry	Transitional
01.2 Growing of perennial crops	Transitional
01.4 Animal production	Transitional
02.10 Silviculture and other forestry activities	Transitional
02.2 Logging	Transitional
02.3 Gathering of wild growing non-wood products	Transitional
02.4 Support services to forestry	Transitional
MANUFACTURING	
20.11 Manufacture of industrial gases	Transitional
20.13 Manufacture of other inorganic basic chemicals	Transitional
20.14 Manufacture of other organic basic chemicals	Transitional
20.15 Manufacture of fertilisers and nitrogen compounds	Transitional
20.16 Manufacture of plastics in primary forms	Transitional
23.51 Manufacture of cement	Transitional

24.1 Manufacture of basic iron and steel and of ferro-alloys	Transitional
24.2 Manufacture of tubes, pipes, hollow profiles and related fittings, of steel	Transitional
24.3 Manufacture of other products of first processing of steel	Transitional
24.42 Aluminium production	Transitional
24.51 Casting of iron	Transitional
24.52 Casting of steel	Transitional
UTILITIES	
35.11 Production of electricity	Transitional
35.12 Transmission of electricity	
35.13 Distribution of electricity	
35.21 Manufacture of gas	
35.3 Steam and air conditioning supply	Transitional
36 Water collection, treatment and supply	
37 Sewerage	
38.11 Collection of non-hazardous waste	
38.21 Treatment and disposal of non-hazardous waste	
38.32 Recovery of sorted materials	
39 Remediation activities and other waste management services	
CONSTRUCTION	
41 Construction of buildings	Transitional
42.11 Construction of roads and motorways	Transitional
42.12 Construction of railways and underground railways	Transitional
42.13 Construction of bridges and tunnels	Transitional
42.91 Construction of water projects	Transitional
43 Specialised construction activities	Transitional
SERVICES	
49.1 Passenger rail transport, interurban	
49.2 Freight rail transport	
49.31 Urban and suburban passenger land transport	
49.39 Other passenger land transport n.e.c.	
49.41 Freight transport by road	
49.5 Transport via pipeline	
50.3 Inland passenger water transport	
50.4 Inland freight water transport	
61 Telecommunications	
62.0 Computer programming, consultancy and related activities	
63.11 Data processing, hosting and related activities	
68 Real estate activities	Transitional

Source: Cerved (2020).

Appendix B – Descriptive statistics

Table B1. Sustainable investment between 2021 and 2023
(percentage of firms)

	1	2	3	4	5	6	7	Total
<i>Number of employees</i>								
20-49	15	12	9	13	2	3	45	100
50-99	22	13	10	13	1	3	38	100
100-249	20	21	9	9	1	2	39	100
More than 249	20	34	10	10	1	1	25	100
<i>Firm sector</i>								
Food products	28	31	12	11	1	2	16	100
Textiles	19	13	8	21	2	3	34	100
Chemical and plastic products	19	23	11	17	3	2	25	100
Non-metallic mineral products	25	12	9	11	1	3	40	100
Machinery	20	15	10	16	2	3	34	100
Other manufacturing	20	20	12	15	2	7	25	100
Energy	21	24	5	11	2	3	34	100
Trade	15	11	13	14	1	2	43	100
Accommodation and restaurants	17	21	13	6	4	3	37	100
Transportation	14	11	5	10	2	3	55	100
Real estate and IT	11	5	4	7	0	2	71	100
<i>EU Taxonomy</i>								
Non-eligible	18	14	10	13	2	3	41	100
Eligible and non-transitional	14	10	5	9	2	3	57	100
Eligible and transitional	18	32	7	15	1	3	25	100
<i>Riskiness in 2019</i>								
Safe	16	15	12	14	1	1	40	100
Sound	19	15	10	12	2	2	41	100
Vulnerable	17	15	8	11	1	4	44	100
Risky	18	8	5	17	4	9	39	100
Total	17	14	9	12	2	3	42	100

Source: Authors' elaboration based on INVIND. The table shows the distribution of firms' responses in waves 2022 and 2023 to the question: "Between 2021 and early 2023 (/2023) has your company made or planned to make investment with the specific aim of improving energy efficiency and/or increasing the use or production of renewable energy?" Answers: 1:=yes, but the investment have not yet started; 2:= yes, and the investment is underway; 3:=yes, and the investment has been completed; 4:=no, because this type of investment have been made in the past; 5:= no, because we consider this type of investment less profitable than others; 6:= no, because we have not found sufficient funds to cover expenses; 7:= no, for other reasons. Statistics are weighted by sampling weights. Rounding may cause discrepancies in totals.

Table B2. Sustainable investment between 2021 and 2024*(percentage of firms)*

	<i>(percentage of firms)</i>				<i>Number of employees</i>			
	2021-22	2023	2024	Total	20-49	50-99	100-249	More than 249
<i>Number of employees</i>								
20-49	60	59	58	59	-	-	-	-
50-99	18	18	20	19	-	-	-	-
100-249	12	13	13	13	-	-	-	-
More than 249	9	10	9	10	-	-	-	-
<i>Firm sector</i>								
Food products	9	8	7	8	9	6	7	5
Textiles	6	4	6	5	5	8	5	4
Chemical and plastic products	6	6	6	6	5	7	10	8
Non-metallic mineral products	1	1	1	1	1	2	1	2
Machinery	21	23	23	22	19	27	27	24
Other manufacturing	8	7	5	6	7	6	5	4
Energy	2	4	3	3	2	2	4	7
Trade	19	19	15	17	16	21	16	16
Accommodation and restaurants	12	14	11	12	18	4	3	1
Transportation	11	9	15	12	12	9	14	17
Real estate and IT	5	5	8	6	5	7	7	11
<i>EU Taxonomy</i>								
Non-eligible	90	91	88	89	91	92	85	80
Eligible and non-transitional	8	5	9	7	6	6	10	14
Eligible and transitional	3	4	3	3	3	3	5	6
<i>Riskiness in 2019</i>								
Safe	34	31	31	32	32	32	31	32
Sound	37	35	37	36	35	38	42	37
Vulnerable	25	31	28	28	30	26	24	26
Risky	4	3	5	4	4	3	4	5
Total	100	100	100	100	100	100	100	100

Source: Authors' elaboration based on INVIND. The table shows the distribution of firms that made green investment between 2021 and 2024. Statistics are weighted by sampling weights. Rounding may cause discrepancies in totals.

Table B3. Linear regression of the probability to make sustainable investment between 2021 and 2024

	<i>Coefficient</i>	<i>P-value</i>	<i>95%-C.I.</i>
Eligible and non-transitional	-0.076	0.010	[-.085 -.066]
Eligible and transitional	0.094	0.007	[.081 .108]

Source: Authors' elaboration based on INVIND. The dependent variable is a dummy equal to 1 if the firm reported having completed, started, or planned investment between 2021 and 2023, or having a positive expenditure in 2024. Activities are classified according to the EU 2020 Taxonomy ('non-eligible' if not included in the Taxonomy, 'eligible and transitional' and 'eligible and non-transitional' if included, with or without the 'transitional' flag). The regression includes dummies for firm size, sector and geographic area. Estimation is weighted by sampling weights.