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(Markets, Infrastructures, Payment Systems)

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Survey evidence from Italy

by Francesca Colletti, Francesco Columba, Manuel Cugliari, Alessandra Iannamorelli,
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DO FIRMS CARE ABOUT CLIMATE CHANGE RISKS? SURVEY EVIDENCE FROM ITALY

by Francesca Colletti,^{*} Francesco Columba,^{**} Manuel Cugliari,^{**}
Alessandra Iannamorelli,^{**} Paolo Parlamento^{**} and Laura Tozzi^{***}

Abstract

This paper presents the findings of a survey on climate change risk management by Italian non-financial corporations, which was conducted by Banca d'Italia in 2024. The firm-level findings allow for a more accurate assessment of climate-related risks and of their impact on creditworthiness. The survey reveals widespread shortfalls in emission and physical risk management, transition planning, and governance. Many firms that are not insured against physical risk tend to underestimate it. Moreover, the approaches to climate change risk management exhibit marked heterogeneity, reflecting differences in governance structure and across sectors and regions. Finally, the findings suggest that climate sustainability commitments, if not accompanied by measurable progress, do not necessarily improve a firm's creditworthiness. The information processed for this work will be used to better integrate climate change risks within Banca d'Italia's In-house Credit Assessment System (ICAS).

JEL Classification: G32, Q51, C83.

Keywords: credit risk, climate change risks, survey methods.

Sintesi

Il lavoro presenta i risultati di un'indagine condotta dalla Banca d'Italia nel 2024 sulla gestione dei rischi climatici da parte delle imprese non finanziarie italiane. I risultati a livello aziendale consentono una valutazione più accurata dei rischi climatici e del loro effetto sul merito di credito. L'analisi segnala carenze diffuse nella gestione delle emissioni e dei rischi fisici, nella pianificazione della transizione e nella governance. Molte imprese prive di copertura assicurativa tendono a sottovalutare il rischio fisico. Inoltre, gli approcci alla gestione del rischio climatico sono caratterizzati da una pronunciata eterogeneità, riflettendo differenze nei modelli di governance, tra settori, tra aree geografiche. Infine, i risultati suggeriscono che gli impegni ad accrescere la sostenibilità climatica, se non accompagnati da progressi misurabili, non migliorano necessariamente il merito di credito di un'impresa. Le informazioni elaborate in questo lavoro saranno utilizzate per rafforzare l'integrazione dei rischi climatici nel sistema ICAS della Banca d'Italia.

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1. Introduction¹

This paper presents the results of a survey devoted to climate change risk management practices by Italian non-financial corporations (NFCs). The survey was conducted in 2024 as part of the ongoing efforts of the In-house Credit Assessment System of Banca d'Italia (ICAS) to integrate climate change risks into its evaluation process, using high-quality data.

On an annual basis ICAS produces ratings for about 4,000 firms, in two steps (Narizzano *et al.*, 2024). In the first step, a statistical model calculates the individual probability of default (PD) with a one-year horizon, based on financial information and credit register data. In the second step, two analysts examine further information and set the final rating. In complex cases, the rating is subject to the review of a rating committee for the final decision. So far, in the second step, ICAS has applied a top-down approach for climate risk assessment, using sector-level data on climate change risks (CCR), with limited use of firm-level data.²

Climate transition and physical risks affect firms' creditworthiness, via the impact on economic and financial performance, and business model. The integration of climate-related risks into credit risk assessment presents two main challenges. The first one pertains to methodological issues, such as those related to the design of scenarios for climate change risks, the endogeneity of such risks, and the non-linearity of climate effects.³ The second challenge is the scarcity of firm-level data on climate change risks (Angelini, 2022b, 2023; Lavecchia *et al.*, 2022).⁴ To address these challenges, the Eurosystem has set minimum common standards for integrating climate change risks into the in-house credit assessment systems managed by national central banks (NCBs).⁵ Such systems are a credit assessment source for collateral in monetary policy operations; the largest commercial banks and the rating agencies also maintain systems to that purpose (Giovannelli *et al.*, 2020).

In 2024 Banca d'Italia carried out an experimental survey to collect information on firms' greenhouse gas emissions, energy consumption, financial impact of climate extreme events and qualitative information

¹ We thank Paolo Del Giovane, Antonio Scalia and an anonymous referee for useful comments and suggestions.

² Top-down approaches incorporate climate risk into credit assessment using sector-level or macroeconomic data, applying broad adjustments across portfolios to capture systemic risk but with limited firm-specific detail. In contrast, bottom-up approaches integrate firm-specific data, such as emissions and adaptation plans, into credit assessment for tailored analysis of climate risks, though they require high-quality, granular data (Auria *et al.*, 2021). A bottom-up approach for ICAS climate risk methodology has been developed. However, it is currently being applied only to firms participating in the EU Emissions Trading System (EU-ETS), due to the availability of firm-specific emissions data (Cugliari *et al.*, 2024).

³ The design of climate scenarios involves methodologies whose development is not settled yet, endogeneity refers to the mutual influence between climate policies and economic behaviors, and non-linearity describes how climate effects can rapidly escalate beyond certain thresholds (Monasterolo, 2020).

⁴ The sustainable data gap for analysing climate change and sustainable finance includes deficiencies in availability, usability, access, and reliability of information (Network for Greening the Financial System - NGFS, 2021), also in Italy.

⁵ See ECB (2022). ICAS systems are currently used by the central banks of Austria, France, Germany, Greece, Italy, Portugal, and Spain.

on corporate governance and organization. The objective of the survey was to enhance the evaluation of the impact of CCR on credit risk and improve the accuracy of ICAS ratings by means of granular firm-level data to be used in assessments for 2025.⁶ This approach overcomes the limitations of the use of sectoral averages.

This paper presents the results of the survey and shows how they contribute to the evaluation of climate-related risks. The survey identifies some shortfalls in Italian firms' climate risk management, such as in emission reporting and insufficient physical risk mitigation, highlighting significant differences with the results expected on the basis of the available sectoral data.

According to the survey, in the manufacturing sector two thirds of the firms have governance bodies that deal with CCR; in the services and agriculture sectors only half of the firms do. Less than half of the firms track their emissions and almost all of them belong to sectors with high emissions; firms that do not track emissions often deem them as being irrelevant or cite resource constraints. Stronger governance practices and investments in emission reduction are more common in firms of higher credit worthiness; only a minority of firms have formalized transition plans to achieve their climate goals.

The survey also reveals a disconnect between firms' perceived exposure to physical risks and the potential impact of extreme climate events. Most firms report low risks, despite one third of them being associated with medium or high physical risk,⁷ yet they acknowledge potentially large disruptions to production capacity, especially in the agriculture and manufacturing sectors. This evidence indicates that substantial progress is still required in firm governance and data reporting in order for self-assessed climate risk evaluations to be usefully integrated into credit risk assessment.

The survey responses illustrate the advantages of incorporating firm-level data into ICAS in the place of currently available proxies. Regarding transition risk, PDs based on individual survey data significantly differ from those estimated with sectoral averages. Sectoral data lead to an overestimation of PD compared to the granularly estimates PD for 48 per cent of the firms in the survey and an underestimation for 52 per cent of them. The mean and standard deviation of granular PDs are higher than for sectoral PDs.⁸ We believe individual survey data also allow for a more accurate assessment of firm exposure to physical risks than that based on sectoral data. Incorporating precise survey information on weather-related damage and mitigation measures leads to an override of third-party scores for around 25 per cent of physical risk assessments.

These results support the use of climate change survey data, for participating firms that responded to the survey, for the purposes of ICAS, especially for firms that do not publish the non-financial statement, at

⁶ The sample of surveyed firms was targeted to maximize the amount of potential collateral to be assessed; as such, the findings cannot be used for statistical inference on Italian NFCs as the sample is not random nor stratified.

⁷ The firms' exposure to physical risk considers its headquarters and local units' locations, with their relevance estimated based on the number of employees.

⁸ The two figures are, respectively, 0.19 and 0.65 for granular PDs and, respectively, 0.03 and 0.07 for sectoral PDs.

least until more systematic firm-level information on CCR becomes available. In the coming years, in fact, a number of initiatives are expected to increase the availability and quality of this type of information, including the Corporate Sustainability Reporting Directive (CSRD)⁹ and, in Italy, the ‘MoF Platform on Sustainable Finance’.¹⁰

The paper is organized as follows: section 2 outlines the structure of the survey; section 3 describes the sample; section 4 provides details on the respondents; section 5 presents the main results; section 6 analyses the impact of granular data on climate risk-adjusted PDs; section 7 concludes.

2. Structure

The survey launched by Banca d’Italia intends to collect granular information from firms on CCR and other qualitative data not otherwise available. Given the experimental nature of the survey, a limited number of firms among those assessed by ICAS was contacted, selecting the most relevant ones in terms of collateral. Participation in the survey was voluntary, but it was incentivized by supplying the respondents with a feedback report comparing individual responses to those of a reference group.

The survey has two sections: (i) a first one on CCR; (ii) a second section on corporate governance and other qualitative information. The climate section consists of 13 questions which span seven areas: i) the existence of dedicated internal climate committees; ii) the monitoring of greenhouse gas (GHG) emissions;¹¹ iii) energy consumption data;¹² iv) the assessment of physical risks and the firm’s ability to manage them; v) the investments in energy transition to assess the firm’s commitment to reducing its carbon emissions; vi) the emission targets; vii) the participation in the Emissions Trading Scheme (ETS).

The second section investigates corporate governance and organizational aspects that are relevant for credit risk assessment of the firm. This section includes 12 questions that explore three areas: i) the firm’s strategic positioning and competitive advantage; ii) the communication with stakeholders; iii) the economic and financial outlook.

⁹ CSRD has updated and expanded the scope of the Non-Financial Reporting Directive (Directive 2014/95/EU, NFRD) by requiring reporting for large, listed, companies from 2025, for large, unlisted, companies from 2026, for small and medium-sized companies listed from 2027. Approximately 2,000 firms evaluated by ICAS should report such data by 2027. However, in February 2025 the EU Commission proposed to simplify sustainability reporting requirements removing around 80 per cent of companies from the scope of CSRD. These changes are subject to approval by the European Parliament and EU Member States.

¹⁰ The initiative is chaired by the Ministry of Economy and Finance (MoF) and involves the Ministry of Environment and Energy Security, the Ministry of Enterprises and Made in Italy, Banca d’Italia, the Italian Companies and Stock Exchange Commission (CONSOB), the Institute for the Supervision of Insurance (IVASS), and the Italian Pension Fund Supervisory Authority (COVIP). Recently, the [Sustainability Dialogue between SMEs and Banks](#) was published by the MoF Platform on Sustainable Finance. The document aims to support SMEs in gathering and producing information on environmental, social, and governance (ESG) impacts, facilitating dialogue with banks on sustainability issues and improving access to financing.

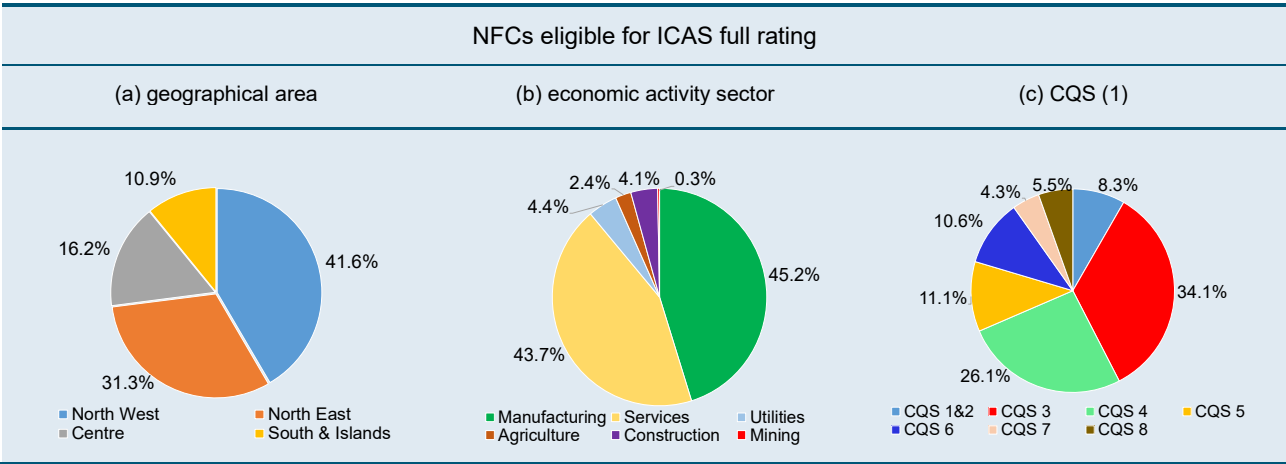
¹¹ Including both direct and indirect emissions (Scope 1 and 2).

¹² Renewable sources are distinguished from non-renewable sources to assess the carbon footprint.

3. Sample

To define the survey sample, we considered the 5,040 NFCs eligible for an ICAS full rating in 2024 (Fig. 1).¹³

Figure 1



Source: Non-financial corporations eligible for ICAS full rating in 2024.
 (1) Credit Quality Steps (CQS) are the credit risk categories defined by the Eurosystem to classify assets eligible as collateral in monetary policy operations. The scale ensures the comparability of credit assessments across all accepted systems, such as ECAIs, IRB systems, and ICASs. CQS 1&2 and CQS 3 correspond approximately to ECAI ratings from AAA to AA– and from A+ to A–, respectively.

The survey sample is designed to address specific information gaps for the ICAS expert assessment. Hence the sample is not stratified and it should therefore not be used for statistical inference about the population of all Italian NFCs.

We selected a candidate group of 1,102 firms from the ICAS sub-sample that we had initially identified,¹⁴ aiming to obtain responses from 680 firms, balancing the need for a sufficient number of valid responses with the goal of containing the survey costs.¹⁵ The firms were selected with the following criteria: a) non-

¹³ Chosen according to criteria based on characteristics of the firm and of the associated loans eligible for use as collateral from the 370,000 firms assessed with the statistical model.

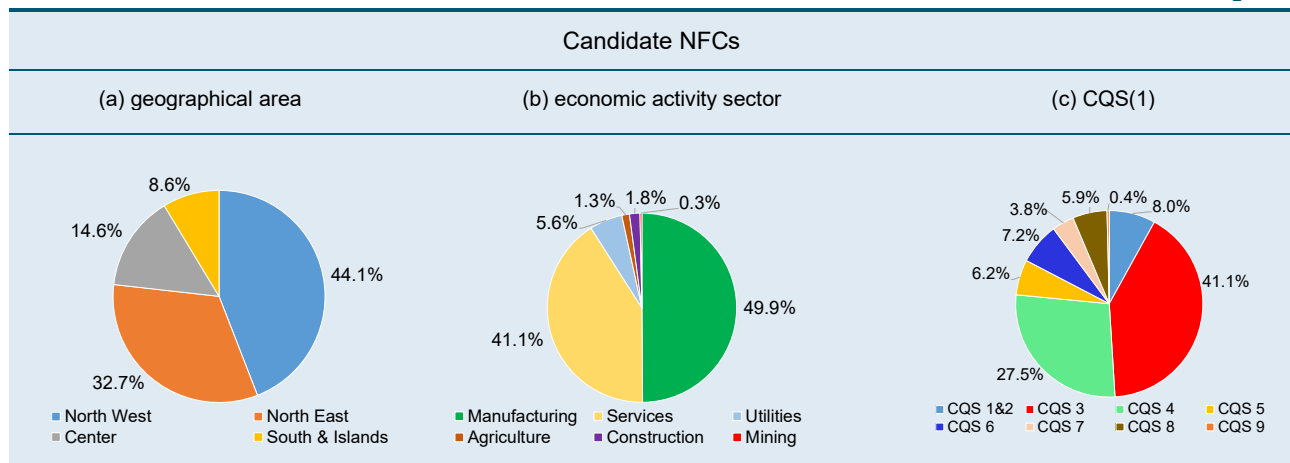
¹⁴ Initially, 1,912 firms stood out as the most interesting for ICAS and selected according to purposive sampling, 871 were assessed relevant for climate change risks and 1,041 for governance and organizational aspects. The relevant companies for climate change risks were identified as being ex ante exposed to transition or physical climate risks based on Di Virgilio *et al.* (2024), external ratings, or third-party climate risk assessment services. Following the ineligibility criteria of the American Association for Public Opinion Research (AAPOR, 2023; Smith T.W., 2023), for example, in cases where the company could not be reached or was no longer operational, only 1,102 firms were included in the candidate group (95 companies were also included in the Banca d'Italia - Survey of Industrial and Service Firms in 2023, the so called Invind Survey).

¹⁵ The target included 540 significant firms in terms of climate change risk (with particular reference to exposure to transition risk and participation in the EU ETS) and the remaining 140 chosen for qualitative significance (including those with the highest statistical ratings or with a possible role as a parent company).

default status;¹⁶ b) medium or large size;¹⁷ c) relevance for monetary policy, based on the collateral exposure of the lending banks. The survey was conducted by ICAS analysts in the regional branches between February and June 2024.¹⁸

Figure 2 shows the distribution of the candidate NFCs by geographical area, sector, and credit quality step (CQS). Additional details on the characteristics of the candidate group are provided in Table a2 in the Appendix.

Figure 2



Source: Non-financial corporations eligible for ICAS full rating in 2024.

(1) Includes CQS9 as some firms have gone into default since the start of the survey.

4. Respondents

The NFCs that responded to the survey are 577, more than half of the contacted firms, and not far from the target of 680.¹⁹

¹⁶ The BI-ICAS default definition relies on Article 178 of the Capital Requirements Regulation (CRR), which sets forth that a default occurs when a bank considers that the obligor is unlikely to pay its credit obligations or the obligor is past due more than 90 days on any material credit obligation to the bank (Auria *et al.*, 2021). A new harmonized definition of ‘fractional default’ has been introduced for evaluating the performance of ICAS models in the yearly Eurosystem CCAF monitoring process (Narizzano *et al.*, op. cit.).

¹⁷ According to Commission Recommendation 2003/361/EC, large companies are those with over 250 employees and revenues above €50 million or assets over €43 million, while medium-sized firms have 50–250 employees and revenues or assets between €10 million and €50 million.

¹⁸ Analysts reached out to companies by sending out questionnaires, followed by phone contact.

¹⁹ In the absence of statistical objectives and due to the non-priority nature of certain questions, even a single response is considered valuable, as it provides otherwise unavailable information that ICAS analysts can use in creditworthiness assessments (AAPOR, 2023; Ballin M. *et al.*, 2000). The survey was submitted to 1,102 NFCs. The response rate can be considered satisfactory as it is not far from that obtained in other Banca d’Italia surveys, in which there is often a significant share of collaborative firms for several years (e.g. the participation rate was 64.2, 62.2 and 69.6 per cent, respectively, for industrial, service and construction firms in the Banca d’Italia’s 2023 Survey of Industrial and Service Firms, the so-called Invind).

The number of responses declined slightly as the questionnaire progressed beyond the first question, it dropped after reaching 80 per cent of questions answered (Table 1). The most significant reduction occurred in the climate section, where some questions required detailed responses.²⁰

Table 1

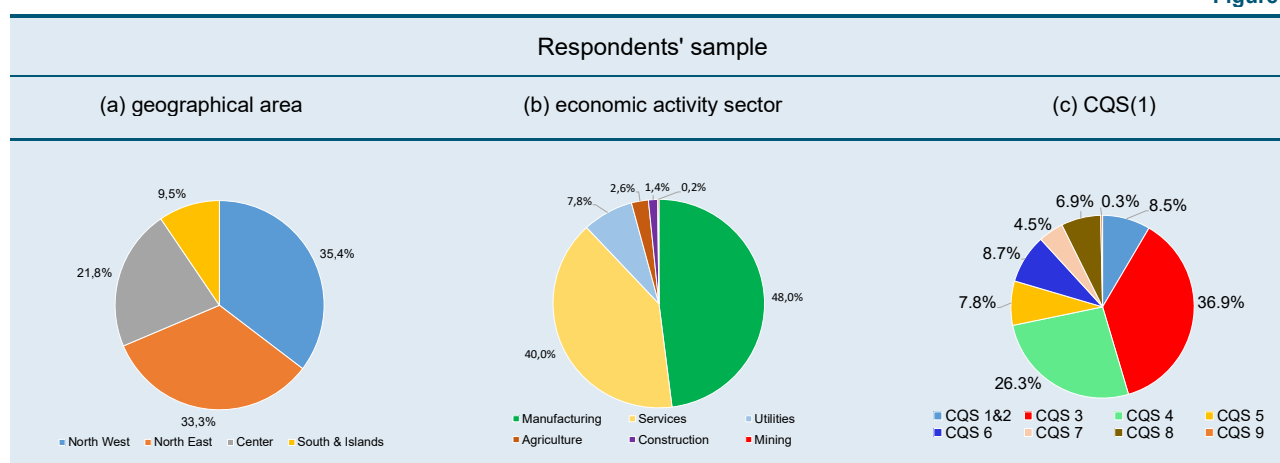
% of completed answers	Responses			
	Climate section	Corporate governance section	Both sections	Only one section (1)
At least 1 answer	569	546	538	577
30	536	536	525	547
50	525	536	522	539
60	523	536	520	539
70	515	536	512	539
80	479	533	475	537
90	288	527	285	530
100	55	509	55	509

Source: ICAS Survey.

(1) The column "only one section" reports the cases in which firms responded either to the climate section or to the corporate governance section,

Regarding the geographical distribution, 69 per cent of respondents are from the northern regions, a slightly lower share compared to the ICAS population distribution (73 per cent). As for the distribution across sectors, nearly half of the responses are from the manufacturing sector (48 per cent), followed by services (40 per cent), in line with the distribution within the ICAS population. From a credit quality perspective, 63 per cent of respondents are in the intermediate risk classes (Fig. 3),²¹ as in the ICAS sub-sample.

Figure 3



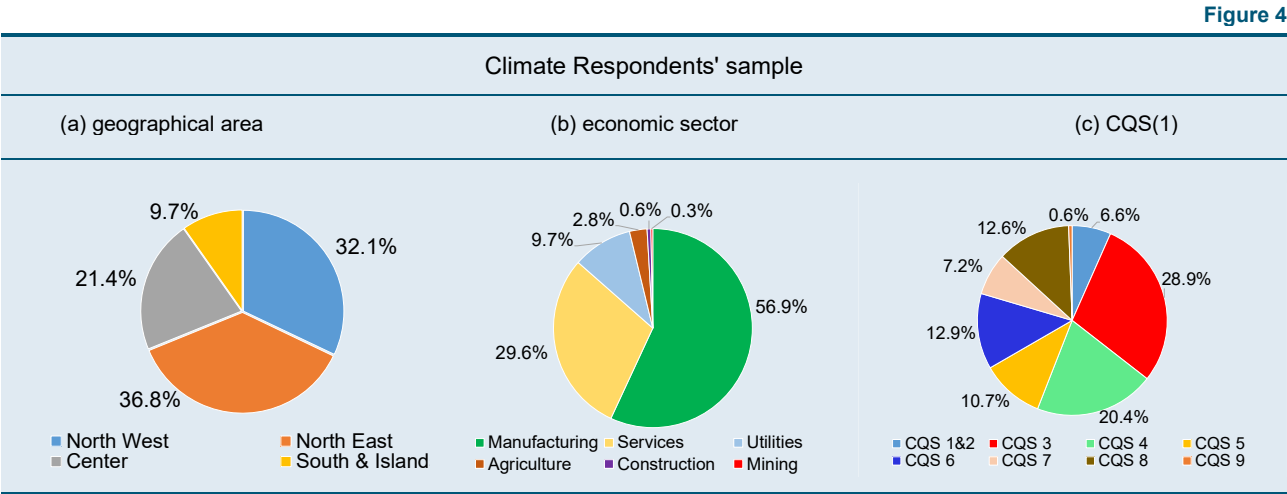
Source: ICAS Survey.

(1) Includes CQS9 as some firms have gone into default since the start of the survey.

²⁰ Questions on energy consumption and emissions required detailed internal data that some firms, particularly those without established environmental reporting, found difficult to provide.

²¹ CQS 3 and 4.

The share of respondents to the climate section that operate in the manufacturing sector is 57 per cent of the section and the share in the higher credit quality steps is 35 per cent (CQS 1-3, Fig.4).



Source: ICAS Survey
(1) Includes CQS9 as some firms have gone into default since the start of the survey

Conversely, the firms that responded to the corporate governance section are more concentrated in the services sector and more creditworthy.²²

5. Results

This section presents the main findings of the survey. The results provide insights into how Italian firms approach climate-related risk governance, emission monitoring, and qualitative aspects relevant to the ICAS framework.

5.1 Climate Change Risk Governance

The first section of the survey investigates how firms manage climate risk. 565 firms (98 per cent of the respondents) provided an answer regarding the presence of a governing body responsible for climate-related risk management.

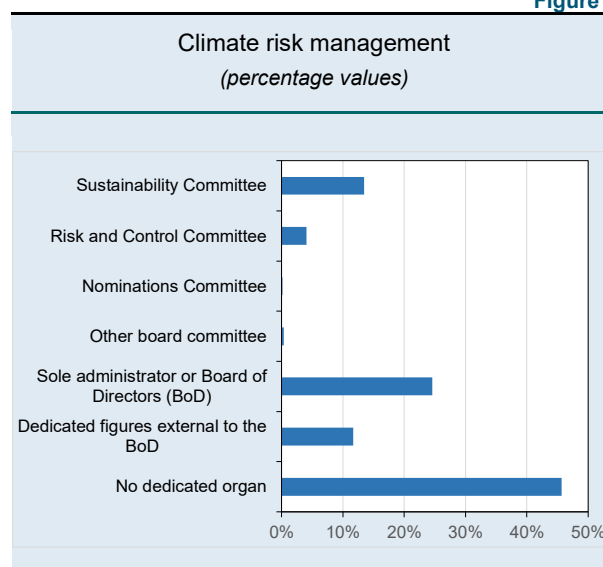
²² For additional details on the respondents’ sample, see Tables a3-a5.

Figure 5

The results indicate in many cases the absence of designated structures: 46 per cent of the NFCs report

no governance structure specifically tasked with climate risk management (Fig. 5). This gap is prominent in the services and agricultural sectors, where 58 and 60 per cent of firms, respectively, lack a designated governance body; the share drops to 35 per cent in manufacturing. A minority of firms (25 per cent) indicate that they have structures exclusively devoted to climate risk management (sustainability committee or dedicated figures external to the Board of Directors, BoD), more frequently in the

manufacturing sector. Additionally, in nearly one-third of the firms, climate-related responsibilities are integrated into existing governance bodies (risk and control committee, nominations committee, other board committee, sole administrator or BoD).



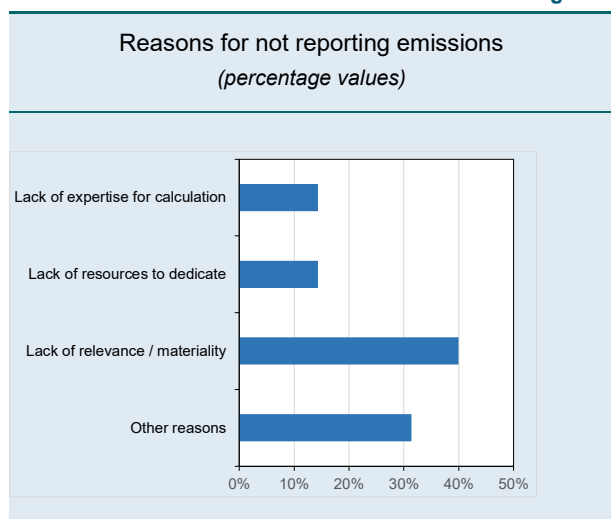
Source: ICAS Survey

The absence of designated bodies is less frequent among firms with higher credit quality scores: only 37 per cent of the NFCs in Credit Quality Step (CQS) 1&2 and 39 per cent in CQS 3 report no specific climate governance roles. In contrast, the share rises to 73 per cent in CQS 6 and 62 per cent in CQS 7 and 8. This pattern should not be interpreted as an indicator of a causal relation: lower attention to climate risks does not necessarily lead to lower credit scores. Causality, if any, may also be running in the opposite direction (reverse causality): NFCs with better credit profiles may naturally adopt stronger governance practices, including those related to climate risks, due to a broader attention to organizational resilience.

5.2 Emission Accounting

Another section of the survey examines the tracking of direct and indirect greenhouse gas emissions (Scope 1 and Scope 2 emissions, respectively). Of the 554 respondents to this section of the questionnaire, only 44 per cent state that they track emissions and only one tenth of the remaining firms plan to begin the tracking; awareness and prioritization of climate risks thus show ample room for improvement. **Emission accounting is more widespread in the manufacturing sector, where the majority of firms (54 per cent) monitor their emissions.**

Figure 6



Source: ICAS Survey.

Of the firms that do not track emissions, 40 per cent cite “lack of relevance or significance” as the primary reason and 14 per cent the lack of skills or resources (Fig. 6). Among the firms that do not track emissions only three per cent belong to low-emission sectors,²³ 81 per cent belong to medium-emission sectors and 16 per cent belong to high-emission sectors.²⁴ The firms in sectors with high emissions report that the lack of tracking is due in 22 per cent of the cases to their own emissions being not significant²⁵ and in 24 per cent of cases to the lack of skills or resources.

5.3 Investments in Emission Reduction

The survey also examines firms’ investments towards reducing their greenhouse gas emissions (“eco-sustainable investments”). Among the 524 respondents to this question, 40 per cent report having made such investments in 2023. **Investments in emission reduction are more common among firms with higher credit quality scores:** 55 per cent of the respondent NFCs with CQS 1&2 and 46 per cent of those with CQS 3 invest in such initiatives. This finding may suggest a relation between credit quality and the (willingness and) capacity to allocate resources to emission reduction, though it is unclear whether stronger credit profiles act as an enabling factor for such investments or whether the underlying organizational strength supports both creditworthiness and sustainability.

In addition, the survey revealed that large firms are more financially committed in reducing their environmental impact; about 80 per cent of the companies that made investments towards reducing their greenhouse gas emissions in 2023 were large. This finding aligns with the ECB’s Survey on the Access to Finance of Enterprises (SAFE; Ferrando *et al.*, 2023).

On average, firms indicate 1.4 financing instruments. **Self-financing is the most common funding source for investments towards reducing own emissions**, reported by 75 per cent of firms, followed by bank loans, indicated by 45 per cent of respondents. Public funding is used by only 11 per cent of the firms; this share rises in Southern Italy and the Islands to 27 per cent of the respondents. **Firms with better CQS scores favour self-financing (91 per cent); those with CQS 3 to 5 rely more on bank loans.** Financing instruments such as bonds and equity are less common yet finance substantial portions

²³ The classification of the sectors with low, medium and high emissions is described in Di Virgilio *et al.* (2024).

²⁴ Of these firms in high emission sectors, 34 per cent belong to the land transportation sector, 26 per cent to the metal sector, 16 per cent to the chemical sector.

²⁵ This may be the case, for example, for firms operating in paper production or in the metallurgical industry, generally considered as high-emissions entities.

of investments when used. Specifically, bonds fund on average 39 per cent of investment, equity 66 per cent and inter-firm financing over 70 per cent (Table 2). Only 11 per cent of firms resorts to public funding, which on average covers only 37 per cent of eco-sustainable investments. These results confirm the findings for the euro area from SAFE, which identifies public subsidies to climate-related investment as insufficient.

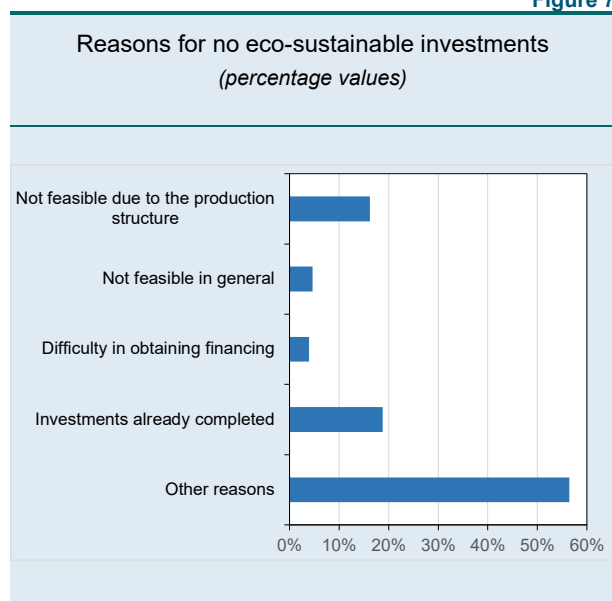
Table 2

Type of financing	Firms (1)	Average share of investment (2)
Self-financing	75.4	73.5
Interfirm financing	5.8	70.6
Banks and other financial intermediaries	45.4	70.9
Issuance of bonds and similar instruments	1.9	38.6
Equity	0.5	66.0
Public funding	11.1	37.1
Other	4.3	72.6

Source: ICAS survey.

(1) Percentage of firms using the specific financing instrument; - (2) Average share of investments financed by this financing instruments, calculated only for firms using it.

Figure 7



Source: ICAS Survey

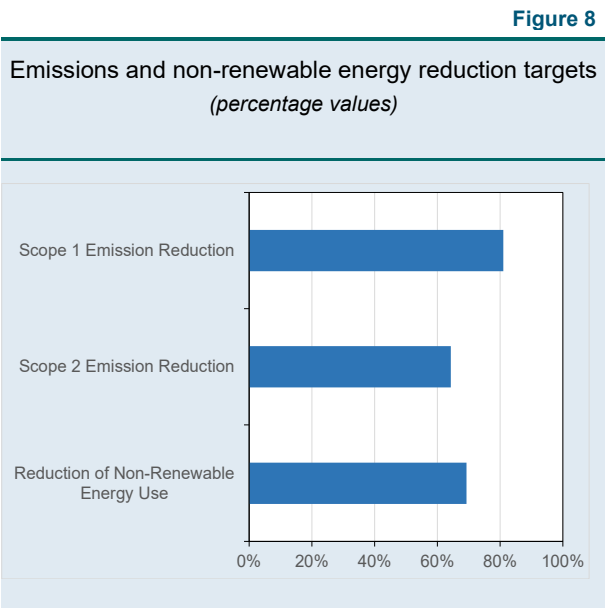
For firms that do not invest in the reduction of emissions, 56 per cent cite “other reasons”, including ongoing planning due to regulatory uncertainty. This is consistent with the idea that a clear regulatory framework could stimulate investment. Additionally, 16 per cent of the respondents report that further investments are not economically viable due to the nature of their production processes, highlighting sector-specific challenges (Fig. 7).

5.4 Investment Forecasts for the Energy Transition

In terms of economic outlook, 76 per cent of responding firms provide forecasts for own investments in the energy transition. Among these, 43 per cent plan no new investments, 25 per cent plan to increase their investment flows, and 24 per cent expect to maintain current flows. **Only a small portion foresees reducing their annual investments**, while 19 per cent of the companies that reported no investments in the previous year foresee them in the future.

5.5 Long-term Goals

Among the 519 respondents to this question, 43 per cent have set emission reduction targets for the



Source: ICAS Survey

next five years. These targets are more widespread in the construction and manufacturing sectors (63 and 51 per cent, respectively) and less frequent in the services sector (33 per cent). Over two-thirds of firms in CQS 1&2 have set targets, while this share declines significantly for firms in lower CQS. For the firms with established targets, the majority (over 80 per cent, Fig. 8) expect reducing Scope 1 emissions relative to 2023. Nearly three-fifths of respondents report having no emission reduction targets; a similar share has not made any related investments.

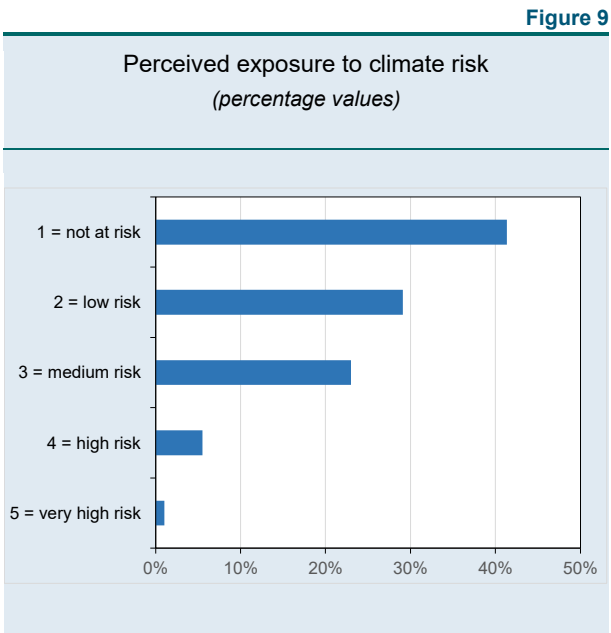
Just over 60 per cent of the respondents expect a reduction in Scope 2 emissions or in the use of non-renewable energy sources.

Among firms that have set emission reduction targets for the next five years, however, only a limited number of firms have formalized a plan to achieve these goals, more often in the manufacturing sector. **No clear relation emerges between having defined a transition plan and the firm CQS score.** Many firms appear to lack the governance and resources necessary to translate the objectives into actions, regardless of the credit standing; more than half of the firms that have not defined a plan in fact have not identified a body responsible for following up on sustainability issues.

5.6 Physical Risk

Among the 541 respondents to this question, 25 per cent of firms report to have suffered direct damages from extreme weather events over the past five years, with a higher incidence in the North-East and North-West areas. However, the impact on productive capacity is low, with more significant effects in the agriculture and utilities sectors.

In terms of perceived exposure to physical climate risk, 70 per cent of the firms indicate a low or zero risk level; of these 68 per cent, according to data based on ISPRA maps, appear to be in areas



Source: ICAS Survey

with low physical risk, 19 per cent in medium risk areas and 13 per cent in high risk areas.²⁶ Only one per cent of firms, all in northern Italy, assess their exposure as very high (Fig. 9). To evaluate the accuracy of this risk perception, self-assessed risk scores (on a 1-to-5 scale) are compared with those from an external provider. Across the 432 respondents to this question, 29 per cent show alignment between internal and external scores; 35 per cent of firms underestimate the risk compared with the external provider, while 36 per cent overestimate risk. This symmetric distribution reveals no systematic bias, but rather a prevailing misalignment between perceived and externally assessed exposure. The divergence is particularly evident among firms operating in areas with a high physical risk: although nearly one-fifth of the respondents operate in such areas, more than two-thirds of them perceive their exposure as minimal, and the majority of those acknowledging some exposure report only limited expected impacts on production capacity.²⁷ These findings suggest that firms' perception of climate-related physical risk may be disconnected from objective indicators of exposure and vulnerability, although we are not in a position to verify this possibility.

Despite the moderate risk perception reported by firms, the potential impact of extreme climate events on productive capacity is assessed as more substantial: based on the 279 responses received to the dedicated question, the average estimated impact is 19 per cent. This apparent contradiction may stem from the distinction between perceived probability ("exposure") and perceived severity ("vulnerability"): firms may consider the occurrence of extreme events unlikely, yet still recognize their potentially significant consequences on operations if such events were to materialize. These estimates of the potential impact of extreme climate events are significantly higher than the damages reported over the past five years, likely reflecting either an underestimation of past losses or expectations of worsening climatic phenomena.

The discrepancy between the low perceived risk and the high expected impact may reflect the coexistence of limited recent experience and growing awareness of the potential consequences of extreme events. This could be due to heightened salience of recent climate disasters without excluding a dynamic adjustment of expectations over time. Although the recent impacts on productive capacity have been limited, firms may be factoring in the growing intensity of climate-related risks. This apparent contradiction may reflect cognitive and structural aspects of risk perception. Firms may perceive low risk based on the limited frequency of past events, influenced by short institutional memory and a lack of recent direct experience. At the same time, recent high-impact disasters – widely reported in the news and socially salient – may amplify their perception of potential severity (Kunreuther *et al.*, 2014).

²⁶ The firms answer for the group, if existing, to which they belong. We compare the survey responses with data based on ISPRA risk maps.

²⁷ The external provider assigns a five-tier score based on the geographical location of the company's headquarters and any secondary sites (for the latter, information on the number of assigned employees, where available, is used to estimate their relative importance). For the purposes of this paper, firms with a score in the two lowest tiers are classified as 'high physical risk'.

From a modelling perspective, this aligns with the standard separation between the probability of occurrence and the conditional severity distribution: climate-related physical risks are often characterised by low expected frequency, but potentially extreme consequences, consistent with fat-tailed loss distributions (Batteson *et al.*, 2014).²⁸

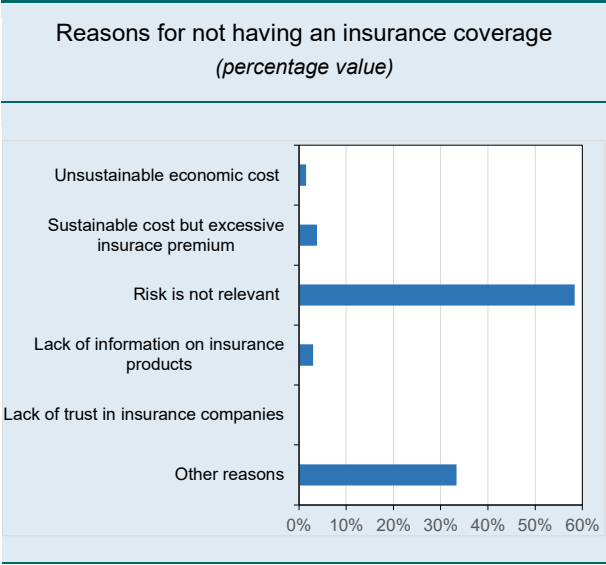
5.7 Insurance Coverage and Mitigation Strategies

The survey indicates that 73 per cent of firms are insured against physical risks, with higher coverage among manufacturing and services (81 and 67 per cent, respectively); most of these firms are large ones (76 per cent). These results are in line with the findings of Banca d’Italia’s 2021 Survey of Industrial and Service Firms (so-called Invind), which showed that 68 per cent of firms had bought insurance coverage at the time.²⁹ However, the reasons for the lack of insurance coverage differ across the two surveys. In the ICAS survey, about one-third of respondents cite non-economic factors, such as the perceived insignificance of risk, while Invind participants primarily flag high insurance costs and insufficient information. These differences may reflect the characteristics of the respective samples: the higher share of smaller firms in the Invind sample may explain their greater focus on cost-related barriers.

Participation in the insurance market is lower for smaller firms and for those located in the South and Islands consistently with previous analyses (Angelini, 2022a; Gallo *et al.*, 2022; Frigo and Venturini, 2024). **Insurance coverage is instead more widespread among firms with higher CQS ratings** (coverage rates between 73 and 81 per cent), compared to firms with lower CQS scores, which display coverage rates between 41 per cent (CQS 7) and 63 per cent (CQS 6).

Among the firms without insurance coverage, 58 per cent indicate that they consider climate risk irrelevant for their operations (Fig. 10). Common strategies include investment in safety measures, the diversification of production and storage sites, general insurance, disaster recovery plans, and relocating operations to areas with lower exposure to climate risk. Italian firms will nevertheless have to gradually

Figure 10



Source: ICAS Survey

²⁸ The Third UK Climate Change Risk Assessment Technical Report (CCRA, 2021) and Rising *et al.* (2022) report that risk perception often trails empirical risk indicators for firms with limited resources devoted to resilience.

²⁹ The same survey also found that damages from climate events more than doubled between 2016 and 2021, while insurance adoption remained largely unchanged (Gallo *et al.*, cit.).

adapt to the national regulations concerning compulsory insurance against damages resulting from catastrophic events.³⁰

5.8 Corporate governance section

This section presents the findings from the survey’s second section, which does not investigate climate change risks, but contributes to hone the qualitative assessment performed by ICAS analysts of key areas of firms’ governance that affect its creditworthiness and on which alternative data are not available. The questions in this section investigate corporate practices in market monitoring, resource allocation for risk management, and formal control functions. In particular, we investigate the scope of governance structures and strategic planning across firms, including plans to respond to sectoral challenges and emerging risks.

Regarding market monitoring, 79 per cent of 535 respondents state that they monitor trends and potential opportunities or threats in their sector of activity. Only one third allocate specific resources to this function, with higher CQS-rated firms doing so more frequently than lower-rated ones. This practice is observed more frequently in the manufacturing sector (42 per cent) than in the services sector (30 per cent).

For formal control functions, 78 per cent of the respondents report to have a Supervisory Body under Italian Legislative Decree 231/2001. Other control functions including internal audit, compliance and risk management, are less widespread (Fig. 11).

Regarding social impact reporting, 93 per cent of firms responded, with 52 per cent stating that they do not produce dedicated documentation, such as sustainability or social responsibility reports. Reporting is more common in sectors like utilities and construction, where 55 and 63 per cent of firms, respectively, engage in such reporting.

Figure 11



Source: ICAS Survey

³⁰ Insurance coverage for asset damage caused by natural disasters was made mandatory in Italy (Law 213/2023). The Italian Budget Law for 2024 has envisaged a gradual entry into force of the obligation for Italian firms, differentiating the recipients between large, medium, small and micro enterprises (by 31 March, 1 October and 31 December 2025, respectively).

6. Climate-Risk Adjusted PDs: ICAS granular data vs. sectoral approximation

The ICAS climate risk survey aims at collecting data for enhancing the precision of climate risk assessment. To check whether firm-specific transition risk (TR) information improves the accuracy of credit risk assessment, the survey results are compared with the sectoral estimates³¹ of emission data used so far in credit risk methodologies. For physical risk, the scores provided by an external provider are refined using the survey data described in previous sections.

6.1 Transition risk

Firstly, we perform a comparison of emission data. For each firm included in the survey, we obtain greenhouse gas emissions by aggregating data reported by firms for the Survey for Scope 1, and Scope 2 (either location-based or market-based) emissions.³² When Scope 2 market-based data are available, we aggregate Scope 1 with Scope 2 market-based data to reflect the energy procurement choices of the firm, such as renewable energy contracts or supplier-specific emission factors. This method prioritises firm-specific information, recognising that Scope 2 market-based data offer a more accurate representation of a firm carbon footprint than Scope 2 location-based data. For firms that do not provide data on direct Scope 2 emissions, energy consumption is converted into emissions using the ISPRA emission factors (ISPRA, 2023),³³ which provide standard values for key energy sources.³⁴ This process ensures consistency and comparability across firms, reflecting Italy's specific energy mix and decarbonization trends as documented by ISPRA. The resulting emission dataset covers 432 firms, representing 11.5 per cent of Italy's total emissions in 2022.

Among the 83 firms included in the survey declaring participation in the EU-ETS, 67 also reported Scope 1 emissions in the survey. For 54 of them, verified emissions from the EU-ETS registry were retrieved, showing a strong correlation (0.87) and an average standard deviation below 9 per cent. This alignment underscores the accuracy of self-reported data and confirms the survey's potential as a validation tool for

³¹ Sectoral estimates refer to emission values and transition risk indicators derived from industry-level averages rather than firm-level data. These estimates are typically obtained by imputing energy use and emissions based on the firm's sector classification (e.g. NACE codes), employment figures, and standard energy intensities.

³² Scope 1 emissions refer to direct greenhouse gas emissions from sources that are owned or controlled by the company, such as emissions from fuel combustion in company-operated facilities or vehicles. Scope 2 emissions are indirect emissions associated with the consumption of purchased electricity, heat, or steam, and depend on how the electricity is generated and procured. Firms provide Scope 2 data in two distinct categories: location-based and market-based, reflecting the different methodologies for accounting emissions from purchased electricity. Location-based data represent emissions calculated using the average emission intensity of the grid where the electricity is consumed, while market-based data are derived from supplier-specific emission factors or contractual instruments, such as renewable energy certificates.

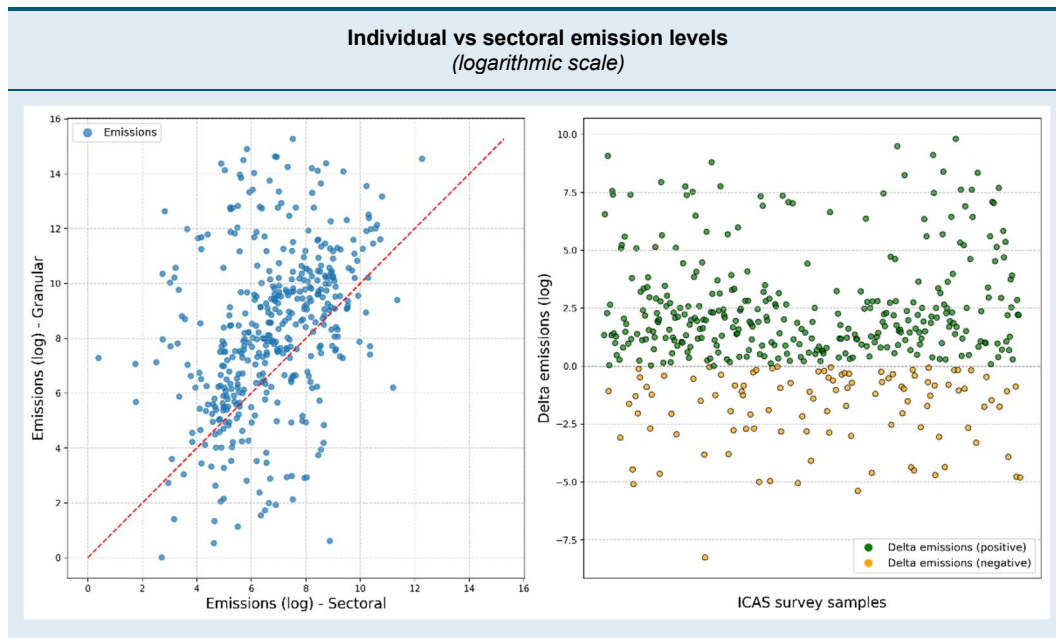
³³ ISPRA (Istituto Superiore per la Protezione e la Ricerca Ambientale) is the Italian Institute for Environmental Protection and Research. It operates within the framework of the National System for Environmental Protection (SNPA) and is responsible for conducting research, providing technical-scientific support, and developing indicators and reports related to environmental protection and sustainability in Italy.

³⁴ For instance, emissions from natural gas are calculated using a factor of 0.001927 tCO₂e per standard cubic meter (Sm³), while market-based electricity emissions are computed using a factor of 0.4491 tCO₂e per megawatt-hour (MWh).

information independently collected by ICAS, despite minor discrepancies due to reference years or reporting boundaries.

The comparison over the whole set of 432 firms reveals significant discrepancies between individual and sectoral emission levels (Fig. 12). The absolute difference between emissions levels exceeds 10 per cent in 85.4 per cent of cases, highlighting substantial discrepancies between firm-level and sectoral estimates. A visual inspection of the scatter plot in the left panel suggests a systematic prevalence of firms whose granular emissions exceed the corresponding sectoral estimates, as evidenced by the dense concentration of points above the 45-degree line. The right panel complements this evidence by showing the distribution of the logarithmic difference between granular and sectoral emissions. The asymmetry in the distribution – particularly the predominance of green points – further confirms that firm-level data often report higher emissions than sectoral averages.

Figure 12



Source: authors' calculations based on sectoral or individual emission data.
Note: the left panel shows individual and sectoral emissions, while the right panel illustrates the dispersion of the log-difference between individual and sectoral emissions across our 432 firms.

Secondly, we integrate these data into the ICAS framework to assess their impact on credit risk metrics. We incorporate individual emission data into the Banca d'Italia's climate stress-testing framework, building on Faiella *et al.* (2021) and Di Virgilio *et al.* (2024). This methodology relies on a tool that embeds the financial risk associated with climate policies into the ICAS methodology. Specifically, emission data are fed into the ICAS stress-testing framework to simulate the impact of TR on the PD of Italian firms. By computing energy expenditures and working out their impact over a range of financial statement items, the methodology allows for the calculation of key financial variables used as inputs to the ICAS statistical model. The mean and standard deviation of granular PDs (respectively, 0.19 and 0.65,

Table 3) are higher than the equivalent figures for sectoral PDs (respectively 0.03 and 0.07)³⁵, as using firm-level data naturally introduces greater variability compared to assigning the same sectoral value to all firms. While this result reflects the shift from sectoral averages to firm-level information, it is methodologically relevant: the increased dispersion and higher average PD highlight the capacity of granular data to reveal firm-specific vulnerabilities and risks that are masked when sectoral proxies are used. This finer granularity improves the ability of the ICAS framework to capture the heterogeneity of transition risks across firms, which is critical for a forward-looking credit risk assessment.

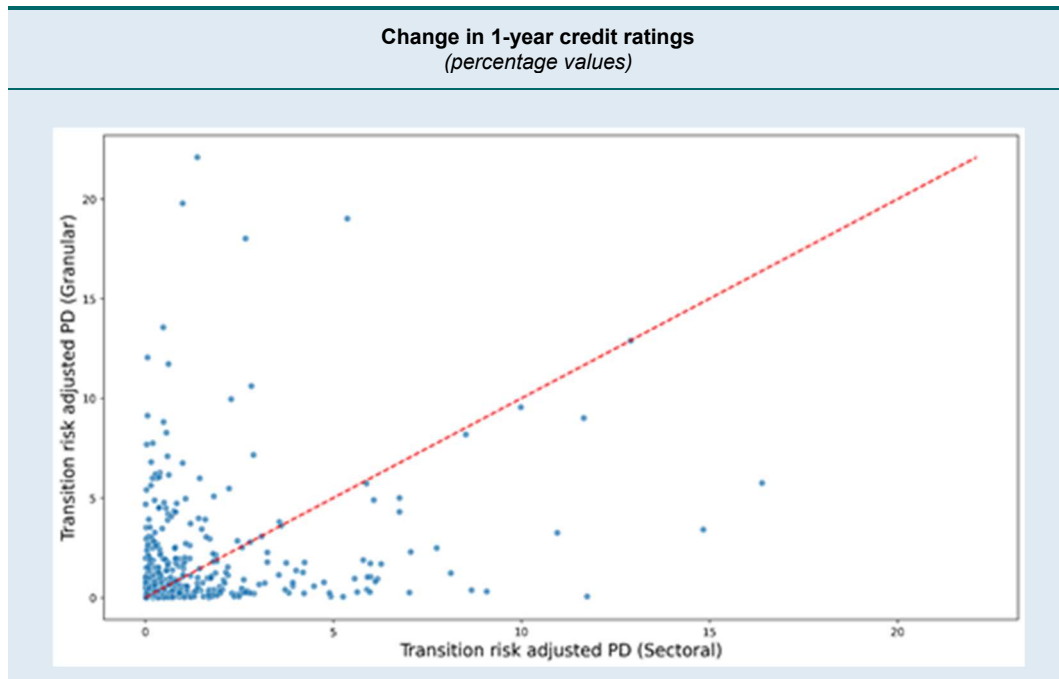
Table 3

Sectoral vs Individual PDs (percentage values)			
Method	Mean	Std. Dev.	CV
Sectoral	0.03	0.07	2.36
Individual	0.19	0.65	3.35

Source: authors' PDs calculations based on sectoral or individual emission data.

The impact of using firm-level versus sectoral data becomes even more evident when comparing the year-on-year change in TR-adjusted PDs derived from the two datasets (Fig. 13).³⁶

Figure 13



Source: authors' TR-adjusted PDs calculations based on sectoral or individual emission data.

³⁵ Both PDs are computed at the individual firm level; the former (granular PDs) use firm-specific data collected via the ICAS survey, while the latter (sectoral PDs) are based on sectoral averages for climate change risk variables.

³⁶ The individual emissions exhibit a wider dispersion and far more outliers, capturing higher variability and extreme values in the transition-risk adjusted PDs.

The diagonal line represents perfect alignment between the two estimates, while deviations indicate firms whose 1-year PDs differ depending on whether granular or sectoral emission data are used. Out of the 172 firms for which complete Scope 1 and Scope 2 data are available, 90 are assigned higher PDs and 82 lower PDs than with the use of sectoral data. The number of firms with higher and lower PDs rises to 227 and 205, respectively, when we employ the full sample of 432 firms for which individual data on either Scope 1 or Scope 2 emission data are available, through the conversion of energy consumption into emission levels.³⁷ These results confirm the importance of individual emission data in capturing firm-specific risks that sectoral averages fail to reflect, particularly in high-emission industries where TR is most pronounced.

Figure 14 illustrates the relation between PD estimates derived from granular and sectoral emission data ('granular PDs' and 'sectoral PDs') under the stress-testing framework³⁸. Although the median values are comparable across the two datasets, the wider dispersion in granular PDs underscores the capacity of firm-level data to reflect a broader array of risk exposures³⁹. This variability reflects the improved detection of vulnerabilities specific to individual firms, especially those in high-risk sectors⁴⁰.

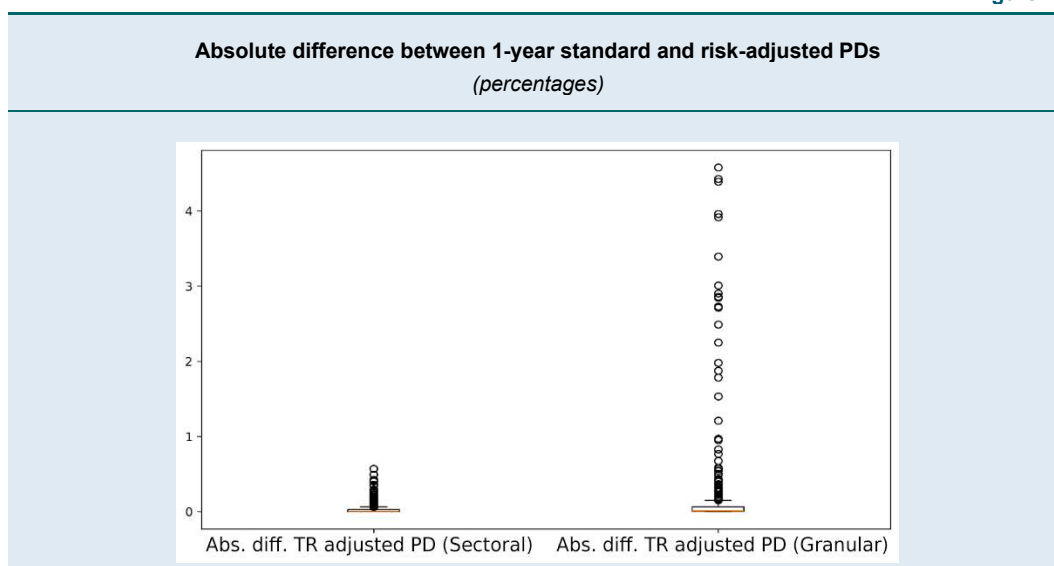
³⁷ Namely, 227 firms showed higher PD estimates based on granular emissions compared to those derived from sectoral averages, while 205 displayed lower PD values.

³⁸ Transition risk-adjusted PDs are computed by monetising firm-specific emissions through a carbon bill, defined as the product of excess emissions and a stressed carbon price. The resulting cost is propagated through the income statement and balance sheet via accounting rules, and the updated financials are fed into the ICAS statistical model to estimate the adjusted PD. See Cugliari *et al.* (2024) for methodological details.

³⁹ The Kolmogorov-Smirnov test yields a significant p-value (2.28×10^{-6}), confirming that PD distributions from detailed and aggregated emissions data differ. Similarly, the Mann-Whitney U test p-value (9.67×10^{-7}) supports the enhanced discriminatory power of detailed emissions data. Quartile analysis further emphasises this disparity, with PD estimates based on detailed data consistently showing higher values across all quartiles compared to those derived from aggregated data.

⁴⁰ The individual methodology's ability to detect outliers is particularly evident in the upper quartile, where the data reveal firms with significantly higher PD deltas under climate change stress scenarios. This finding helps demonstrating the asymmetric nature of climate transition risks, where a subset of firms faces disproportionately high exposure. The sectoral data, limited by their aggregate nature, fail to capture these nuances, thereby underestimating potential vulnerabilities.

Figure 14



Source: authors' TR-adjusted PDs calculations based on sectoral or individual emission data.

Note: the left portion of the figure shows, for each firm, the absolute difference between the one-year (standard) PD and the one-year risk-adjusted PD when transition risk is proxied by sectoral averages ("Sectoral PDs"). The right portion shows the absolute difference between the one-year (standard) PD and the one-year risk-adjusted PD when transition risk is calculated through granular emissions ("Granular PDs").

Table 4 and Table 5 show the difference in terms of ICAS ratings and CQS migrations produced by the integration of transition risk in the credit risk assessment. Granular data result in a higher proportion of downgrades (25 per cent) compared to sectoral estimates (14 per cent). **This outcome reflects the circumstance that granular data, by capturing firm-level differences, allow for the identification of transition risks that are masked when using sectoral averages data.** Stable ratings, referring to firms for which the stressed PD under climate risk does not result in a rating migration, remain the vast majority in both cases, accounting for 75 per cent in granular assessments and 86 per cent in sectoral ones.

Table 4

1-year change in credit ratings (percentage values)		
Method	Stable	Downgrade
Sectoral	86	14
Individual	75	25

Source: authors' calculations based on sectoral or individual emission data.

Note: Table 4 illustrates the changes in credit ratings resulting from the climate stress test, reflecting how the ICAS baseline probability of default (PD) was adjusted under climate risk scenarios. Table 5 presents the corresponding variations in credit quality steps (CQS), which were also derived from the stress-induced shifts in PDs. The stress is inherently adverse, as the extra carbon bill (either imputed or reported through the survey) resulting from the carbon tax negatively impacts financial indicators, leading to a deterioration in the PDs.

Table 5

1-year change in credit quality step (percentage values)		
Method	Stable	Downgrade
Sectoral	95	5
Individual	85	15

Source: authors' calculations based on sectoral or individual emission data

In terms of CQS (table 5), not surprisingly the downgrades are less frequent than those observed for rating changes, reflecting the less fine-grained nature of the CQS scale. However, individual assessments still show a higher proportion of downgrades (15 per cent) compared to sectoral assessments (5 per cent).

These findings confirm that, by capturing firm-specific variations and extremes in transition risk, fine-grained assessments allow for a more precise evaluation of credit risk, aligning with the goals of the Banca d'Italia's forward-looking risk management framework.

6.2 Physical risk

To evaluate the potential impact of the survey data, we adapt the ICAS methodology used to assess physical risk exposure.

This approach starts from the baseline scores provided by an external provider, which estimate individual firms' exposure to floods and landslides. These scores⁴¹ are refined using additional information from the ICAS survey. Specifically, the baseline score is adjusted upward (higher risk) when survey responses indicate that recent physical events have caused significant damage - particularly when these events have disrupted business operations in the short term. Conversely, the assessment is revised downward (lower risk) when the survey responses indicate mitigation measures, such as insurance coverage, contingency plans, or other resilience-enhancing actions. Hence, the final evaluation is an integrated view that combines the starting score with firm-reported vulnerabilities and adaptive capacity into an ICAS physical score.

This refinement is performed for the 511 firms in the survey that provide the necessary information. The results show that the incorporation of additional information generally leads to a different assessment of physical risk exposure. The resulting exposure distribution reduces the firms classified in the higher risk classes and increases those classified in the negligible class, underlying an overall shift towards lower risk classes (Table 6). This shows the value added of collecting data directly from individual firms, in order to integrate the information available to commercial providers in assessing exposure to physical risk.

⁴¹ The external provider provides a discrete indicator of physical risk on a five-point scale (1 to 5), where higher values indicate greater exposure. The score captures the riskiness of the areas where firms' headquarters and operational units are located, based on the likelihood and impact of various natural hazard events. The assessment is derived from geo-located data on company premises, linked to census tracts, and incorporates risk from acute climate events, chronic climate phenomena, and non-climate physical hazards. The classification accounts for the type of facility exposed and sector-specific vulnerabilities. Data sources include ISPRA, Copernicus, INGV, and other public datasets.

Table 6

Exposure to physical risk (units; percentage values)				
Exposure level	Baseline		Adjusted	
	Number of firms	Share	Number of firms	Share
Very high	2	0.4	1	0.2
High	14	2.7	8	1.6
Medium	63	12.3	23	4.5
Low	90	17.6	25	4.9
Negligible	342	66.9	454	88.8
Total	511	100.0	511	100.0

Source: authors' calculations based on ICAS Survey and external provider's data

7. Conclusions

The ICAS survey carried out by Banca d'Italia in 2024 examines the climate-related risk management practices of Italian NFCs within the context of the ICAS climate risk methodology. The survey addresses some limitations of sectoral approximations, dictated by data availability, by collecting granular data on emission strategies, risk management practices, and governance structures.

The survey identifies notable differences in climate risk management practices across sectors, geographical areas, and credit quality classes. Governance structures related to climate issues vary significantly across firms; deficiencies are more pronounced in the agriculture and services sectors, while manufacturing firms generally exhibit more structured approaches. Nearly 43 per cent of firms have set emission reduction targets over the next five years, yet no strong correlation emerges between these commitments and firms' credit quality scores. The measurement of emissions is limited, especially for firms in sectors with medium and high emissions, and some firms quote the irrelevance of climate change risks as a reason for not monitoring greenhouse gas emissions. 58 per cent of firms without climate insurance view climate risks as negligible; the introduction of the compulsory insurance against damages resulting from catastrophic events should mitigate this vulnerability. Firms with higher credit standing tend to be more engaged in emission reduction. The results indicate that Italian firms have room for significant advances in climate risk integration within their strategies, including through credible commitments to long-term mitigation goals.

The use of the survey data as inputs for the ICAS model leads to improvements in both transition and physical risk assessment, given that without those the assessment would be based on sectoral data. The improvements are especially valuable for firms that do not provide non-financial disclosure. By integrating granular emission data into the ICAS methodology, the analysis reveals significant discrepancies between the PD estimates obtained with granular data and those that proxy them with sectoral data.

Overall, the survey data provide an additional layer of analysis for the expert assessment performed by the credit analysts which can more accurately assess the impact of physical and transition risks on the creditworthiness of a firm with a new and direct estimation of firms' vulnerability to climate-related risks, as well as with a direct assessment of key governance and organizational variables. The findings of the survey strengthen considerably the ability of ICAS to integrate sustainability considerations into its credit risk assessment process by providing granular bottom-up information for climate risk analysis. This enhancement allows to meet the Eurosystem common standards for the assessment of CCR that will be implemented for the first time in 2025.

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Appendix

Table a1

Rating scale (percentage values)						
Risk Class of ICAS	Minimum PD	Maximum PD	ECAI Scale			Eurosystem Credit Quality Step
			S&P / Fitch	Moody's	DBRS	
1	0.000%	0.001%	AAA	Aaa	AAA	CQS 1&2
2+	0.001%	0.010%	AA+	Aa1	AA-H	
2	0.010%	0.030%	AA	Aa2	AA	
2-	0.030%	0.050%	AA-	Aa3	AA-L	
3+	0.050%	0.070%	A+	A1	A-H	
3	0.070%	0.090%	A	A2	A	
3-	0.090%	0.100%	A-	A3	A-L	
4+	0.100%	0.170%	BBB+	Baa1	BBB-H	CQS 3
4	0.170%	0.300%	BBB	Baa2	BBB	
4-	0.300%	0.400%	BBB-	Baa3	BBB-L	
5+	0.400%	0.800%	BB+	Ba1	BB-H	CQS 4
5	0.800%	1.000%				
5-	1.000%	1.500%	BB	Ba2	BB	CQS 5
6+	1.500%	2.000%	BB-	Ba3	BB-L	CQS 6
6	2.000%	3.000%	B+	B1	B-H	
6-	3.000%	5.000%	B/B-	B2/B3	B/B-L	CQS 7
7	5.000%	25.000%	CCC/C	Caa/C	CCC/C	CQS 8
8	25.000%	100.000%				
9			Default	Default	Default	

Table a2

Composition of the ICAS sub-sample (unit; percentage values)		
	Number	Share
Geographical Area		
North West	843	44.1
North East	625	32.7
Center	279	14.6
South & Islands	165	8.6
Size		
Micro	0	0.0
Small	1	0.1
Medium	525	27.5
Large	1,386	72.5
Size		
Revenues <= € 2 m	18	0.9
€ 2 m <= Revenues < € 10 m	56	2.9
€ 10 m <= Revenues < € 30 m	346	18.1
€ 30 m <= Revenues < € 50 m	214	11.2
€ 50 m <= Revenues < € 100 m	518	27.1
€ 100 m <= Revenues < € 250 m	443	23.2
€ 250 m <= Revenues < € 1000 m	234	12.2
Revenues >= € 1000 m	83	4.3
Industry		
Manufacturing	954	49.9
Services	785	41.1
Utilities	108	5.6
Agriculture	25	1.3
Construction	34	1.8
Mining	6	0.3
Individual firm or Group		
Individual firm	1,279	66.9
Part of a Group	633	33.1
Participation in EU ETS		
Participating in EU ETS	182	9.5
Not participating in EU ETS	1,730	90.5
Availability of NFD		
NFD available	65	3.4
NFD not available	1,847	96.6
Credit quality step		
CQS 1&2	153	8.0
CQS 3	785	41.1
CQS 4	525	27.5
CQS 5	118	6.2
CQS 6	137	7.2
CQS 7	73	3.8
CQS 8	113	5.9
CQS 9	8	0.4
Total sample	1,912	100.0

Table a3

Composition of the Respondents' sample (unit; percentage values)		
	Number	Share
Geographical Area		
North West	204	35.4
North East	192	33.3
Center	126	21.8
South & Islands	55	9.5
Size		
Micro	0	0.0
Small	1	0.2
Medium	153	26.5
Large	423	73.3
Size		
Revenues <= € 2 m	4	0.7
€ 2 m <= Revenues < € 10 m	16	2.8
€ 10 m <= Revenues < € 30 m	104	18.0
€ 30 m <= Revenues < € 50 m	59	10.2
€ 50 m <= Revenues < € 100 m	134	23.2
€ 100 m <= Revenues < € 250 m	128	22.2
€ 250 m <= Revenues < € 1000 m	98	17.0
Revenues >= € 1000 m	34	5.9
Industry		
Manufacturing	277	48.0
Services	231	40.0
Utilities	45	7.8
Agriculture	15	2.6
Construction	8	1.4
Mining	1	0.2
Individual firm or Group		
Individual firm	356	61.7
Part of a Group	221	38.3
Participation in EU ETS		
Participating in EU ETS	87	15.1
Not participating in EU ETS	490	84.9
Availability of NFD		
NFD available	35	6.1
NFD not available	542	93.9
Credit quality step		
CQS 1&2	49	8.5
CQS 3	213	36.9
CQS 4	152	26.3
CQS 5	45	7.8
CQS 6	50	8.7
CQS 7	26	4.5
CQS 8	40	6.9
CQS 9	2	0.3
Total sample	577	100.0

Table a4

Composition of the Climate Section Respondents' sample
(unit; percentage values)

	Number	Share in the subsample	Share in the full sample
Geographical Area			
North West	102	32.1	17.7
North East	117	36.8	20.3
Center	68	21.4	11.8
South & Islands	31	9.7	5.4
Size			
Micro	0	0.0	0.0
Small	1	0.3	0.2
Medium	120	37.7	20.8
Large	197	61.9	34.1
Size			
Revenues <= € 2 m	4	1.3	0.7
€ 2 m <= Revenues < € 10 m	13	4.1	2.3
€ 10 m <= Revenues < € 30 m	80	25.2	13.9
€ 30 m <= Revenues < € 50 m	41	12.9	7.1
€ 50 m <= Revenues < € 100 m	72	22.6	12.5
€ 100 m <= Revenues < € 250 m	66	20.8	11.4
€ 250 m <= Revenues < € 1000 m	30	9.4	5.2
Revenues >= € 1000 m	12	3.8	2.1
Industry			
Manufacturing	181	56.9	31.4
Services	94	29.6	16.3
Utilities	31	9.7	5.4
Agriculture	9	2.8	1.6
Construction	2	0.6	0.3
Mining	1	0.3	0.2
Individual firm or Group			
Individual firm	217	68.2	37.6
Part of a Group	101	31.8	17.5
Participation in EU ETS			
Participating in EU ETS	85	26.7	14.7
Not participating in EU ETS	233	73.3	40.4
Availability of NFD			
NFD available	16	5.0	2.8
NFD not available	302	95.0	52.3
Credit quality step			
CQS 1&2	21	6.6	3.6
CQS 3	92	28.9	15.9
CQS 4	65	20.4	11.3
CQS 5	34	10.7	5.9
CQS 6	41	12.9	7.1
CQS 7	23	7.2	4.0
CQS 8	40	12.6	6.9
CQS 9	2	0.6	0.3
Total "Climate" subsample	318	100.0	55.1

Table a5

Composition of the Corporate governance Section Respondents' sample
(unit; percentage values)

	Number	Share in the subsample	Share in the full sample
Geographical Area			
North West	102	39.4	17.7
North East	75	29.0	13.0
Center	58	22.4	10.1
South & Islands	24	9.3	4.2
Size			
Micro	0	0.0	0.0
Small	0	0.0	0.0
Medium	33	12.7	5.7
Large	226	87.3	39.2
Size			
Revenues <= € 2 m		0.0	0.0
€ 2 m <= Revenues < € 10 m	3	1.2	0.5
€ 10 m <= Revenues < € 30 m	24	9.3	4.2
€ 30 m <= Revenues < € 50 m	18	6.9	3.1
€ 50 m <= Revenues < € 100 m	62	23.9	10.7
€ 100 m <= Revenues < € 250 m	62	23.9	10.7
€ 250 m <= Revenues < € 1000 m	68	26.3	11.8
Revenues >= € 1000 m	22	8.5	3.8
Industry			
Manufacturing	96	37.1	16.6
Services	137	52.9	23.7
Utilities	14	5.4	2.4
Agriculture	6	2.3	1.0
Construction	6	2.3	1.0
Mining		0.0	0.0
Individual firm or Group			
Individual firm	139	53.7	24.1
Part of a Group	120	46.3	20.8
Participation in EU ETS			
Participating in EU ETS	2	0.8	0.3
Not participating in EU ETS	257	99.2	44.5
Availability of NFD			
NFD available	19	7.3	3.3
NFD not available	240	92.7	41.6
Credit quality step			
CQS 1&2	28	10.8	4.9
CQS 3	121	46.7	21.0
CQS 4	87	33.6	15.1
CQS 5	11	4.2	1.9
CQS 6	9	3.5	1.6
CQS 7	3	1.2	0.5
CQS 8		0.0	0.0
CQS 9		0.0	0.0
Total "Corporate governance" subsample	259	100.0	44.9

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