

Article

ESG Rating for SMEs: A Tool to Measure Sustainability Performance and Support Credit Assessment

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Abstract

The European sustainable finance agenda has increased the demand for ESG information, yet most small and medium-sized enterprises (SMEs) remain outside mandatory sustainability reporting requirements, which are largely designed for large listed firms. This creates an information gap for banks required to integrate ESG risks into credit assessment, while SMEs often lack proportionate tools to disclose and signal their sustainability-related practices. This paper addresses this gap by examining how an SME-oriented ESG rating can structure sustainability information in bank lending and which criteria and data can support a proportionate assessment framework for resource-constrained firms. Using Banca Etica's internal socio-environmental rating model and a unique dataset of 2395 Italian SMEs, the study provides descriptive evidence on ESG score patterns by firm size, legal form and economic sector. The results suggest that Social and Governance dimensions are more readily assessable within the rating model, as they rely on observable organisational practices such as labour conditions, gender balance, stakeholder relations and governance structures. By contrast, Environmental scores are systematically lower, suggesting that environmental practices are more difficult to formalise and document through standardised assessment tools, especially when they require monitoring systems, certifications, technological adaptation and upfront investments. The paper contributes to the literature by linking the SME regulatory gap with a parallel gap in ESG rating research and by documenting how an internal bank-based ESG rating can structure SME sustainability information and support credit assessment processes. Rather than providing direct evidence of improved creditworthiness, the study shows how such ratings may function as potential signalling mechanisms for SMEs within relationship-based lending.

Keywords: sustainability; SMEs; ESG rating; sustainable finance; creditworthiness; information asymmetry

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1. Introduction

Sustainability-related information has become increasingly relevant for finance and bank lending, as financial institutions are increasingly expected to integrate sustainability-related risks into investment and credit decisions. In this context, Environmental, Social and Governance (ESG) ratings have emerged as important informational tools for assessing firms' performance beyond traditional financial indicators, although their interpretation, comparability and economic implications remain widely debated [1,2]. This debate is particularly relevant for small and medium-sized enterprises (SMEs), which

represent the vast majority of European firms [3], but remain difficult to assess through standard ESG rating frameworks, which are generally designed for large listed companies with extensive public disclosure.

The limited availability of structured ESG information for SMEs creates a specific information gap in bank lending. SMEs have historically faced significant information asymmetries and more constrained access to credit than larger firms [4]. At the same time, banks are increasingly required to consider ESG risks in loan origination and monitoring processes, in line with the European Banking Authority (EBA) Guidelines [5] and broader supervisory work recognising sustainability factors as drivers of traditional risk categories.

The European regulatory framework has partly intensified this tension. The transition from the Non-Financial Reporting Directive [6] to the Corporate Sustainability Reporting Directive (CSRD) [7] has strengthened the role of sustainability information as decision-useful data for investors and financial institutions. More recently, this legislative trajectory has been partially recalibrated by the “Omnibus I” package [8], which reduces the disclosure burden through a “value-chain cap” limiting the sustainability data that large companies can request from their small and medium-sized enterprise partners. However, even when SMEs remain outside direct mandatory reporting requirements, banks and larger value-chain partners may still need structured ESG information from them. The result is an “SME regulatory gap”: a mismatch between the growing demand for ESG information in credit assessment and the limited tools and disclosure capacity available to SMEs.

In this landscape, proportionate sustainability ratings aligned with SME characteristics can play an important role. By translating a firm’s ESG practices into a credible and comparable signal, an SME-focused ESG rating can help reduce the information gap between borrowers and lenders. Such a rating can provide inputs for credit assessment that go beyond formal regulatory compliance and support a more structured evaluation of sustainability-related risks [9]. At the same time, a proportionate framework can make data collection more feasible by focusing on material and accessible indicators, thereby allowing SMEs to signal their sustainability performance in a structured and comparable way and potentially supporting their access to finance [10]. In line with signalling theory, these mechanisms are particularly relevant for firms with limited collateral and limited disclosure capacity, as they provide an alternative way to communicate organisational quality and long-term viability to financial intermediaries [11].

The banking sector is also undergoing a gradual transformation. Ethical and value-based banks have expanded and become more structured within international networks, while mainstream financial intermediaries have progressively integrated sustainability considerations into their operations, although often within traditional profit-oriented frameworks [12]. In this context, sustainability assessments are increasingly embedded in credit processes, both as internal risk management tools for financial intermediaries and as potential signals of borrowers’ sustainability performance. Evidence also suggests that banks can influence firms’ corporate social responsibility and that sustainability-related information may shape lending relationships and credit conditions [13].

Against this background, the analysis of Banca Etica represents a particularly relevant case study. As an ethical bank whose mission is closely linked to financing sustainable and socially oriented enterprises, Banca Etica has progressively integrated sustainability considerations into its credit processes, combining financial and non-financial evaluation of its counterparties, including both profit and non-profit organisations. This makes it a useful setting for examining how sustainability information can be collected and translated into structured credit signals. Moreover, datasets combining financial and

detailed ESG information on SMEs remain relatively rare in the literature, particularly given the limited empirical evidence available for this segment.

This paper addresses the information asymmetry that emerges from the “SME regulatory gap” and examines how proportionate sustainability assessment tools can generate credible signals within credit processes. The study is guided by two main research questions. At the theoretical level, it asks how an ESG rating can act as a mechanism to reduce information asymmetries and support access to credit for SMEs. At the practical level, it investigates which criteria and information can be used to construct a meaningful and proportionate rating model for evaluating SMEs’ sustainability.

To answer these questions, the paper adopts a single-case-study approach and analyses the internal socio-environmental evaluation model developed by Banca Etica. Using a unique dataset of ESG assessments for 2395 Italian SMEs over multiple years, the study provides descriptive evidence on how sustainability scores vary across size, sector and legal form. In doing so, the analysis documents how an internal bank-based ESG rating can structure SME sustainability information and how its scores may be interpreted as potential signals within credit assessment processes.

The paper contributes to the literature in three main ways. First, it provides a theoretical contribution by linking ESG ratings, SME information asymmetry and signalling theory in the context of bank lending, a setting that remains less explored than capital-market-based ESG rating research. Second, it contributes to the debate on the European sustainable finance framework by showing how the current regulatory architecture can generate uncertainty and fragmentation for SMEs. In this context, ESG ratings can help move sustainability information beyond mere reporting, making it more useful for reducing information asymmetries within credit assessment. Third, the paper offers a methodological and practical contribution by documenting how a bank-developed ESG rating can be adapted to SMEs through proportionate, observable and accessible indicators.

The paper is structured as follows. Section 2 discusses the European normative framework on non-financial disclosure and the regulatory gap affecting SMEs. Section 3 presents the theoretical foundations of sustainability disclosure and its relationship with credit access, especially for SMEs. Section 4 describes the Banca Etica ESG rating context and the structure of the rating model. Section 5 presents the dataset composition and data-cleaning procedure. Section 6 reports the empirical results, analysing ESG scores by firm size, legal form and economic sector. Section 7 discusses the findings. Section 8 presents the limitations and future research directions, and Section 9 concludes.

2. The Evolving EU Regulatory Framework on Non-Financial Disclosure

This section reviews the evolution of the EU sustainability reporting framework, focusing on its implications for small and medium-sized enterprises (SMEs).

Over the past 25 years, the European framework on sustainability and corporate disclosure has moved from voluntary corporate social responsibility (CSR) practices to mandatory reporting for specific categories of firms. This evolution reflects growing pressure from stakeholders and policymakers to make companies more accountable for the social and environmental consequences of their activities, in line with CSR and stakeholder theories [14,15]. Non-financial reporting has thus become a key instrument to measure and disclose corporate impacts, progress towards sustainability goals and transparency practices [16].

The first major step was the Non-Financial Reporting Directive (NFRD) [6], which required large public-interest entities, including large companies, banks and other financial institutions with more than 500 employees, to disclose information on Environmental, Social and Governance matters. Although it did not use the term explicitly, the Directive

implicitly introduced the logic of double materiality, asking companies to report information relevant both to financial performance and to Social and Environmental impacts [6,17,18].

However, the Directive suffered from two main limitations: the absence of detailed guidance and standardised frameworks, and a narrow scope that excluded SMEs on cost–benefit grounds [17].

To improve implementation, the European Commission issued non-binding guidelines in 2017 and launched the Action Plan on Financing Sustainable Growth in 2018. The guidelines provided more concrete indications on climate-related, social and human-rights disclosures [17], while the Action Plan marked a broader shift by making sustainability considerations central to financial markets and access to finance [19].

In this context, the Sustainable Finance Disclosure Regulation (SFDR) [18] introduced harmonised transparency obligations for financial market participants on how they integrate sustainability risks and adverse impacts. Although the SFDR does not impose direct duties on non-financial firms, it indirectly affects SMEs, since banks and investors need ESG information from their corporate clients to comply with their own disclosure duties [20]. This represents an early source of the SME information gap: the EU framework limits direct obligations for SMEs in order to avoid disproportionate administrative costs, but it regulates financial actors and large companies that increasingly request ESG information from them. As a result, ESG data become relevant for SMEs through indirect market channels rather than through direct legal obligations.

The Action Plan also highlighted the lack of a common definition of “sustainable” activities. To address this issue, the EU adopted the Taxonomy Regulation [21], which establishes a classification system based on six environmental objectives and the “do no significant harm” principle. While the Taxonomy formally targets large companies and financial institutions, SMEs may use it on a voluntary basis.

In practice, however, many SMEs experience trickle-down pressure from large organisations that request taxonomy-relevant data to comply with their own obligations in reporting the sustainability of value chains [22–24]. For SMEs, the costs of collecting, organising and aligning this information are often high, making full alignment financially unfeasible [25]. This dynamic confirms that the SME regulatory gap is not only linked to formal obligations, but also to indirect information requests and compliance burdens, contributing to a structural data gap for smaller firms [26].

The EU has progressively recognised these challenges. In particular, the SME Strategy for a Sustainable and Digital Europe explicitly acknowledges the difficulties faced by SMEs and proposes measures to strengthen their capacity, reduce disproportionate regulatory burdens and improve access to finance [27–29]. Similarly, the updated Industrial Strategy and post-COVID-19 recovery instruments support SMEs in the green and digital transitions, making reliable ESG data an important pillar of the European economic strategy [23].

The Corporate Sustainability Reporting Directive (CSRD) [7] represents a qualitative step forward. It substantially expands the scope of mandatory sustainability reporting to a much larger set of companies, including listed SMEs for the first time, and replaces multiple frameworks with a single set of European Sustainability Reporting Standards [30]. The CSRD formally embeds the double materiality principle and requires digital reporting and value-chain considerations, while including proportionality mechanisms such as materiality assessment, phase-in periods and deferred application for listed SMEs [7,31].

Alongside the CSRD, the Corporate Sustainability Due Diligence Directive (CSDDD) shifts the focus from disclosure to corporate conduct, requiring large companies to identify, prevent, mitigate and account for adverse human rights and environmental impacts across their operations and value chains [32]. In practice, however, this framework still

primarily targets large and listed firms, as the regulatory burden of such requirements is often too heavy for smaller firms to absorb [8].

Non-listed SMEs remain outside the direct scope of the CSRD, the CSDDD and the Taxonomy, yet they face growing demand for ESG and value-chain data from customers, investors and banks [30,33]. At the same time, the cost and complexity of building reporting systems, together with the absence of fully tailored guidance, make it difficult for many SMEs to produce structured ESG information [10,34].

This situation generates a normative and informational gap: the regulatory architecture strengthens the demand for ESG data in financial intermediation but does not provide most SMEs with proportionate tools and incentives to supply such data. This gap is not simply the result of missing regulation, but rather the consequence of an asymmetric regulatory design, in which large firms and financial institutions are required to collect sustainability information while smaller firms are expected to respond without equivalent support.

The EU has sought to address this gap through a voluntary sustainability reporting standard for non-listed SMEs [30], developed with the support of EFRAG, and through a Recommendation encouraging large companies and financial institutions to align their data requests with this simplified framework [35]. However, these initiatives do not fully solve the structural limitations, as smaller firms remain only indirectly covered by regulation and still lack a fully tailored framework reflecting their specific characteristics and reporting capacities.

Recent simplification proposals, such as the “Omnibus I” package [8,36], have introduced further uncertainty regarding the timing and scope of sustainability obligations. Directive (EU) 2026/470 amends both the CSRD and the CSDDD with the aim of reducing regulatory complexity and compliance burdens, postponing the application of some requirements and narrowing the number of enterprises directly subject to sustainability obligations.

For SMEs, however, this creates a structural paradox. While recent regulatory adjustments reduce direct reporting obligations, smaller firms continue to face indirect pressure to provide ESG information within credit relationships, supply chains and broader market interactions. This misalignment between formal regulatory obligations and market-driven information needs reinforces the SME regulatory gap, since smaller firms are expected to produce sustainability-related data without being supported by a clear and proportionate framework [3,10,27]. This issue is further complicated by limited coordination across the EU sustainable finance architecture, which creates a fragmented landscape and places a disproportionate burden on resource-constrained SMEs [37].

In this context, the evolution of the EU regulatory architecture highlights a key tension between simplification and effectiveness. Reducing administrative burdens is necessary, but an excessive narrowing of the reporting scope may weaken transparency, comparability and the integration of sustainability considerations into economic decision-making processes. For this reason, proportionate non-financial disclosure approaches tailored to non-listed SMEs remain essential.

If ESG information remains fragmented, costly and difficult to compare, it risks becoming only an additional reporting burden for smaller firms. By contrast, simplified and context-specific assessment tools can make sustainability information more useful for credit assessment and for reducing information asymmetries between SMEs and financial institutions.

The development of an internal, SME-focused socio-environmental rating model can thus be seen as a practical response to this regulatory gap: it translates heterogeneous, often informal SME practices into structured indicators usable in credit assessment processes. In the case of Banca Etica, the ESG model provides a way to operationalise these

requirements in a manner consistent with the bank's mission and with SMEs' limited reporting capacity.

3. Literature Review: ESG Ratings as a Tool to Bridge the Information Gap

3.1. Theoretical Foundations of Non-Financial Disclosure

The literature on non-financial disclosure is closely related to the evolution of corporate sustainability (CS) and corporate social responsibility (CSR), which have progressively moved from peripheral concerns to central themes in both academic and professional debates [38,39]. This shift reflects a broader change in how firms are assessed, as performance is no longer evaluated just in financial terms but in relation to Environmental and Social responsibilities [1]. In this context, CSR and stakeholder-oriented theories provide important foundations for explaining why firms disclose sustainability-related information, how this information may affect decision-making processes and how such disclosure is interpreted by external stakeholders [39].

CSR and corporate sustainability are often described as multidimensional constructs that combine economic objectives with social and environmental responsibilities [38,40]. This perspective moves beyond a narrow focus on profit maximisation and treats sustainability as part of a firm's strategic decision-making, rather than as an external or additional activity. In this sense, non-financial disclosure becomes a way for enterprises to communicate how they manage their impacts on the socio-economic environment and respond to stakeholder expectations [38,41]. Sustainability reporting frameworks, such as the Global Reporting Initiative (GRI), and later ESG metrics, provide tools for translating these commitments into observable and comparable indicators of sustainability performance [1,42].

From a theoretical perspective, sustainability disclosure can also be understood as a response to information asymmetry between firms and external stakeholders. Signalling theory suggests that firms disclose ESG information to communicate otherwise unobserved characteristics, such as resilience to non-financial risks, organisational quality or long-term strategic orientation [4,43]. This signalling role is especially relevant for risk management, because stronger ESG performance may reduce stakeholder conflict and lower the cost of debt, reinforcing the importance of sustainability information in financial decision-making [44,45].

This framework is particularly relevant for small and medium-sized enterprises, which play a central role in the economy but often face greater difficulties in signalling their economic quality and sustainability performance [10,46]. For these firms, ESG disclosure can help reduce information gaps in credit analysis and communicate strategic and organisational characteristics that would otherwise remain less visible [4,43]. This issue is especially relevant for non-listed SMEs, which often remain outside the direct scope of mandatory sustainability reporting but may still face indirect information requests from financial institutions, investors and value-chain partners [33].

A credible ESG assessment, supported by clear reporting on sustainability impacts, may therefore improve how SMEs are perceived by external stakeholders and support credit assessment by strengthening the information available to lenders [43]. Building on this theoretical framework, the next section examines how ESG information has been empirically linked to firm performance and, more specifically, to credit access, with particular attention to the challenges faced by SMEs.

3.2. ESG, Credit Access and the SME Imperative

The relationship between ESG performance and firm outcomes, including both operational and sustainability dimensions, has attracted increasing attention in recent years. Empirical studies suggest that firms integrating ESG metrics into managerial incentives tend to display stronger Environmental, Social and business performance [47]. In the credit market context, several contributions examine the link between ESG scores, credit ratings and borrowing conditions, finding that ESG factors can influence perceived credit risk and financing terms [48–51]. These findings, in line with recent supervisory insights, support the idea that ESG risks should not be addressed separately from traditional financial risks, but rather as drivers that interact with risk categories such as credit and operational risk [9]. Since bank debt may also signal the credibility of firms' sustainability efforts, the integration of ESG factors is increasingly relevant for risk-based assessments of long-term firm value [52].

However, the use of ESG information in credit assessment raises specific challenges for SMEs. Smaller firms are typically characterised by greater information asymmetry, limited disclosure capacity and stronger dependence on bank financing [53,54]. At the same time, European supervisory authorities expect banks to integrate ESG risks into loan origination and monitoring processes, as outlined in the Guidelines on Loan Origination and Monitoring and in subsequent EBA reports on ESG risks [5,9]. This creates a structural mismatch: financial institutions require ESG-related information to comply with supervisory expectations and improve risk management, while most SMEs are not subject to mandatory sustainability reporting and remain outside conventional ESG rating coverage.

In this context, ESG ratings can be interpreted as potential signalling mechanisms that translate complex sustainability practices into decision-useful information for lenders [11,55]. When designed in a proportionate and context-specific way, ESG assessments may help reduce informational frictions, improve risk evaluation and support credit assessment for SMEs.

This perspective is consistent with the broader literature on information asymmetry in credit markets, which has examined how additional borrower information, fintech credit assessment, alternative data and digital financial inclusion can improve lenders' ability to evaluate firms and borrowers [56]. At the same time, these approaches raise concerns about data quality, transparency, bias and privacy, showing that the production and use of additional information is not neutral. For SMEs, this issue is particularly relevant because digital capabilities affect firms' ability to collect, manage and share information, while limited financial resources and skills continue to constrain this process [57].

The literature increasingly recognises that standard ESG ratings, developed primarily for capital markets and large firms, are poorly suited to these conditions. Recent methodological contributions have therefore focused on improving the construction, explainability and interpretability of ESG scores through advanced quantitative techniques [58–60]. However, these approaches remain mainly oriented towards external ratings and large-firm datasets, while the specific conditions of SMEs remain comparatively underexplored.

Overall, the literature has extensively analysed ESG disclosure practices, ESG rating divergence and the growing relevance of sustainability information for financial decision-making. Recent contributions on fintech credit assessment, alternative data and digital transformation further show that the reduction of information asymmetry increasingly depends on firms' capacity to generate, manage and communicate structured data [56,57]. Yet important gaps remain.

First, most empirical studies on ESG ratings focus on large listed firms and external rating providers, using datasets that are inaccessible or unsuitable for SMEs [2,61]. As a result, the mechanisms through which ESG information can be generated and used for

SMEs, which are characterised by limited disclosure capacity and greater informational opacity, remain insufficiently explored [10,33].

Second, while many contributions examine the relationship between ESG scores and credit ratings, they generally treat ESG ratings as exogenous inputs to credit risk models [11,48,50,51]. Much less attention has been paid to how ESG assessments are operationalised within banks' internal credit processes, especially in relationship-based lending, where qualitative information and direct data collection play a central role [52]. Third, although ESG rating divergence has been widely discussed as a source of uncertainty and potential bias in capital markets [61,62], the literature has largely overlooked alternative, proportionate assessment models specifically designed to reduce information gaps for SMEs. This limitation reflects a broader normative and informational gap: banks are increasingly expected to integrate ESG risks into credit decisions, while most SMEs remain outside mandatory sustainability reporting regimes and often lack the resources, digital capabilities and internal structures needed to produce comparable ESG information. In this context, qualitative assessment and proportionate, digitally supported tools become important for making SME sustainability data usable in practice [5,33,37,57].

This paper contributes to the literature by addressing these gaps through an in-depth case study of Banca Etica's internal ESG rating model. By analysing a bank-developed, SME-focused assessment framework, the study provides empirical evidence on how sustainability information can be collected and embedded into credit processes, and discusses how the resulting ESG scores may function as potential signals within SME credit assessment.

4. Context and Rationale

Most ESG rating systems currently available are designed for large listed companies and rely on data from global providers such as Refinitiv, MSCI or Moody's. For SMEs, these tools are often unavailable or poorly suited to their characteristics, as they require extensive disclosure that many smaller firms are unable to provide. As a result, SMEs face structural limitations in communicating their sustainability performance and in accessing comparable ESG assessments.

Recent studies on ESG ratings and credit risk largely rely on commercial providers. For example, Del Vitto et al. [59] use machine learning to reconstruct Refinitiv's (LSEG) ESG rating process and find that agency ratings can be replicated with a relatively high degree of accuracy, while still showing persistent noise in proprietary models. Dupuy and Garibal [60] examine how aggregation rules across Environmental, Social and Governance pillars can bias overall ESG scores and propose a correction for cross-dispersion bias. These contributions confirm the relevance of ESG ratings in financial analysis, while also highlighting the methodological and data-related limitations of current approaches, especially when applied to smaller firms.

Among alternative approaches, the socio-environmental assessment developed by Banca Etica represents an illustrative case, as it is applied to a client base largely composed of SMEs, cooperatives and third-sector organisations. The framework, formalised as the "Social-Environmental Evaluation", assesses the sustainability performance of counterparties and supports the identification of projects with positive impact. Rather than serving only reporting purposes, it functions as a mechanism for reducing information asymmetries and capturing dimensions of firm behaviour that are not reflected in traditional financial indicators. In line with its institutional objectives, Banca Etica adopts an approach that considers the non-economic consequences of economic actions and excludes activities that hinder human development or violate fundamental rights [63].

Within this perspective, ethical finance supports the development of ESG assessment approaches that go beyond standardised reporting practices and are better suited to the

specific characteristics of SMEs. Empirical evidence based on integrated ESG and financial data for SMEs remains limited. The dataset used in this study therefore provides a valuable basis for analysing how sustainability performance can be measured in a proportionate way and how such information can support decision-making processes.

Rating Structure

The internal ESG rating is a composite score ranging from 0 to 1 and is based on information collected through a structured socio-environmental questionnaire that firms complete when applying for credit or updating an existing relationship with the bank. The rating is organised around three pillars—Environmental (E), Social (S) and Governance (G)—adapted to the characteristics of SMEs. Each pillar includes different types of indicators, including binary variables, categorical responses and continuous measures, such as workforce composition.

All indicators are normalised on a 0–1 scale to ensure comparability across variables. Pillar scores are calculated as simple averages of the indicators included in each pillar, while the overall ESG score is obtained as the average of the three pillar scores. This equal-weighting scheme is not introduced by the authors as an external methodological choice, but reflects the structure of the bank’s internal ESG rating model. Table 1 reports the main metrics included in each pillar.

Table 1. Description of ESG Rating.

Environment (E)	Social (S)	Governance (G)
1. Sustainable suppliers	1. Protected workers	1. Board gender diversity
2. Recycled materials	2. Training	2. Employee involvement
3. Environmental efficiency	3. Employment contracts	3. Female managers
4. Renewables	4. Tax irregularities	4. Pay dispersion
5. Emissions	5. Workplace injuries	5. Innovation & R&D
	6. Staff turnover	6. Partnerships
	7. Remote work	7. Social report
	8. Wellbeing monitoring	8. Sanctions
	9. Community support	9. Litigation
		10. Certifications
		11. Code of ethics
		12. Organisational impact
		13. Impact on turnover

Note: The Environmental pillar includes 5 indicators, the Social pillar 9 indicators, and the Governance pillar 13 indicators.

5. Methodology

5.1. Dataset Composition

The analysis is based on an internal dataset provided by Banca Etica, covering 7260 credit applications over the period 2018–2024. Each observation combines financial information with responses to the socio-environmental questionnaire used within the bank’s credit evaluation process. The sample is predominantly composed of micro and small enterprises, with larger firms representing only a small share. This composition reinforces the relevance of proportionate ESG assessment frameworks for organisations with constrained reporting capacity.

The dataset includes over 100 variables covering financial, organisational, social and Environmental dimensions. However, two main data quality issues arise. First, missing values reflect heterogeneous disclosure practices across organisations, in line with the lack

of standardised sustainability reporting requirements for SMEs. Second, multiple credit applications submitted by the same organisation may generate a double-counting problem. To address these issues, and given the anonymised nature of the data, specific selection criteria were applied to ensure that each firm is represented only once in the final sample, as described in the following section.

5.2. Dataset Cleaning

To ensure the comparability of ESG scores, the dataset underwent three cleaning steps:

1. **Missing values:** Observations with missing values in core ESG variables were removed, reducing the sample from 7260 to 5421 observations. This step ensures that all retained units contain sufficient information for ESG score computation.
2. **Duplicates:** Multiple records for the same firm, identified through the customer ID, were collapsed into one observation by retaining either the most recent year or the highest questionnaire completion rate. This procedure reduced the dataset from 5421 observations to 2478 unique enterprises. A higher incidence of duplicate records was observed among micro and small firms, consistent with their greater dependence on bank financing and repeated credit applications.
3. **Trimming:** Firms with a questionnaire completion rate below 50% were excluded, following standard practices in microdata cleaning. This resulted in a final analytical sample of 2395 observations.

Tables 2 and 3 report the evolution of the sample across cleaning stages by firm size. Despite the reduction in observations, the overall size distribution remains stable, with micro and small enterprises accounting for approximately 85% of the final sample. This suggests that the cleaning procedure does not materially alter the structural composition of the dataset.

Table 2. Evolution of the sample by firm size across cleaning steps.

Firm Size	Original Dataset	Without Missing Values	Without ID Duplicates	Final Sample
Micro	4664	3042	1603	1528
Small	1525	1380	538	534
Medium	832	790	275	275
Large	217	209	62	62
Total	7260	5421	2478	2395

Note: The final sample refers to the dataset after missing-value removal, duplicate handling and trimming based on questionnaire completion.

Table 3. Percentage distribution of the sample by firm size across cleaning steps.

Firm Size	Original Dataset	Without Missing Values	Without ID Duplicates	Final Sample
Micro	64%	56%	65%	64%
Small	21%	26%	22%	22%
Medium	12%	15%	11%	11%
Large	3%	4%	2%	3%
Total	100%	100%	100%	100%

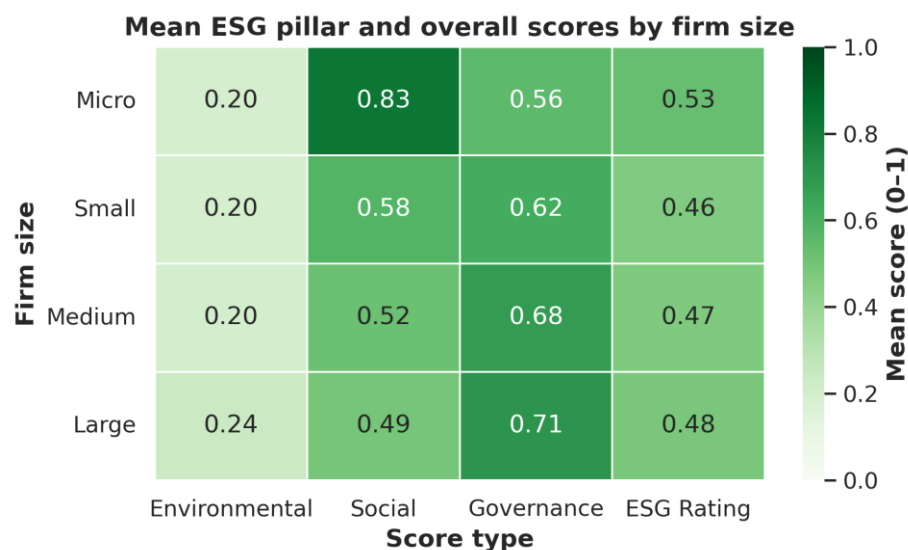


Figure 1. Distribution of ESG pillar and overall scores by firm size.

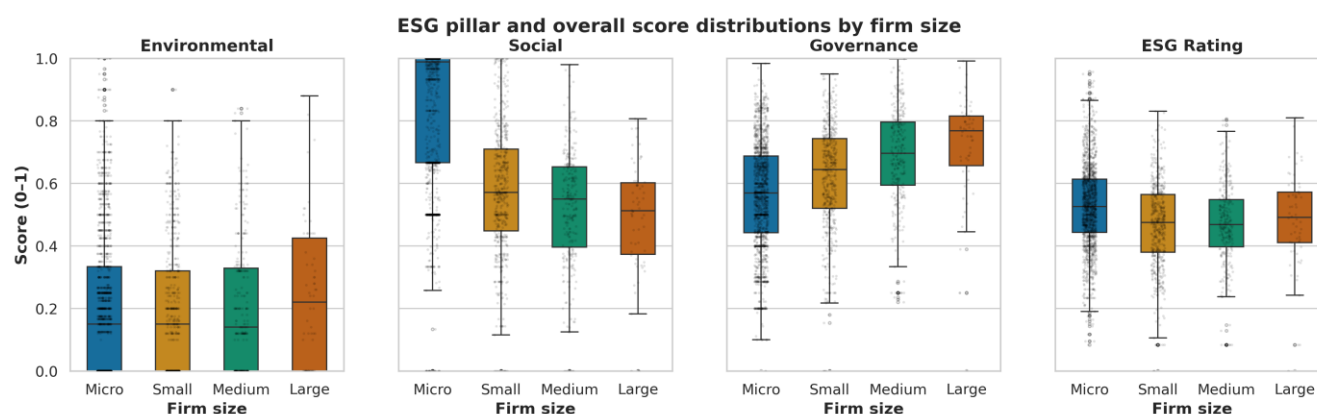


Figure 2. Mean ESG pillar and overall scores by firm size.

6. Results

6.1. ESG Scores by Firm Size

The distribution of ESG scores by firm size reveals clear differences across pillars. As shown in Figure 1, Social and Governance scores are generally higher than Environmental scores, while overall ESG ratings remain relatively stable across firm-size classes. Micro firms show the highest average Social score (0.83) and a Governance score of 0.56, whereas larger firms display slightly higher Environmental scores, increasing from 0.20 for micro firms to 0.24 for large firms.

Environmental scores increase only marginally with firm size. The result is consistent with studies showing that SMEs often face financial, technical and organisational constraints when adopting environmental practices and formalising sustainability-related information [10,57]. Medium and large firms may have greater capacity to access data-intensive monitoring systems, environmental certifications and formalised reporting procedures, while micro and small firms may face higher relative sunk costs when investing in environmental transition technologies, especially when such investments require long implementation horizons [22,25].

Figure 2 further confirms these patterns. Social and Governance dimensions appear particularly observable for SMEs, as they capture practices embedded in daily operations, such as labour relations, compliance mechanisms and stakeholder engagement. These practices can often be documented without highly complex reporting systems. At the

same time, the substantial within-group variation observed in Figure 2 suggests that ESG performance differs considerably even within the same size category.

Overall, these results suggest that differences in ESG scores are associated with firm size, disclosure capacity and the practical difficulty of formalising sustainability practices. This supports the need for proportionate ESG assessment frameworks that reflect the organisational and financial constraints of SMEs, while avoiding the assumption that lower Environmental scores necessarily indicate weaker environmental commitment.

6.2. ESG Signalling Considering Legal Form Organization

The analysis by legal form shows relatively similar overall ESG scores across organisational categories, although some differences emerge across pillars. As shown in Figure 3, Environmental scores remain systematically lower than Social and Governance scores for all legal forms, suggesting that environmental practices and data may be more difficult to formalise and document through standardised assessment tools. Associations and co-operatives display relatively strong Social scores, equal to 0.80 and 0.63 respectively, reflecting their stronger orientation towards stakeholder engagement, labour practices and community-related activities.

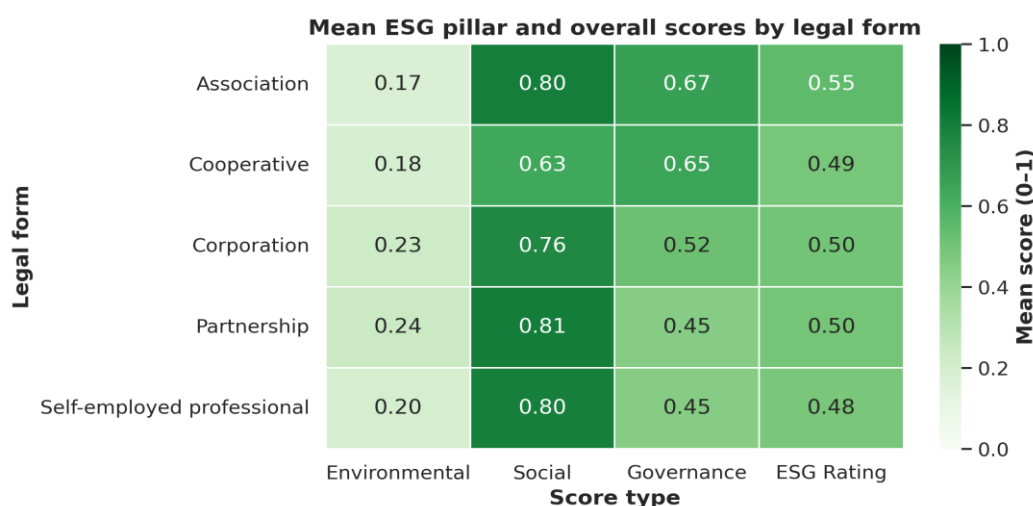


Figure 3. Mean ESG pillar and overall scores by legal form.

Governance scores also vary across legal forms. Associations and cooperatives perform relatively well in this pillar, with average scores of 0.67 and 0.65, respectively. This pattern may reflect the presence of more formalised internal rules, participatory governance structures and accountability mechanisms. By contrast, partnerships and sole proprietors show lower Governance scores, which is consistent with simpler organisational structures and less formalised governance arrangements.

Figure 4 confirms these patterns while also showing substantial within-group variation. Although legal form influences average ESG scores, the overlap between distributions suggests that sustainability performance varies considerably even among organisations with the same legal structure. This indicates that legal form is relevant, but it is not the only determinant of ESG performance.

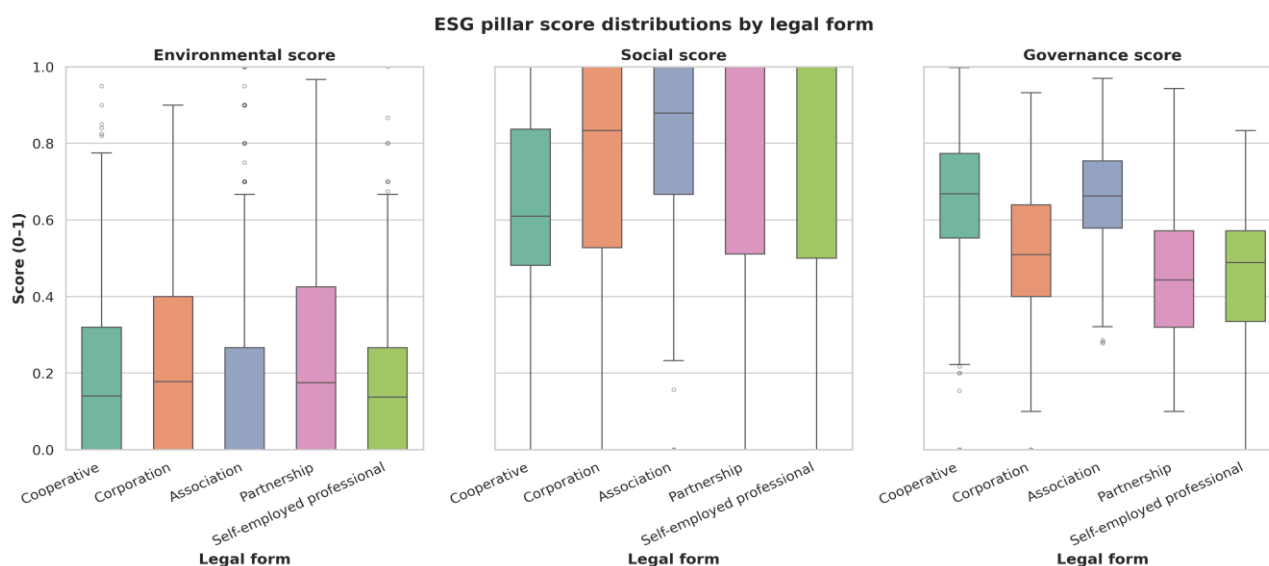


Figure 4. Distribution of ESG pillar scores by legal form.

The results suggest that Social and Governance dimensions are more readily observable within the rating model for SMEs and other smaller organisations. These pillars capture employment conditions, internal accountability mechanisms and stakeholder relationships that can be documented even without complex reporting systems. This is especially relevant for associations and cooperatives, whose institutional features may facilitate the disclosure of social and governance-related information.

6.3. ESG Signalling Considering Economic Sector by ATECO Classification

To analyse sectoral differences in ESG performance, firms were grouped according to the Italian ATECO classification of economic activities. This allows the comparison of ESG scores across sectors while taking into account the specific area in which each organisation operates.

Figure 5 provides an overview of both the sample composition and the mean ESG scores by sector. Panel (a) shows that the dataset is mainly concentrated in service-related activities, especially Health and Social Work (Q), Professional Activities (M), Arts and Entertainment (R), Wholesale and Retail Trade (G), Other Service Activities (S), Administrative and Support Services (N), and Agriculture, Forestry and Fishing (A). This composition is broadly consistent with the structure of the sample and with the sectoral profile of the organisations assessed.

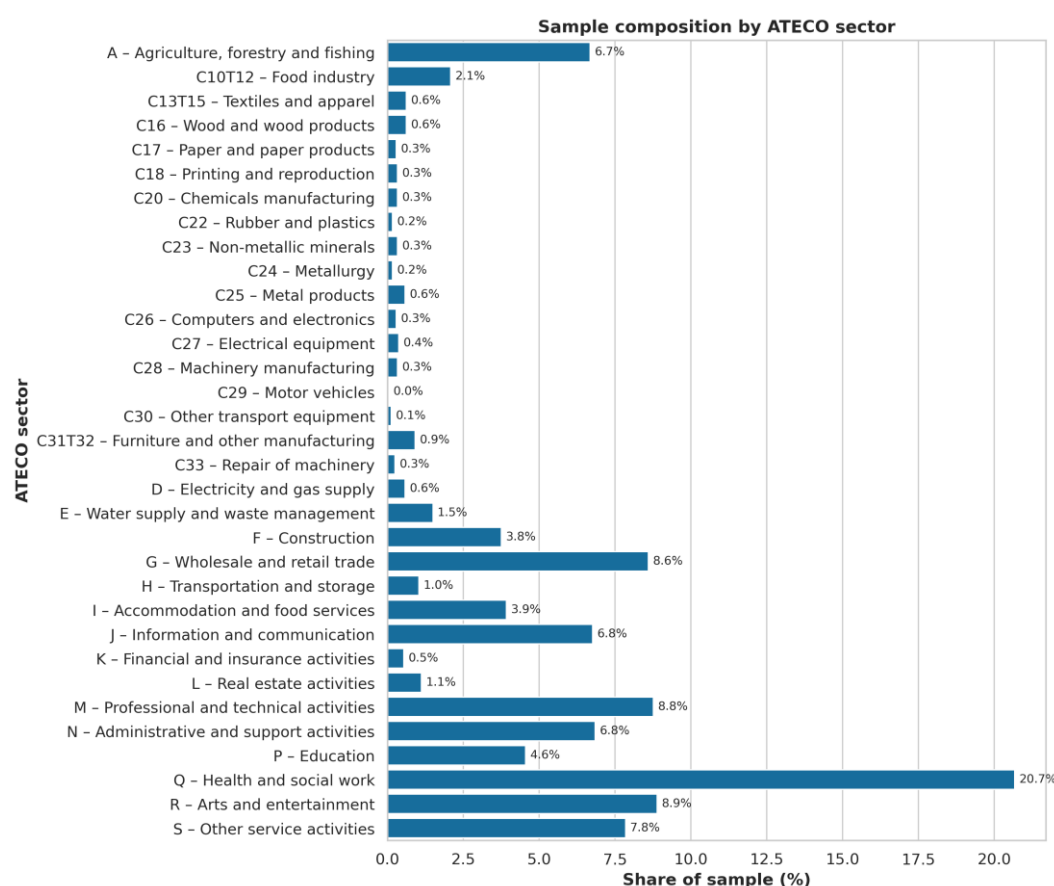
Across most sectors, Environmental scores remain systematically lower than Social and Governance scores. This pattern may reflect the greater difficulty of formalising environmental practices, which often require higher upfront investments in monitoring systems, certifications and technological adaptation. These requirements can be particularly burdensome for SMEs, as existing studies show that limited financial resources, skills and digital capabilities may constrain their ability to collect, manage and formalise sustainability-related information [10,57]. These constraints may be especially relevant in sectors where environmental disclosure is not yet strongly standardised or where environmental investments generate returns only over longer time horizons.

Panel (b) of Figure 5 highlights some relevant sectoral patterns. Electricity, Gas and Steam Supply (D) shows the highest Environmental score, which is plausibly associated with stronger regulatory requirements and greater pressure for environmental monitoring. Agriculture, Forestry and Fishing (A) also records an Environmental score above the sample average, suggesting that environmental issues are more directly embedded in the

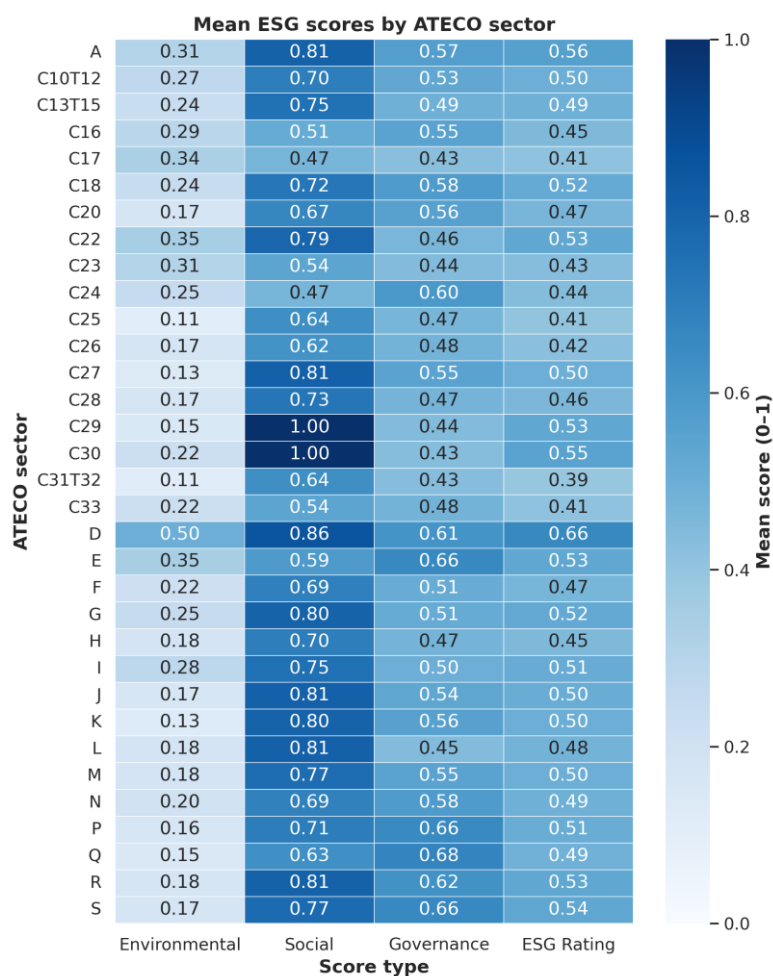
sector's core activities. By contrast, many service sectors display comparatively low Environmental scores but relatively stronger Social and Governance performance.

Social and Governance dimensions appear to be the main drivers of overall ESG scores in several service-oriented sectors. For example, Health and Social Work (Q) shows relatively strong Social and Governance scores, while sectors such as Professional Activities (M), Arts and Entertainment (R), and Wholesale and Retail Trade (G) also display relatively high Social scores. These results suggest that, in many SME-dominated sectors, sustainability performance is more easily captured through organisational practices, stakeholder relations and internal governance arrangements than through Environmental indicators alone.

Figure 6 presents the distribution of overall ESG scores across ATECO sectors. The boxplots confirm that some sectoral differences exist, but they also show substantial overlap in score distributions. This suggests that sector affiliation explains part of the variation in ESG scores, while firm-level practices, internal organisation and disclosure capacity remain equally important.



(a) Sample composition by ATECO sector (%)



(b) Mean ESG pillar and overall scores by ATECO sector.

Figure 5. Sectoral composition of the sample and mean ESG scores by ATECO sector. Note: ATECO codes follow the Italian classification of economic activities; the sectors names are reported next to each code

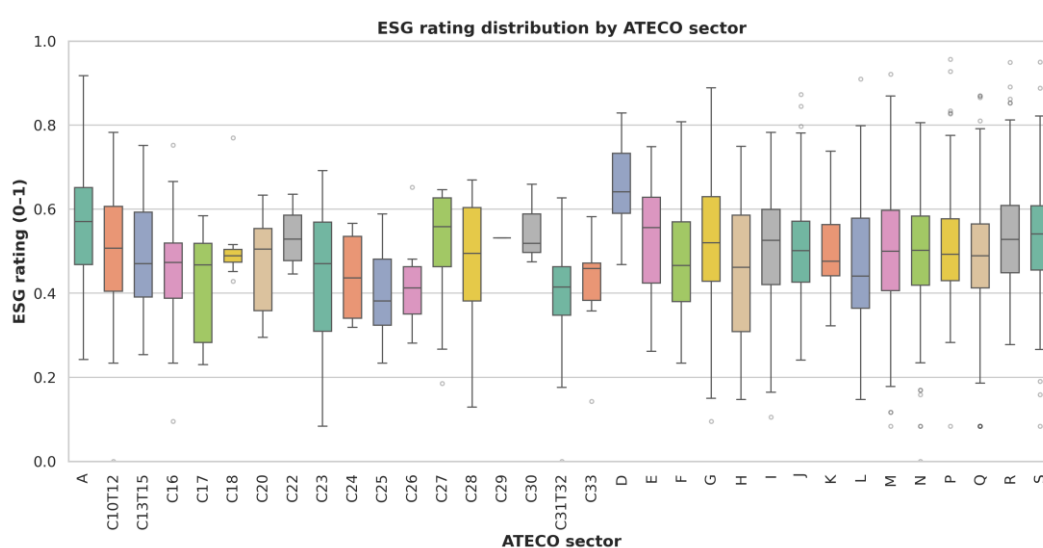


Figure 6. Distribution of overall ESG scores by ATECO sector. Note: ATECO codes follow the Italian classification of economic activities; the sectors names are reported next to each code.

Overall, the sectoral analysis suggests that ESG performance is shaped both by the economic characteristics of each sector and by the practical ability of firms to disclose

sustainability-related information. For this reason, proportionate ESG assessment frameworks remain particularly important, as they allow sector-specific differences to emerge without imposing excessively demanding reporting requirements on smaller firms.

7. Discussion

The empirical findings provide relevant insights into how ESG information can be structured and interpreted for SMEs through an internal rating framework. After addressing data-quality issues through the cleaning procedure, ESG scores display coherent patterns across firm size, legal form and economic sector. This suggests that the rating framework captures relevant variation in observable sustainability-related practices among SMEs. In particular, Social and Governance dimensions emerge as more readily assessable than the Environmental dimension. These pillars reflect organisational practices, compliance mechanisms, labour conditions, stakeholder relationships and governance structures that can often be implemented and formalised even by resource-constrained firms. This finding is consistent with the principle of proportionality embedded in the European sustainable finance framework and supports the relevance of ESG assessment tools tailored to the structural characteristics of SMEs.

This evidence is also consistent with the results of the normative analysis. European sustainable finance regulation has progressively expanded disclosure requirements, while emphasising proportionality and the need to avoid excessive burdens on SMEs. From this perspective, SMEs should not necessarily be interpreted as structurally weak in sustainability terms. Many firms may already display relevant sustainability-related practices but face difficulties in formalising and communicating them through standardised reporting tools. This is especially evident in the Environmental dimension, where practices often require monitoring systems, certifications, technological adaptation or upfront investments. However, the analysis does not directly test the mechanisms explaining lower Environmental scores. These results should therefore be read as descriptive evidence of greater difficulty in formalising environmental information, rather than as direct evidence of weaker environmental commitment by SMEs.

Overall, these results help to reframe the role of SMEs within the sustainable finance debate. Social and Governance practices, such as labour conditions, gender equality, internal organisation and basic compliance mechanisms, may be more easily documented than Environmental practices and can provide useful information for financial intermediaries. For regulators, this reinforces the need for proportionate and simplified ESG frameworks centred on material, accessible and decision-useful indicators. For banks, it highlights the potential of internal sustainability assessment tools to capture information that is not available through standardised external ESG ratings, especially in relationship-based lending, where qualitative information and contextual knowledge remain important.

The contribution of the paper should also be interpreted carefully in relation to creditworthiness. The empirical analysis does not test whether ESG scores directly affect loan approval, loan pricing, repayment behaviour or default risk. ESG scores should therefore be understood as descriptive assessment tools and as potential signalling mechanisms within SME lending, rather than as direct evidence of improved creditworthiness. In this sense, an internal ESG rating may support credit assessment by making SME sustainability information more visible, structured and comparable.

8. Limitations and Future Research

Although the analysis provides useful evidence on how ESG information can be structured for SMEs within a banking context, its findings should be interpreted in light

of some limitations related to the dataset, the case-study design and the construction of the ESG rating. The analysis is based on Italian SMEs assessed within the internal credit processes of a single ethical bank. Banca Etica operates in a specific national, institutional and market context, and its mission, client base and lending practices may differ from those of mainstream commercial banks. For this reason, the findings cannot be directly generalised to SMEs in other countries, financial systems or banking models. Nevertheless, the case provides rare evidence on how sustainability information can be collected and structured for SMEs within a real banking process.

The dataset is based on self-reported information collected through a questionnaire. This may expose the analysis to reporting errors, missing values and differences in firms' capacity to provide structured information. In addition, missingness is partly linked to the administrative process through which the data are generated. When a firm submits multiple credit applications over time, the internal system updates only the information that has changed since the previous application. As a result, variables that remain unchanged may appear as missing in the extracted dataset, even though the information was available in earlier records. The cleaning, deduplication and trimming procedures reduce this issue, but cannot eliminate it completely.

A further methodological aspect concerns the equal-weighting scheme used in the ESG rating. This aggregation method reflects the structure of the bank's internal assessment model and is therefore retained in order to analyse the rating as it is actually implemented in the credit process. However, it also affects the interpretation of the results. Since the Environmental pillar contains fewer indicators than the Governance pillar, each Environmental indicator carries a higher implicit weight in the overall score. This may influence cross-pillar comparisons and the interpretation of overall ESG scores, especially when Environmental scores are systematically lower. Future research should therefore test alternative aggregation methods and conduct sensitivity analyses.

The study remains descriptive and does not examine the relationship between ESG scores and credit outcomes. The analysis does not test whether higher ESG scores are associated with loan approval, loan pricing, repayment behaviour or default risk. Future research could extend this work by linking internal ESG ratings to credit-risk indicators and lending outcomes, including loan conditions and probability of default. Further studies could also compare internal ESG assessment models across different banks and countries, examine alternative weighting schemes and investigate how ESG information is interpreted within credit assessment processes.

9. Conclusions

This paper contributes to the literature on ESG assessment and SME finance by analysing how sustainability information can be collected and structured through an internal bank-based rating model. Compared with traditional ESG rating studies, which mainly focus on large listed firms and external rating providers, this study examines a real-world ESG assessment framework applied to 2395 Italian SMEs within a bank credit process. In doing so, it addresses an underexplored empirical setting and shows how ESG ratings can be adapted to firms that face limited reporting capacity, stronger information asymmetries and higher relative costs of producing structured sustainability information.

The paper makes three main contributions. At the theoretical level, it connects the SME regulatory gap identified in the European sustainable finance framework with a parallel gap in the ESG rating literature, where SMEs remain insufficiently studied despite their relevance for banks and sustainable finance. At the practical level, it shows how an internal ESG rating can structure dispersed sustainability-related information and make it usable within credit assessment processes, without implying that ESG scores directly predict credit outcomes. At the policy level, the findings support the need for

proportionate ESG frameworks that are aligned with SMEs' organisational and reporting capacities, while still providing financial institutions with decision-useful sustainability information.

The empirical results show coherent ESG patterns across firm size, legal form and economic sector. Social and Governance dimensions appear more readily assessable within the rating model, as they capture organisational practices, labour conditions, stakeholder relations and compliance mechanisms that can often be documented even by resource-constrained firms. By contrast, Environmental scores are systematically lower, suggesting that environmental practices may be more difficult to formalise and document, especially when they require monitoring systems, certifications, technological adaptation or upfront investments.

These findings suggest that SME-focused ESG ratings can help make sustainability-related information more visible, structured and comparable. From the perspective of financial intermediaries, internal ESG assessment tools may support credit assessment by complementing traditional financial indicators with sustainability-related information. From the perspective of SMEs, such tools may function as potential signalling mechanisms, allowing firms to communicate organisational quality and sustainability-related practices that would otherwise remain less observable.

The contribution of the paper should nevertheless be interpreted with caution. The analysis is descriptive and does not test whether ESG scores directly affect loan approval, loan pricing, repayment behaviour or default risk. Future research could extend this work by comparing internal ESG models across financial institutions and by empirically examining the relationship between ESG scores and credit outcomes, including loan conditions, default risk and repayment behaviour.

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