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The Role of Accredited Certification in Sustainable Finance

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Contents

Abstract

The study *The Role of Accredited Certification in Sustainable Finance* examines the role of the Quality Infrastructure[1], with particular reference to accreditation and accredited certification, in the context of sustainable finance, assessing their contribution to improving corporate performance and to the management of environmental and social dimensions.

In recent years, sustainability has progressively become established as a structural element of economic and financial policies at the international level. At the European level, this process has resulted in the development of a comprehensive sustainable finance framework aimed at directing capital flows towards activities aligned with environmental and social objectives. Instruments such as the European taxonomy, ESG (Environmental, Social and Governance) disclosure regulations, and green bond standards contribute to establishing common criteria for assessing the sustainability of economic activities, increasingly influencing investment decisions, access to credit, and the cost of capital.

Within this context, the interrelationship between regulation, the financial system, and corporate behaviour becomes increasingly prominent. The growing demand for reliable, comparable ESG information calls for mechanisms capable of supporting its generation, verification, and standardisation. Accredited certifications may play a supporting role in this framework by contributing to the institutionalisation of corporate processes and enhancing the quality of the information available to financial market participants and supervisory authorities.

[1] *The Quality Infrastructure (QI) is the system of "quality and conformity" developed by advanced industrial economies.*

To ensure the proper functioning of markets, safeguard consumer health and safety, and protect the environment. Together with market surveillance, the component of the QI –technical standardisation, metrology, accreditation and conformity assessment – operate synergistically to form an integrated framework comprising tools and processes designed, to ensure that the quality and safety requirements of products and services placed on the market are aligned with the needs and expectations of users and stakeholders at large (institutions, businesses, and consumers).
In detail, the pillars of the Quality Infrastructure, which exist at national (NQI), European, and international (InQI) levels, are:
• Technical standardisation: the adoption of common measurement systems or reference frameworks, defined with the involvement of all stakeholders in the interest of the wider community.
• Metrology: the science of accurate and reliable measurement, commonly divided into scientific, industrial, and legal metrology.
• Accreditation: the attestation, by an authoritative body acting as an impartial third-party guarantor, of the competence and impartiality of a certification, inspection, and verification body, or of a testing and calibration laboratory, etc., which is qualified to carry out specific conformity assessment activities.
• Conformity assessment: the verification of requirements set out in relevant standards for products, processes, management systems, and persons. This includes, among others, certification, inspection and verification activities, validation and verification processes, laboratory testing, and calibration.
• Market surveillance: the activities and tools of market surveillance authorities that monitor products to ensure compliance with the requirements specified in European legislation.

The transition towards more sustainable production models is, however, characterised by significant heterogeneity across sectors. Different economic sectors are required to undergo profound yet differentiated changes, both in terms of their intensity and the timeframe over which they occur. Energy- and emissions-intensive sectors require substantial investment in innovative technologies, whereas other industries are primarily affected by organisational and managerial transformations. This heterogeneity implies that sustainability policies and supporting instruments should be tailored to the specific characteristics of different productive contexts.

Within this context, the Testing, Inspection and Certification (TIC) system contributes to the implementation of sustainability policies. Through independent verification activities, it enhances the reliability of ESG information and promotes greater alignment between businesses, the financial system, and institutions. In particular, accredited certifications, based on internationally recognised standards, provide a framework for companies to structure their processes, monitor their performance, and demonstrate, in a verifiable manner, compliance with specific requirements. This aspect is becoming increasingly important in a context where access to credit, participation in supply chains, and relationships with investors are increasingly dependent on the quality of available information.

The empirical analysis shows that accredited certifications have become widely adopted across the Italian productive system, accompanied by a gradual evolution in their use. While certifications relating to quality and governance initially predominated, recent years have seen a growing emphasis on environmental and social dimensions, reflecting the increasing attention devoted to sustainability issues and the evolving regulatory framework.

• From the perspective of firm characteristics, certified companies tend, on average, to be larger, more integrated into markets, and characterised by more structured and formalised organisational processes, all of which may facilitate the adoption of more sophisticated management systems. However, the analysis goes beyond merely describing these differences, seeking instead to isolate the specific contribution of accredited certifications to firms' performance.

• From a performance perspective, certified companies exhibit, on average, higher values than non-certified firms, both in terms of economic and financial outcomes and across ESG dimensions. Composite sustainability indicators also reveal a generally stronger positioning and a more sustained growth trajectory over time. Econometric analyses indicate a positive effect of adopting accredited certifications on key performance variables. In particular, the introduction of ESG certifications is associated with an increase in turnover that tends to emerge already in the year of adoption and to consolidate in subsequent periods. This pattern is consistent with the nature of management systems, which involve gradual organisational

adjustments over time. The benefits associated with accredited certifications can be attributed to several channels, including improved internal efficiency, enhanced access to regulated markets, the reduction of information asymmetries, and the strengthening of corporate reputation.

• With regard to sustainability, accredited certifications are associated with improvements across the environmental, social, and governance dimensions, with effects occurring over different timeframes. The environmental dimension shows more immediate effects, partly because many companies initiate improvement measures before formally obtaining certification. By contrast, the social and governance dimensions require longer periods to generate measurable outcomes, as they involve deeper changes in organisational processes and corporate culture.

• A further element of interest concerns the monetary valuation of environmental and social impacts. This approach makes it possible to translate heterogeneous effects into a common metric, enabling direct comparisons across different types of impact and providing a synthetic measure of the value generated. The findings show that the benefits associated with accredited certifications are overall substantial, with a greater contribution from the environmental component, particularly in relation to climate change impacts. The social component also makes a significant contribution, especially with regard to employment and equal opportunities, although its overall weight is more limited.

The study also highlights marked sectoral heterogeneity in the distribution of benefits. Sectors characterised by higher emissions intensity or resource use intensity tend to record greater environmental benefits, whereas more labour-intensive sectors show a stronger contribution from social benefits. This confirms that the value generated by certifications depends to a significant extent on the structural characteristics of the productive contexts in which they are adopted.

Overall, the evidence suggests that accredited certifications can represent a valuable instrument both for addressing the requirements of the regulatory framework and for supporting the improvement of corporate performance and the management of ESG dimensions. Their contribution appears to be linked to their ability to make corporate processes more structured and verifiable, while at the same time promoting greater transparency towards stakeholders.

In summary, the Quality Infrastructure and, in particular, the system of accredited certifications emerge as an element that supports companies in integrating economic objectives with sustainability goals, contributing to making the principles of sustainable finance and the European regulatory framework more operational and measurable.

1 An Evolving Landscape: TIC and sustainable finance

1.1 Sustainability Objectives

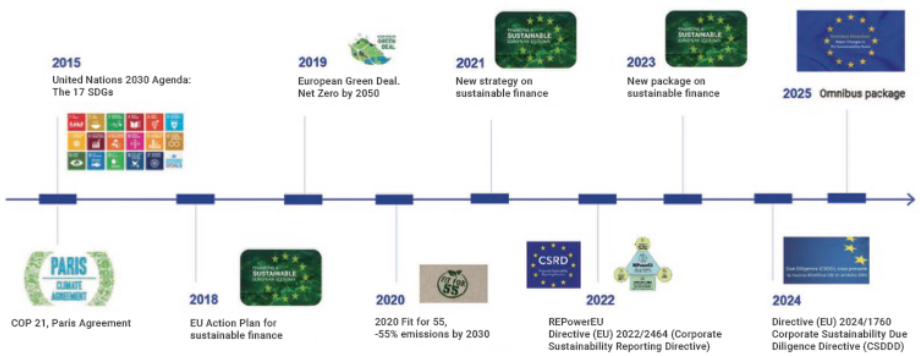
1.1.1 Sustainability: A Supranational Issue

The definition of sustainability objectives has evolved rapidly over recent decades. Early reflections on the subject, such as those set out in the *Our Common Future* report of the Brundtland Commission (1987), emphasised the need to reconcile economic development with the protection of natural resources for future generations.

In subsequent years, this perspective has progressively been translated into a more operational approach. A genuine paradigm shift occurred with the 2015 Paris Agreement (COP21), when 191 countries formally committed to limiting the increase in global average temperature to well below 2°C above pre-industrial levels, while pursuing efforts to limit the rise to 1.5°C. This objective, concrete and measurable, has redefined sustainability in terms of clear and verifiable limits, establishing it as a central priority of global economic and industrial policies.

In this context, the European Union has assumed a leading role in implementing this regulatory framework, translating the international strategy into a coherent set of instruments that integrate sustainability, finance, and industrial policy. Among these, the European Green Deal represents the broadest and most ambitious reference framework. It is a communication fromthe European Commission which, while not legally binding, sets out the EU's long-term vision: to become the first climate-neutral continent by 2050. Its main role is to guide and coordinate subsequent legislative initiatives, including the key regulatory milestones illustrated in Figure 1.

Figure 1 - Regulatory Milestones



At the same time, the European Union has established itself as a key player in sustainable finance, thanks to an advanced regulatory framework based on the EU taxonomy of sustainable activities. It has also launched a broad programme of green bond issuance, creating an innovative public financing mechanism capable of attracting private capital and directing public expenditure towards environmental objectives. According to the *Next Generation EU (NGEU) Green Bonds Allocation and Impact Report* published in 2024 by the European Commission, the European Union issued green bonds totalling €60.2 billion over the past year, confirming its position as the world's largest supranational issuer of green bonds.

Within this framework, Italy stands out as one of the main beneficiaries of the European strategy. The National Recovery and Resilience Plan (PNRR) represents one of the highest shares of "green" expenditure eligible under the Commission's criteria (European Union, 2024). This centrality reflects the Italian Government's decision to allocate a significant portion of PNRR resources to the energy transition, the upgrading of the building stock, the modernisation of transport systems, and the promotion of innovative supply chains.

1.1.2 Sectoral impacts: "one sector does not fit all"

Building on these foundations, it becomes clear that the objectives set by the European Commission, while cross-cutting in nature, produce heterogeneous effects across different economic sectors. This gives rise to the principle of "one sector does not fit all", which recognises that the transition towards sustainability entails different transformations depending on the sector concerned. Timelines, the intensity of interventions, and technological requirements in fact vary significantly, making it necessary to adopt a sector-specific approach to environmental and industrial policies.

Among the sectors that require specific attention is the manufacturing sector, which accounts for a significant share of global emissions. According to the IPCC (AR6 Synthesis Report, 2023), the industrial sector contributed approximately 24% of global anthropogenic greenhouse gas emissions in 2019, with basic industries—particularly steel, cement, and chemicals—responsible for around two-thirds of industrial emissions and over 70% of direct CO_2 emissions. Reducing emissions in these sectors requires the progressive adoption of innovative low- or zero-emission technologies, such as the use of green hydrogen in steelmaking, carbon capture and storage (CCS) systems, and the electrification of industrial thermal processes. While these solutions represent key drivers of decarbonisation, they remain constrained by the long investment and amortisation cycles typical of the production infrastructures in these industries.

Turning to the **energy sector**, Directive (EU) 2023/2413 on Renewable Energy (RED III – *Renewable Energy Directive III*) sets a binding target whereby at least 42.5% of the European Union's gross final energy consumption must come from renewable sources by 2030 (European Parliament and Council, 2023c). The legislation requires Member States to significantly increase the share of renewable energy even in sectors that have so far been less involved in decarbonisation efforts. To achieve such ambitious targets, a parallel acceleration of infrastructure development is essential, through smart grids, storage systems, and resilient networks capable of ensuring continuity of supply even under adverse environmental conditions. As highlighted by Drago and Gatto (2022), effective and transparent regulation is a prerequisite for successfully addressing the complexity of the energy transition.

A sector that plays a crucial role in food security, but is also a significant source of greenhouse gas emissions, is **agriculture, forestry and other land use**. According to the IPCC (AR6 Synthesis Report, 2023), this sector accounted for approximately 22% of global anthropogenic greenhouse gas emissions in 2019. In line with the European Green Deal, the *Farm to Fork* strategy has set ambitious targets to be achieved by 2030, such as halving the use of chemical pesticides and reducing fertiliser use by 20% (European Commission, 2020). In addition, the new Common Agricultural Policy (CAP) introduces economic instruments aimed at rewarding farmers who adopt environmentally friendly practices, such as crop rotation and precision farming (European Commission, 2021).

Finally, among the sectors most affected by the green transition is the **transport** sector, which is increasingly at the centre of the regulatory shift towards sustainable mobility. Road transport accounts for around 20% of total CO_2 emissions in the European Union (IPCC, 2023), making it a key target of climate policies.
In this context, Regulation (EU) 2023/851 establishes that, from 2035 onwards, only new zero-emission light vehicles may be registered, marking the end of sales of petrol and diesel cars and vans. In addition, by 2030 manufacturers will be required to reduce the average emissions of new cars by 55% compared with 2021 levels (European Parliament and Council of the European Union, 2023a). In parallel, Regulation (EU) 2023/1804 requires Member States to develop a comprehensive network of alternative fuel infrastructure along the main European transport corridors (European Parliament and Council of the European Union, 2023b).
To support this transformation, the EU has deployed financial instruments such as the Connecting Europe Facility (CEF) Transport[2] (European Commission, 2025).

[2] *Connecting Europe Facility - European Commission*.

1.2 Regulatory Framework

1.2.1 Key European Directives

After outlining the main sectoral challenges arising from the implementation of European climate objectives—from manufacturing to energy, from agriculture to transport—it is necessary to focus on the regulatory framework that provides the governing and strategic context. Indeed, the transition towards a sustainable economic model cannot be fully understood outside the system of rules that defines obligations, reporting mechanisms, and implementation modalities.
In this context, the European regulatory system on sustainability is now broad, complex, and continuously evolving, the result of a gradual process that, over the past decade, has systematically expanded disclosure, accountability, and reporting requirements in environmental, social, and governance (ESG) matters.

Among the most significant milestones in this process is Directive 2014/95/EU (the Non-Financial Reporting Directive, NFRD), under which large Public Interest Entities (PIEs) —such as listed companies, banks, and insurance undertakings with more than 500 employees— have been required to publish a Non-Financial Statement.

Table 1 - Key European Directives

	EU ETS	NFRD - CSRD	CSDDD
Act	**Directive 2003/87/CE (EU ETS)** establishes the Emissions Trading System.	**Directive 2014/95/UE (NFRD) and Directive 2022/2464/UE (CSRD)** egulate the disclosure of ESG information by non-financial companies.	**Directive 2024/1760/ UE (CSDDD)** regulates corporate due diligence obligations regarding environmental impacts and human rights.
Scope	Energy-intensive companies are required to monitor and report their CO_2 emissions annually·	The process begins with PIEs under the NFRD), followed by large companies and the extension to listed SMEs under the CSRD.	Mandatory disclosure of environmental impacts and human rights across the value chain; requirement for a climate transition plan.
Entry into force	In force across the EU since 2005. Currently in Phase IV (2021–2030), revised in 2023 under the Fit for 55 package.	In force since January 2024. It applies to additional companies from January 2025. Substantially amended by the Omnibus Package, with changes to implementation timelines and scope.	Entered into force on 25 July 2024. Member States must transpose it by 26 July 2027. Substantially amended by the Omnibus Package.

Although initially limited to a few hundred companies, this measure laid the foundations for more mature and transparent ESG reporting, paving the way for the subsequent Directive 2022/2464/EU (CSRD – Corporate Sustainability Reporting Directive).

The current European regulatory framework on corporate sustainability is the result of a significant recalibration introduced in 2026 under the so-called Omnibus I package, aimed at streamlining and simplifying the ESG regulatory framework. The reforms introduced by Directive 2026/470/EU, both in the area of sustainability reporting and in that of due diligence, as well as the enhancement of standardised voluntary tools such as the Voluntary Sustainability Reporting Standards for non-listed SMEs (VSME), can be interpreted as a concrete application of the principles of better regulation (OECD, 2023a). While the European Union seeks to preserve environmental objectives by ensuring the reliability and comparability of information, attention has progressively shifted towards the need to contain regulatory burdens within levels compatible with the industrial structure of European economies.

The amendments introduced have a differentiated impact across the main pillars of the European regulatory framework, from reporting to due diligence, as well as climate mitigation instruments. Directive 2022/2464/EU (CSRD – Corporate Sustainability Reporting Directive), which had introduced a harmonised disclosure system based on the European Sustainability Reporting Standards (ESRS), has been substantially revised by Directive 2026/470/EU, in force since 18 March 2026. The latter has limited the reporting obligation to companies with more than 1,000 employees and annual net revenues exceeding €450 million, significantly reducing the scope of undertakings originally in scope and removing the obligation to apply sector-specific reporting standards.[3,4]
In this context, the development of the voluntary VSME standard is also relevant. It is based on a limited set of core indicators, designed to enable smaller companies to adopt standardised reporting frameworks on a voluntary basis.

Similar dynamics of regulatory selectivity have also affected Directive (EU) 2024/1760 (CSDDD – Corporate Sustainability Due Diligence Directive), through which the European Union had extended corporate responsibility to include the obligation to carry out due diligence on environmental and social risks and impacts throughout the entire value chain. Directive 2026/470/EU has raised the threshold

[3] *Directive (EU) 2026/470 of the European Parliament and of the Council, of 24 February 2026, Official Journal of the European Union Series L, 26 February 2026, art. 1, par. 4 (new art. 19bis, par. 1).*

[4] *European Financial Reporting Advisory Group (EFRAG), Draft Technical Advice on the Revision of the European Sustainability Reporting Standards, transmitted to the European Commission on 3 Dicember 2025; Directive (EU) 2026/470, art. 4, par. 1, lett. b).*

to companies with more than 5,000 employees and annual net revenues exceeding €1.5 billion, resulting in a significant reduction in the number of undertakings originally in scope, and has simultaneously removed the obligation to adopt a climate transition plan within the due diligence framework5. The deadline for transposition into Member States' national legal systems is set at 26 July 2028, with operational application for companies starting from July 2029.

On the side of direct climate mitigation, Directive (EU) 2023/959 (EU ETS 2) of 10 May 2023 amends Directive 2003/87/EC by extending the emissions trading system to fuels placed on the market in the buildings and road transport sectors, as well as to additional sectors not covered by the original EU ETS. This intervention is part of the strengthening of the European climate framework for 2030 and contributes to the achievement of the emission reduction targets set under the "Fit for 55" package. The operational phase of the new system, initially planned for 2027, has been postponed to 2028 following a subsequent legislative amendment adopted in November 2025. From that date onwards, fuel suppliers will be required to purchase all allowances through auctioning, with no free allocation, with the first surrender deadline set for 31 May 2029. The ETS 2 operates under a cap-and-trade mechanism and maintains a legally distinct compliance framework from the EU ETS applicable to larger industrial and energy-intensive sectors.

Closely linked to the strengthening of the EU ETS is the carbon border adjustment mechanism introduced by Regulation (EU) 2023/956 (CBAM – Carbon Border Adjustment Mechanism). This instrument extends the carbon price to imports of carbon-intensive goods, with the aim of preventing carbon leakage and ensuring a more level playing field between European producers and non-EU operators. Within the Omnibus I package, simplification measures have also been introduced, including a minimum application threshold of 50 tonnes per year for certain categories of imports, designed to exclude marginal operators and reduce administrative burdens without undermining environmental effectiveness. In this way, CBAM helps preserve the carbon price signal and strengthen the overall coherence of European climate policy.

1.2.2 Main European Regulations

After examining the framework of European policies and directives on climate mitigation, attention now shifts to the second pillar of the European sustainability strategy: the regulatory framework for sustainable finance.

[5] Directive (EU) 2026/470, art. 2, par. 2 (new art. 2, par. 1 of Directive (EU) 2024/1760); art. 2, par. 5 (new art. 16, par. 1).

This set of rules not only complements the logic of the Green Deal, but also provides a common language for assessing the environmental consistency of economic activities and investments.

A key element of this regulatory architecture is represented by Regulation (EU) 2020/852 on the Taxonomy of sustainable activities, which operates in close synergy with the CSRD Directive and with the new European regulation on green bonds. The taxonomy establishes a unified classification of economic activities deemed sustainable, thereby providing an objective framework to steer capital flows towards investments aligned with environmental objectives.

Building on this foundation, Regulation (EU) 2023/2631 establishes the European Green Bond (EuGB) label and the corresponding disclosure templates. This label allows issuers to designate their bonds as "green" at the European level, provided that the proceeds are allocated to activities aligned with the EU Taxonomy (with a "flexibility pocket" of up to 15% for activities not yet covered). The EuGB label requires both pre- and post-issuance external review, under the supervision of the European Securities and Markets Authority (ESMA), thereby strengthening the credibility of the instrument and reducing the risk of greenwashing.

Table 2 - European regulations on finance and sustainability - I

	EU TAXONOMY	EU GREEN BONDS	ESG RATINGS
Act	**Regulation (EU) 2020/852 Disclosure of Taxonomy-eligible and Taxonomy-aligned activities**.	**Regulation (EU) 2023/2631**: establishes the EuGB standard, with transparency, Taxonomy, reporting and external review requirements.	**Regulation (EU) 2024/3005**: regulates ESG rating providers, with ESMA authorisation and supervision and amends **Regulation (EU) 2019/2088 (SFDR).**
Scope	Companies within the scope of NFRD/CSRD according to the application timeline.	All issuers wishing to use the EuGB designation.	All ESG rating providers operating in the EU (including non-EU providers).
Entry into force	Entered into force on 12 July 2020. From 2024, disclosure was extended to Taxonomy eligibility and alignment, covering all 6 environmental objectives.	Application from 21 December 2024; transitional regime for External Reviewers, with ESMA registration required from 21 June 2026.	Level 1 application from 2 July 2026.

The role of ESMA is further strengthened by Regulation (EU) 2024/3005, which introduces a framework for transparency, integrity, and governance for ESG rating providers, aligned with the principles of the Credit Rating Agencies (CRA) Regulation. The application of Level 1 of the Regulation is set for 2 July 2026, as summarised in Table 2.

The evolution of the European regulatory framework does not stop here. In order to coordinate the various ESG disclosures, Regulation (EU) 2024/3005 also amends Regulation (EU) 2019/2088 on sustainability-related disclosures in the financial services sector, known as the SFDR (Sustainable Finance Disclosure Regulation). This regulation concerns in particular fund managers, banks, insurance companies, and financial advisors, requiring them to transparently disclose how they integrate ESG factors into investment decisions and what the Principal Adverse Impacts (PAI) of their portfolios are. For Italian companies, this translates into a higher demand for traceable ESG data, with consequent effects on access to credit and financing conditions.

Another component of the system is represented by Regulation (EU) 2016/1011 on indices used as benchmarks in financial instruments and financial contracts, or to measure the performance of investment funds, the so-called Benchmark Regulation (BMR).
This Regulation sets out the rules for the provision, administration, and use of financial benchmarks, including Climate Transition Benchmarks (CTB) and Paris-aligned Benchmarks (PAB), introduced in 2020. For companies, the impact is indirect but significant: their ESG data feed into climate benchmark methodologies, influencing the cost of capital and access to index-linked products. From 1 January 2026, the revised BMR limits its scope to significant or critical benchmarks, reducing administrative burdens and strengthening the quality of disclosures, under the supervision of ESMA.

In this context, the role of European supervision exercised by ESMA is also crucial with regard to the quality of ESG information disclosed to the market. The Authority indeed calls on market participants to ensure that sustainability-related claims are clear and supported by evidence, identifying four guiding principles: *accuracy, accessibility, substantiation, and timeliness*, aimed at preventing greenwashing practices and ensuring the reliability and verifiability of information (ESMA, 2026).

Finally, the European regulatory framework is completed by two further initiatives that broaden the scope of sustainability, extending it both to more specific environmental aspects and to retail financial products. On the one hand, Regulation (EU) 2024/573, in force since 11 March 2024, substantially updates therules on F-gases (fluorinated greenhouse gases), with the aim of progressively reducing their placing on the market up to 2050.

Table 3 - European Regulations on Sustainable Finance - II

	SFDR	BMR	F-GAS
Act	**Regulation (EU) 2019/2088** on sustainable finance: transparency requirements on ESG factor integration and investment PAI disclosures.	**Regulation (EU) 2016/1011** Regulates the provision, administration and use of financial and climate benchmarks, with registration, governance and codes of conduct requirements.	**Regulation (EU) 2024/573** provides for the phase-down of F-gases, with stricter limits and market placement bans.
Scope	Financial market participants: asset managers, insurers, pension funds, banks and financial advisers.	Benchmark administrators, data contributors (banks, intermediaries, supervised entities) and supervised users.	Manufacturers, importers, distributors, installers and maintainers of F-gas-containing equipment.
Entry	In force since 10 March 2021. Technical standards from 1 January 2023. Revision underway (SFDR II).	Entered into force on 30 June 2016; BMR revision finalised as Regulation (EU) 2025/914, entering into force on 8 June 2026.	In force since 11 March 2024. Phased application until 2050.

On the other hand, the ongoing initiative on the EU Ecolabel for retail financial products, still under development, aims to extend the environmental quality label to funds intended for retail investors, setting minimum environmental criteria consistent with the EU Taxonomy.

1.3 The Role of the TIC Sector in Sustainable Finance

After outlining the complex regulatory framework governing sustainability at the European level—from ESG reporting directives to climate and finance regulations—the focus shifts from the regulatory level to the operational and market level. The task of translating principles, obligations, and standards into concrete practices falls to financial system actors, who are called upon to act as a bridge between public policies and the real economy. Banks, investment firms, certification bodies, and more broadly the TIC (Testing, Inspection and Certification) sector play a crucial role in making the green transition measurable, verifiable, and financeable.

1.3.1 Financial Intermediaries and Sustainable Finance

The evolution of the European regulatory framework has brought about a structural paradigm shift for financial intermediaries, redefining their role in the transition process. A key component of this transformation is the introduction of Pillar 3 ESG risk disclosures, provided for under Regulation (EU) 2019/876 and governed by the so-called Implementing Technical Standards (ITS) issued by the European Banking Authority (EBA).

Since 2023, large banks listed on EU regulated markets have been required to publish detailed information on their exposures to climate and environmental risks, distinguishing between physical and transition risks, as well as on the mitigation strategies adopted. The subsequent Regulation (EU) 2024/1623 (the so-called CRR III) has further expanded the scope of disclosure requirements, consolidating the shift towards a fully integrated approach to ESG6 risk management within the prudential framework.

In this context, the role of financial intermediaries is structured along a dual dimension:

- as **preparers**, they are responsible for producing transparent, verifiable reporting consistent with European standards, including quantitative and qualitative data on climate risks, financed emissions, and transition strategies;

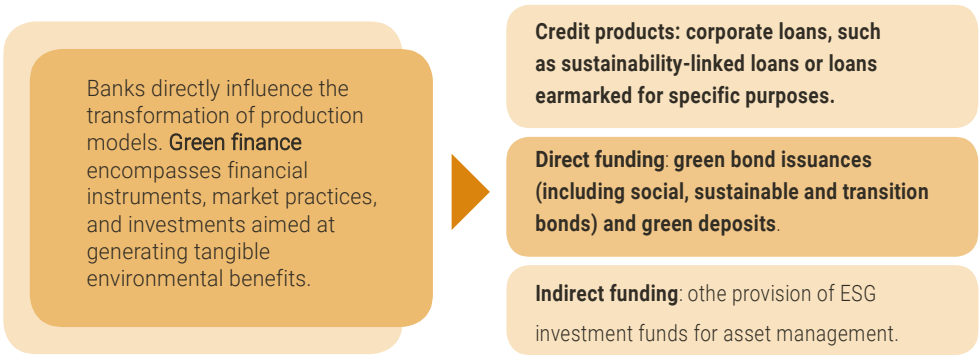
- as **users**, they rely on the ESG data of financed companies, including SMEs and retail clients, to feed internal risk assessment models, guide lending decisions, and shape investment strategies.

The integration of ESG factors into risk management processes responds not only to a principle of transparency, but also to one of systemic prudence: an accurate understanding of environmental and social risks makes it possible to prevent unexpected losses, enhance capital resilience, and improve the banking system's ability to absorb shocks arising from climate change.

In parallel, this evolution in disclosure and risk management has led to the development of new sustainability-focused financial products, such as green loans, green mortgages, and sustainability-linked loans, as well as to the definition of measurable targets related to emissions reduction, portfolio composition, and alignment with the EU Taxonomy.

[6] *As outlined in the objectives of the Financing Sustainable Growth Action Plan and Sustainable Finance Strategy.*

Figure 2 - Banks as Agents of Change



1.3.2 The Role of the TIC Sector in the New ESG Governance

In parallel with the role of banks, the credibility of sustainable finance increasingly depends on the quality and verifiability of the information underpinning financial decision-making flows. The TIC sector can make a significant contribution to this objective, as it strengthens trust in the system and ensures transparency through independent verification activities. A central role is played by accreditation issued by Accredia, the national accreditation body that guarantees the competence and impartiality of entities responsible for carrying out conformity assessment activities (certification, inspection, verification and validation, testing, and calibration).
Even in cases where regulations do not provide specific requirements, accredited conformity assessments represent a reliable technical reference for supervisory authorities and market operators. The accreditation system is based on internationally recognised standards, such as the ISO/IEC 17000 series, and on the activities of national accreditation bodies operating within a framework of international mutual recognition. This system is made possible by international mutual recognition agreements, namely the EA and IAF MLA (Multilateral Agreements) and the ILAC MRA (Multilateral Recognition Arrangements), promoted respectively by the European co-operation for Accreditation (EA), the International Accreditation Forum (IAF), and the International Laboratory Accreditation Cooperation (ILAC). At European level, EA, and globally, IAF and ILAC, are the organisations that coordinate the network of accreditation bodies[7].

[7] *As of 1 January 2026, Global ACI has replaced IAF and ILAC as the single global organisation representing accreditation bodies and stakeholders involved in conformity assessment. A key feature of the new framework is the Global ACI MRA, which provides a unified mechanism for the recognition of conformity assessment results and the acceptance of certificates and reports issued by accredited bodies and laboratories.*

These agreements promote the mutual recognition of conformity assessments between different countries, helping to ensure consistency, reliability, and transparency in international markets. This model is based on periodic audits conducted by assessment and accreditation bodies and fosters the dissemination of more transparent and measurable business practices.
A concrete example of this dissemination is the *Sustainability Dialogue Document between SMEs and Banks* (MEF, 2024), which promotes the standardisation of ESG information and recognises accredited certifications as tools of transparency and comparability in the relationship between companies and the financial system.
In this perspective, accredited conformity assessment is a possible enabling and complementary tool: it provides independent assurance on data quality and facilitates a common language among economic operators, institutions, and markets. In this context, the evidence presented in Chapters 2 and 3 that follow further explores the role that accredited certifications can play in strengthening the quality, verifiability, and comparability of ESG information used in risk assessment and management processes, as well as in stakeholder dialogue.

1.3.3 The TIC Sector between Mandatory Requirements and Complementarity

In several areas, the European Union has introduced or strengthened the requirement to use accredited bodies, recognising their contribution to the credibility of disclosures:

- **Regulation EU 2023/956 (CBAM - Carbon Border Adjustment Mechanism)**: as of the full implementation phase in 2027, CBAM declarations referring to 2026 will require verification by accredited bodies in accordance with verification and validation standards (EN ISO/IEC 17029 and ISO 14065), as specified in Delegated Regulation (EU) 2025/2551, which defines the conditions for the accreditation of verifiers, supplementing the CBAM Regulation on the Carbon Border Adjustment Mechanism.

- **Regulation (EU) 2018/2067: verifiers of ETS data must be accredited in accordance with ISO/IEC 17029**.

- **Regulation (EU) 2023/1805 on renewable fuels in maritime transport: requires the verification of environmental compliance by accredited verifiers (in accordance with ISO/IEC 17029).**

- **Regulation (EU) 2024/3012 establishes a European Union certification framework for permanent carbon removals, carbon farming, and carbon storage in products**.

This legal act has been supplemented by Implementing Regulation (EU) 2025/2358, which lays down rules on certification schemes and certification bodies, and further specifies the relevant accreditation standards: certification bodies must be accredited in accordance with EN ISO/IEC 17065 and, where they also carry out verification activities, must additionally comply with the applicable requirements of EN ISO/IEC 17029 and EN ISO 14065.

Beyond cases where legislation explicitly requires the use of accredited bodies, accredited certifications and verifications can also represent a factor of competitiveness and a means of reducing assurance costs. The guidelines of the Committee of European Auditing Oversight Bodies (CEAOB, 2024) highlight precisely the risk of redundant costs and propose the "incorporation by reference" approach: when a valid assurance engagement already exists, another practitioner[8] may rely on it instead of repeating procedures, provided that independence and quality are ensured. In this context, accredited bodies and laboratories[9] can play a key role in improving the reliability of ESG information while also containing overall compliance costs. Accreditation is directly or complementarily linked to various regulatory instruments of sustainable finance, as shown in Table 4.

[8] *The definition of CEAOB (2024) is "practitioner(s) - statutory auditor(s) and/or independent assurance services provider(s) appointed to express an opinion as per the CSRD (see Accounting Directive Article 34.1(aa)".*

[9] *The European Commission's official FAQ (07/08/2024) clarifies the definition of an independent assurance services provider: "… means a conformity assessment body accredited in accordance with Regulation (EC) No 765/2008 …" which includes accredited conformity assessment bodies.*

Table 4 - Regulations and the potential role of the TIC sector

Regulation	The relevance of the TIC sector and accreditation
Regulation (EU) 2024/3005 - ESG Rating Activities	Accredited conformity assessment can support entities subject to ESG ratings by providing assurance on data and KPIs (GHG, Taxonomy alignment), verification of processes or datasets (under ISO/IEC 17029), and inspections of internal controls (under ISO/IEC 17020). Accredited certification of management systems (e.g. ISO 9001 and ISO 27001 under ISO/IEC 17021-1) may also facilitate ESMA's supervisory activities.
Regulation (EU) 2023/2631 - European green Bonds	Accredited validation and verification statements (e.g. under ISO/IEC 17029 and ISO 14065) may be used to demonstrate alignment with the EU Taxonomy, verify GHG data, and validate project milestones, thereby reducing the risk of deviations identified during the post-allocation review.
Regulation (EU) 2019/2088 - SFDR	The use of information verified under accreditation (ISO/IEC 17029, ISO 14065 enhances the reliability, comparability and auditability of disclosures, particularly in relation to environmental PAIs (GHG, energy, waste and water) and social indicators (e.g. workplace injuries and the gender pay gap).
Regulation (EU) 2016/1011 - BMR	Accredited verification can help ensure the quality of ESG data and the consistency of calculations. Accredited bodies can also provide independent assurance on ESG benchmark disclosures and methodologies, thereby strengthening transparency and internal governance.
EU Ecolabel for Retail Financial Products	Although it does not introduce mandatory requirements, the use of accredited verifiers provides independent assurance on environmental data and on asset managers' ESG data governance, thereby enhancing the credibility of the label.
Implementing Regulation art. 111-bis TUB (MEF Decree No. 209 of 4 October 2022)	It establishes the requirements for qualification as an ethical finance banking operator. Accredited bodies certify compliance with the criteria of impartiality, transparency and ESG consistency, ensuring the credibility of the recognition process established by the Decree.

2 Accredited Certifications and Firm Performance: an Empirical analysis of ESG dimensions

2.1 The Role of Accredited Certifications in the ESG Framework and Corporate Strategies

The ISO (International Organization for Standardization) codifies, through a set of internationally recognised technical standards, management systems that define the procedures, controls, and organisational processes required to meet the needs of an economic agent's stakeholders. In recent years, these systems have progressively become one of the main points of convergence between regulation, market forces, and corporate strategy.

If, in the past, accredited certification was perceived primarily as a technical tool, today it increasingly represents a component of corporate governance, as it makes it possible to translate stated commitments into comparable, verifiable evidence that can be used in relations with stakeholders. The growing importance of ESG issues has further accelerated this process. Within the ESG framework, measurability is no longer an ancillary element, but a necessary condition to give credibility to corporate narratives and to support the transition towards more responsible production models.

As described in Chapter 1, this evolution is reflected in the recent European framework, which shifts the focus from mere formal compliance to the substantive demonstration of sustainability performance. Companies are required not only to pursue sustainability objectives, but also to document their outcomes through a shared and verifiable language. Accredited certification therefore plays a bridging role between corporate strategy and the regulatory system, helping to reduce information asymmetries, structure processes, clarify responsibilities, and make practices comparable across companies operating in different contexts. The role of accredited certifications is thus embedded in a broader system in which the production and verification of ESG information become central elements for the functioning of markets. Access to credit, participation in supply chains, and relationships with investors increasingly depend on companies' ability to demonstrate their reliability across ESG dimensions.

The growing availability of structured data on ESG performance, drawn both from market sources and from administrative records and sustainability reports, now enables a systematic empirical analysis of the role played by accredited certifications. In this perspective, it becomes possible not only to describe the diffusion of ESG practices, but also to assess their effects on firm performance, both in terms of financial and economic outcomes and across environmental, social, and governance dimensions.

The aim of this chapter is to analyse the characteristics of firms with management Systems certified by accredited bodies and to compare their economic, financial, and sustainability performance with those of non-certified firms, in order to assess the existence of a causal relationship between certification and corporate outcomes. The analysis is structured into three parts.

The first provides an overview of the diffusion of **accredited certifications among Italian firms**, highlighting differences by sector and by type of certification, with particular attention to schemes related to ESG dimensions.

The second compares performance indicators between **certified and non-certified firms**, with the aim of analysing the main differences, while maintaining a focus on the role of certification schemes linked to ESG dimensions.

Building on these descriptive findings, the third part enriches the analysis with a counterfactual econometric approach to isolate the **causal effect of certifications** on firms' economic, financial, and ESG performance.

2.2 Diffusion and Characteristics of Accredited Certifications among Italian Firms

In 2025, accredited certifications are widely spread across the Italian production system and are increasingly integrated into corporate processes along ESG dimensions. ESG-related accredited certifications cover a broad and diverse range of areas, reflecting the multidimensional nature of sustainability.

The **environmental dimension** (E – Environment) includes certifications based on technical standards aimed at managing environmental impacts and promoting the efficient use of resources, such as UNI EN ISO 14001 for environmental management systems and UNI CEI EN ISO 50001 for energy management, alongside schemes linked to specific European regulatory requirements.

Within the **social dimension** (S – Social), certifications primarily concern aspects related to worker protection, health and safety, and social responsibility. Among the relevant standards, UNI EN ISO 45001 provides a reference framework for occupational health and safety, while more recent standards, such as UNI/PdR 125, introduce criteria related to gender equality and, more broadly, organisational well-being and inclusion.

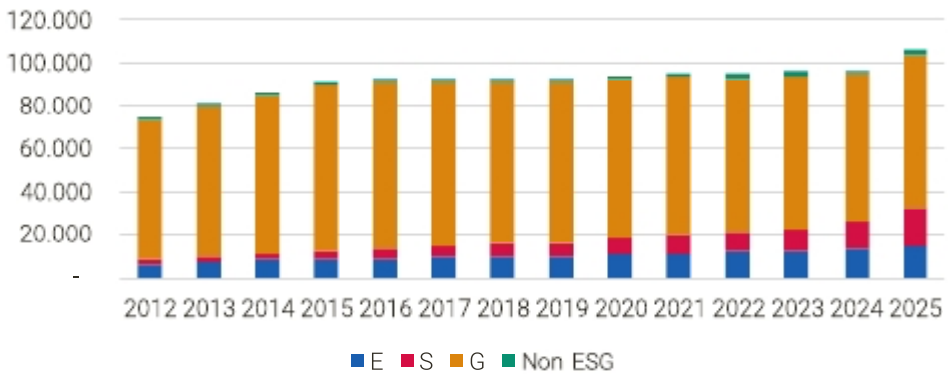
Finally, the **organisational dimension** (G – Governance) includes certifications related to Corporate organisation, management systems, and internal control frameworks.

In this area, among others, are certifications based on UNI EN ISO 9001 for quality management systems, ISO/IEC 27001 for information security, and UNI ISO 37301 for compliance management systems[10]. Overall, these schemes represent complementary tools that enable firms to structure, monitor, and make their practices verifiable across all ESG dimensions.

Between 2012 and 2025, the number of firms with an accredited certified management system increased from around 75,000 to over 100,000. In absolute terms, this figure may appear limited when compared with the approximately 5 million active firms in Italy according to Infocamere data[11] — or with 2.2 million if sole proprietorships are excluded, which account for only 2% of the sample of firms holding accredited certifications.

However, their economic weight is highly significant: in terms of turnover, these firms account for over 40% of the total of Italian companies. ESG-related certifications represent the vast majority of the certifications adopted. This dynamic is mainly driven by the prevalence of UNI EN ISO 9001, a governance-related certification and the most widely adopted standard among firms. The governance component is therefore the largest among ESG certifications, followed by environmental and social certifications (Figure 3).

Figure 3 - Evolution of ESG certification adoption – number of companies by type of ESG certification, 2012–2024



Source: Prometeia analysis based on Accredia data

[10] *For further details on the certification schemes classified as ESG, please refer to the Methodological Note.*

[11] *The analyses were carried out using Accredia registry data, relating to the various certification standards belonging to the management systems family and concerning companies certified by conformity assessment bodies accredited by Accredia. Company size estimates and sector classifications were obtained by cross-referencing this information with Prometeia proprietary data and company financial statements (source: Orbis database, Moody's).*

Specifically, in 2025 certifications attributable to the governance dimension concern 67% of firms, while 17% of firms hold a certification in the social domain and 15% in the environmental one. Only a small share of certifications, 2%, is not associated with an ESG dimension.

Although they remain at lower absolute levels, the Environment and Social components nevertheless show higher growth rates, in line with the increasing attention to sustainability issues and the gradual expansion of the ESG perimeter in corporate strategies. While in the early part of the period considered the Governance component clearly dominated, in subsequent years a progressive strengthening of the environmental dimension is observed and, more recently, also of the social one, with governance remaining nonetheless the largest component. This trend is consistent with the strengthening of the European regulatory framework and the growing pressure from investors and supply chains on sustainability issues. Overall, it therefore points to a gradual shift from a model primarily focused on quality and governance towards a more articulated system.

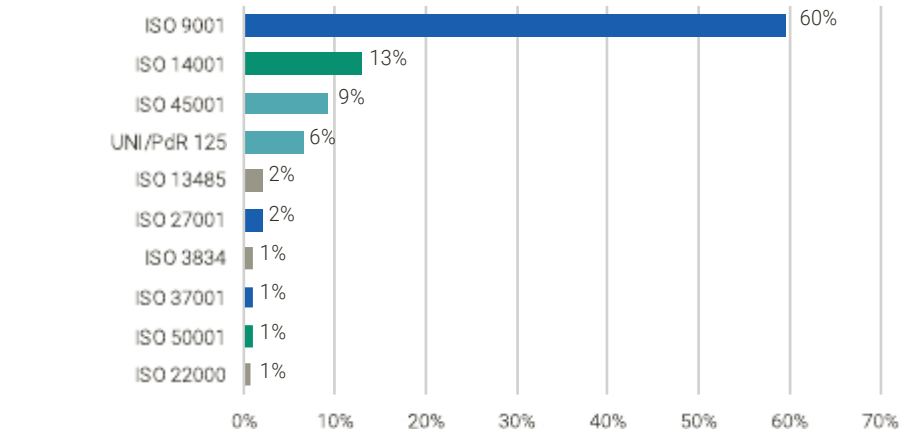
From a sectoral perspective—analysed according to the 39 IAF accreditation scopes —certified firms show a strong concentration in construction (IAF 28), trade (IAF 29), and machinery and equipment (IAF 18). This pattern also reflects the presence of specific regulatory incentives and constraints. In the case of construction, for example, accredited certifications often represent a prerequisite for access to public procurement, helping to explain the sector's high incidence.

Although the Governance component remains prevalent across all sectors, significant differences emerge between industries. Some sectors show a particularly high incidence of accredited environmental certifications, such as recycling (IAF 24), where the share approaches 40%, leather and leather products manufacturing (IAF 5), with values around 35%, and the hotels and restaurants sector (IAF 30), where it exceeds 25%. In other cases, a stronger emphasis on the social dimension is observed, for example in printing activities (IAF 9), where accredited social certifications account for around 30% of the total, in gas production and distribution (IAF 26), with values around 25%, and in the pharmaceutical sector (IAF 13), at similar levels.

In sectors with the highest propensity to obtain accredited certifications, the distribution of ESG certifications is skewed towards the governance dimension.

In the main sectors—construction, machinery and equipment, and trade—this component accounts for around 75–80% of the total, while the environmental and social dimensions remain more limited, at approximately 10–12% and 6–10%, respectively.
Overall, the most widely adopted certification scheme among Italian firms is UNI EN ISO 9001, accounting for 60% of the total and confirming its role as the reference standard for management systems. It is followed, at a distance, by UNI EN ISO 14001 (13%), related to environmental management systems, and UNI EN ISO 45001 (10%), related to occupational health and safety management systems (Figure 4).

Figure 4 - Most Widely Adopted Certifications – Share of Total Certifications, 2025



Source: Prometeia analysis based on Accredia data

Shifting the focus from the type to the number of accredited certifications per firm, it emerges that 76% of companies have a single certification, 14% adopt two, 8% have three, while around 2% adopt four or more certifications. The combination UNI EN ISO 9001 (G), UNI EN ISO 14001(E), and UNI EN ISO 45001 (S) represents the most common configuration among multi-certified firms, followed by the pairs UNI EN ISO 9001 (G) + UNI EN ISO 14001 (E) and UNI EN ISO 14001 (E) + UNI EN ISO 45001 (S).
The most frequent combinations therefore concern the integration of governance (G), environmental (E), and social (S) aspects, highlighting the growing trend towards managing the different ESG dimensions.

2.3 Characteristics and Performance of Certified Firms

The aim of the following analysis is to compare the economic, financial, and ESG Performance of certified and non-certified firms over the 2012–2024 period. To this end, the sample of certified firms included in the Accredia registry has been integrated with information on non-certified companies and enriched with a broad set of common variables of interest for both groups[12]. Specifically, the integration involved, on the one hand, financial statement data, which allow a detailed analysis of firms' size, profitability, and efficiency; and, on the other hand, a comprehensive set of variables related to ESG dimensions. These include indicators of sustainability practices and disclosed corporate policies, organisational and governance structures, as well as the environmental and social impacts of production activities. Financial statement data are collected over longer time horizons compared to certification registries. For this reason, the analysis of economic and financial performance is limited to 2024, the most recent year for which a complete coverage of financial statement data is available.

In terms of economic and financial performance, an initial key aspect concerns firm size within the sample. Certified firms exhibit higher levels of net revenues and a significantly greater number of employees compared to non-certified firms (Table 5), with a particularly pronounced gap for firms holding environmental and social certifications. These firms show substantially larger average sizes (in terms of both revenues and employment), whereas firms with governance-related certifications display lower values, although still significantly higher than those of non-certified firms. This suggests a greater diffusion of environmental and social certifications among larger and more structured firms.

Alongside firm size, significant differences also emerge in terms of profitability, evident both in net income differentials and in gross operating margin (Table 5). The median gross operating margin (GoM), expressed as a percentage of production value, stands at 12.7% for certified firms, compared to 8.9% for non-certified firms.

[12] Company size and sector classifications were determined by matching the information contained in the Accredia registers with proprietary Prometeia data and companies' financial statements (source: Orbis database, Moody's). ESG performance data were collected from four different sources: the Refinitiv database, providing information on the ESG sustainability performance of listed companies; companies' sustainability reports, obtained through the NFD Observatory; the ETS Register, containing information on emissions from installations covered by the Emissions Trading System; and the PRTR Register, containing information on emissions to air, water and wastewater, as well as transfers of waste from industrial installations subject to mandatory reporting requirements.

The differential is substantial (almost 4 percentage points) and remains stable across the different ESG dimensions, with slightly higher values for firms holding environmental (13.2%) and social (13.0%) certifications.

Table 5 - Financial Performance of Companies in the Sample – Median, 2024

	Non-certified	Certified	Certified Non-ESG	Certified ESG	Certified E	Certified S	Certified G
Number of companies	804.253	63.485	1.633	61.852	11.930	8.605	58.580
Net revenue	€0,2 mln	€3,6 mln	€3,8 mln	€3,6 mln	€9,9 mln	€10,5 mln	€3,4 mln
Net profit (% of net revenue)	3,1%	3,6%	3,2%	3,6%	3,7%	3,8%	3,6%
Return on investment	5,4%	9,1%	8,1%	9,1%	8,1%	8,7%	9,2%
Gross operating margin (% of value of production)	8,9%	12,7%	12,3%	12,7%	13,2%	13,0%	12,7%
Employees	2	17	15	17	39	43	16

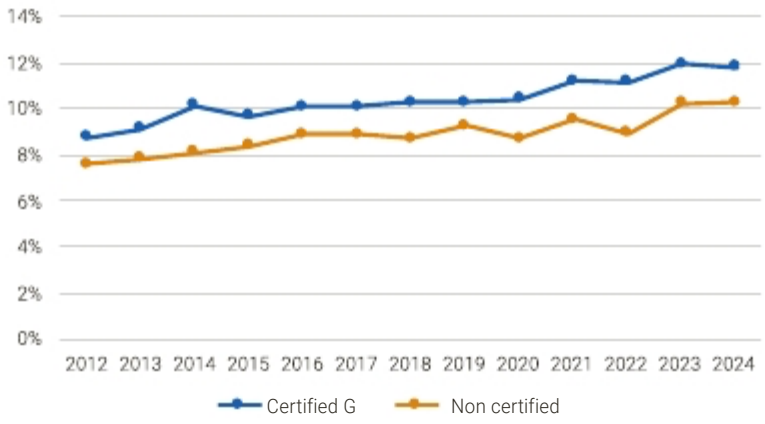
Source: Prometeia analysis

Differences between certified and non-certified firms also emerge in the dynamic analysis of gross operating margin (GoM) over the 2012–2024 period (Figure 5). Throughout the entire period considered, certified firms consistently show higher operating margins compared with non-certified companies, with a gap that remains relatively stable over time. Both groups show an upward trend in GoM, but certified firms start from higher levels and maintain a persistent advantage even during periods of greater volatility.

This pattern suggests not only a structural differential between the two groups, but also a greater ability of certified firms to consolidate operating margins over time, even in less favourable economic conditions.

A more pronounced differential is observed in terms **of return on investment (ROI)**. Certified firms exhibit a median ROI of 9.1%, significantly higher than the 5.4% recorded for non-certified firms.
The advantage is confirmed across all types of certification, with values ranging between 8.1% and 9.2%. In particular, certifications related to the governance dimension are associated with the highest ROI levels, consistent with the central role of management systems in streamlining processes and ensuring efficient resource allocation. Firms with social certifications show intermediate values (8.7%), while those with environmental certifications are positioned at lower levels (8,1%).

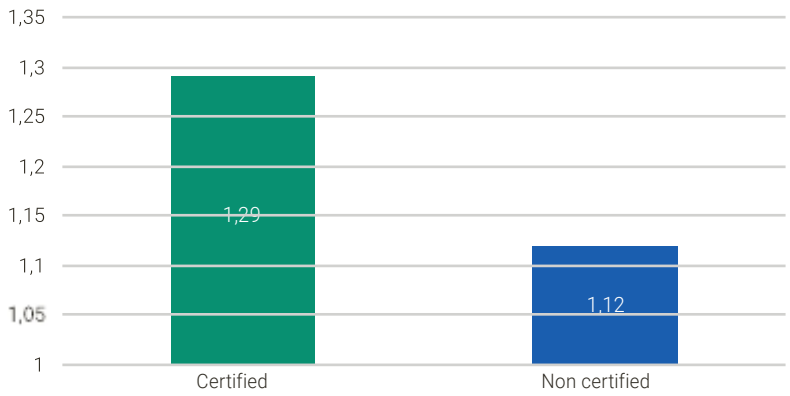
Figure 5 - Gross operating margin – % of value of production, 2012-2024



Source: Prometeia analysis

Another relevant indicator for assessing efficiency in the use of capital is the **asset turnover ratio**. In this respect as well, certified firms display a significant advantage over the period considered (Figure 6). This result suggests a greater ability to generate revenues per unit of invested capital, reflecting a more efficient organisation of production and managerial processes.

Figure 6 - Asset turnover ratio – average, 2012-2024

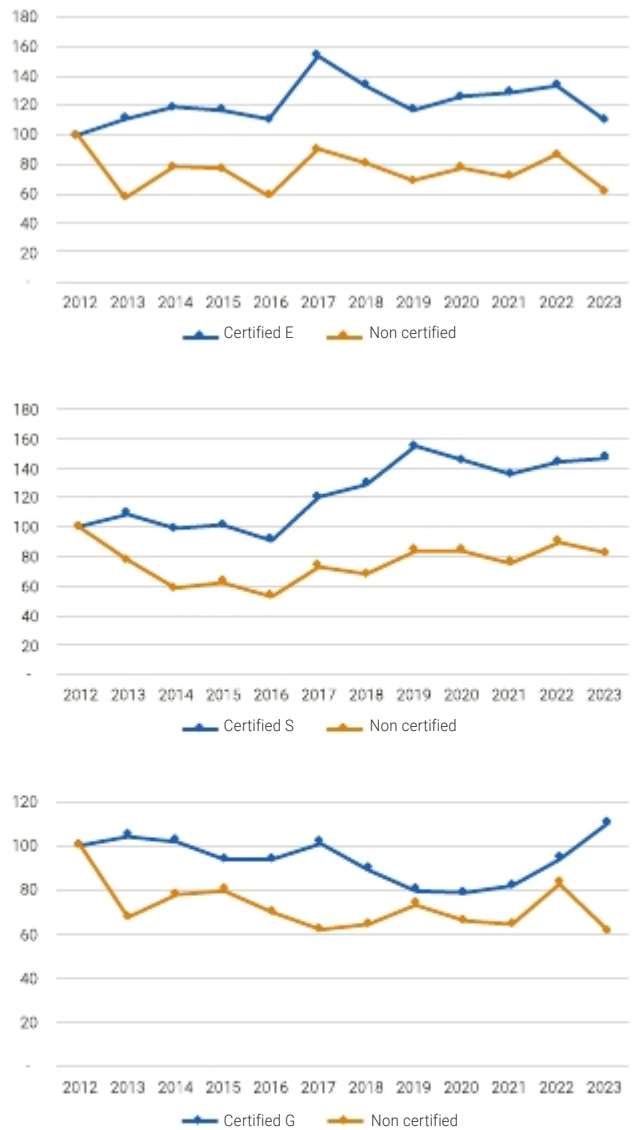


Source: Prometeia analysis

Alongside economic and financial dimensions, the analysis has been extended to the Assessment of **firms' sustainability performance**. To this end, three composite indices (E, S, and G) have been constructed, corresponding to the fundamental ESG dimensions, defined in such a way that higher values reflect better performance levels[13].
The indices are constructed starting from a broad set of elementary information, covering different areas of corporate sustainability, including the environmental impacts of production activities, aspects related to human resource management and occupational health and safety, as well as governance practices and internal organisation.
These data, drawn from heterogeneous sources, have been made comparable and integrated into a coherent framework, in order to capture in a synthetic and comparable way firms' positioning across each ESG dimension.

[13] *The ESG indices are constructed from more than 400 underlying variables relating to the environmental, social and governance dimensions (for example, emissions, occupational safety indicators, and organisational and sustainability practices). The variables are first assigned to their respective dimension (E, S, G) and harmonised in terms of polarity, so that higher values consistently correspond to better performance. Flow variables or variables expressed in absolute terms are normalised relative to the company's economic size, in order to ensure comparability between entities of different scales. The series are then adjusted for missing values (through interpolation where possible) and for the presence of outliers (using winsorisation). The resulting indicators are aggregated for each ESG dimension using a simple average and, finally, normalised on a 0–100 scale through a min–max transformation, in order to preserve relative differences between companies and ensure the comparability of the resulting indices.*

Figure 7 - Trends in the ESG composite indices



Source: Prometeia analysis

The index construction process therefore makes it possible to move from a multitude of individual indicators to synthetic measures capable of providing an immediate representation of the differences between firms and of their evolution over time. The resulting indices are expressed on a normalised scale from 0 to 100 in order to facilitate the interpretation of the results and comparisons between firms as well as over time[14].

Based on these indicators, it is possible to carry out an initial descriptive comparison between certified and non-certified firms. Across all the dimensions considered, a systematic advantage emerges in favour of certified firms, which display stronger growth dynamics over time (Figure 7). With regard to both the environmental (E) and social (S) components, certified firms record a more pronounced increase than non-certified firms, with the gap tending to widen over the period under consideration. A more favourable trend is also observed in the governance (G) component for certified firms, with differences that are initially more limited but which tend to widen in the final years of the period under analysis.

2.4 The Effects of ESG Certifications on Firms' Performance

The analysis presented in the preceding sections shows that certified firms exhibit, on average, higher levels of performance than non-certified firms, both in terms of their economic and financial outcomes and across ESG dimensions. However, this comparison does not allow the direction of the causal relationship to be established, as certified firms may already be, *ex ante*, more structured, more efficient, or better positioned in the market. To overcome this interpretative ambiguity and identify the causal effect more rigorously, the following analysis employs econometric techniques commonly used in observational studies, based on a double comparison: over time and between groups of similar firms[15].

The aim is to compare the situation of the treated units — in this case, firms that adopt an accredited certified management system — with that of a control group possessing comparable characteristics. In particular, this approach makes it possible to compare the observed condition of the treated firms with a hypothetical condition — the counterfactual — representing what would have occurred in the absence of the treatment, thereby allowing the differences observed between the two groups to be attributed to the intervention[16].

[14] For further details on the construction of the indicators, please refer to the Methodological Note.
[15] For further details on the construction of the indicators, please refer to the Methodological Note.
[16] Angrist, J. D., & Pischke, J. S. (2009). Mostly harmless econometrics: An empiricist's companion. Princeton university press; De Chaisemartin, C., & D'Haultfœuille, X. (2018). Fuzzy differences-in-differences. The Review of Economic Studies.

To ensure that the comparison is as homogeneous as possible, the control group is constructed by matching each certified firm with a set of similar non-certified firms, based on characteristics observed in the period preceding certification, including firm size, economic and financial structure, and sector of activity)[17]. This helps to reduce initial differences between the groups and improves the causal interpretation of the results. In support of the validity of the adopted approach, no systematic differences are observed between treated firms and the control group in the periods preceding the adoption of certification, a finding that strengthens the robustness of the empirical strategy.

A further relevant aspect concerns the timing of certification adoption. Firms do not, in fact, obtain certification in the same year, but follow different trajectories over time. This is a crucial issue for estimation, as firms that become certified at different points in time are not immediately comparable. If not properly accounted for, such heterogeneity may lead to bias, insofar as firms that have been certified for longer end up being used as a benchmark for firms that become certified at a later stage. To account for this element, the analysis explicitly considers the timing of certification adoption, comparing groups of firms that are homogeneous in terms of their year of entry and subsequently reconstructing an overall effect consistent with the temporal distribution of adoptions. In particular, for each year, the control group associated with treated firms includes only firms that have never obtained certification or have not yet obtained it ("not yet treated"), allowing for the use of comparison units with similar characteristics that have not yet been exposed to the treatment. This approach helps to avoid distortions linked to differences in adoption timing (the so-called "staggered adoption"), which could otherwise compromise the correct identification of the effect of certification[18].

The time horizon of the analysis considers three distinct periods: the year of certification adoption, the first subsequent year, and the second subsequent year. The results therefore take on a dynamic dimension, allowing the causal effect of certification to be captured both in the year of adoption and in the immediately following period.

[17] *Imai, K., Kim, I. S., & Wang, E. (2023). Matching methods for causal inference with time-series cross-section data. American Journal of Political Science.*

[18] *See, for instance: Goodman-Bacon, A. (2021) Difference-in-differences with variation in treatment timing, Journal of Econometrics e Callaway, B., and Sant'Anna, P. H. C. (2021). Difference-in-differences with multiple time periods. Journal of Econometrics.*

In assessing the effect of ESG certifications on economic performance, the main variable of interest is represented by revenue. The analysis is subsequently extended to a set of additional economic and financial indicators, with the aim of more precisely identifying the possible channels through which accredited certification affects firm performance.

The certifications considered include the main schemes attributable to the three ESG dimensions: UNI EN ISO 14001 (E), UNI EN ISO 45001 (S), UNI/PdR 125 (S), and ISO/IEC 27001 (G). The treated group consists of firms that adopted an ESG certification at least two years after obtaining UNI EN ISO 9001, based on three main considerations. First, this choice ensures greater sample robustness, as approximately 85% of firms adopt ESG certifications in combination with UNI EN ISO 9001, while only 8% adopt ESG certifications exclusively without UNI EN ISO 9001. Restricting the analysis to the latter would therefore entail a significant loss in terms of sample size and representativeness. Second, the proposed empirical design still makes it possible to isolate the effects of the treatment in a robust manner, reducing the risk of overlap between the effect of ESG certifications and that of UNI EN ISO 9001. Finally, the time interval considered is consistent with the organisational adjustment processes required to implement management systems, strengthening the plausibility of causal identification and reducing the risk that the observed effects reflect pre-existing dynamics or those associated with quality certification. Consistent with the choice of the treated group, the control group in this case is composed of firms that have adopted UNI EN ISO 9001 certification but have not obtained any ESG certification.

As a complement to this analysis, and in order to provide a more comprehensive Overview of the research object, the results also include an estimate of the relationship Between UNI EN ISO 9001 and revenue, obtained by comparing firms that have obtained this certification with a control group of comparable characteristics among non-certified firms. In this case, the empirical design differs slightly from that described above. While maintaining a staggered adoption structure, the definition of both the treatment and the counterfactual changes. Whereas in the previous analysis the treatment was represented by the adoption of an ESG certification in addition to UNI EN ISO 9001, in this case the treated group consists of firms that adopt UNI EN ISO 9001 as their first and only certification, while the control group is made up of non-certified firms.

Table 6 reports the average effects of adopting an ESG certification on firms' revenue, differentiated by type of certification.
The values are expressed in percentage terms and represent the increase in revenue attributable to the certification compared with a counterfactual scenario, that is, what would have been observed in its absence.

To facilitate the interpretation of the results, consider for example firms that adopt an environmental certification (UNI EN ISO 14001) after having already obtained UNI EN ISO 9001. The value reported in the first column (4.3%) indicates that, in the year in which they obtain UNI EN ISO 14001 certification, these firms record, on average, a revenue level that is 4.3% higher than the counterfactual. This effect tends to strengthen over time, reaching 8.4% one year after and 11.4% two years after certification.

In intuitive terms, these values can be interpreted as the share of revenue that would not have been realised in the absence of certification: for example, an increase of 11.4% implies that approximately 11 euros out of every 100 euros of revenue in the second year following certification can be attributed to it. A similar interpretation applies to the other types of certification reported in the table, allowing for a comparison of both the intensity and the temporal dynamics of the effects.

As can be seen in Table 6, the positive impact emerges already in the year of certification and tends to strengthen in subsequent periods, with particularly marked increases in the second year after adoption. This pattern is consistent across the different schemes considered, although with some variation in intensity. The effect of these certifications is therefore not transitory in nature, but tends to consolidate over time, in line with the nature of management systems, which involve progressive and cumulative organisational changes.

Overall, the evidence suggests that ESG certifications do not merely act as a reputational signal, but translate into a tangible improvement in economic performance. This effect can be attributed to several channels, including access to more regulated markets, greater attractiveness to clients sensitive to ESG issues, competitive differentiation, and the strengthening of internal organisational structures, with positive spillovers on productivity.

The analysis of the impact of UNI EN ISO 9001 certification shows a similar pattern (Table 7). In this case as well, the effect is persistent and increases over time, suggesting a stable improvement in performance. In terms of magnitude, the adoption of UNI EN ISO 9001 is associated with a revenue increase in the range of 3–8%, while the introduction of an ESG certification in firms that have already obtained UNI EN ISO 9001 leads to a comparable but slightly higher increase.

Table 6 - Revenue increase attributable to ESG certification. Average Treatment effect on the Treated (ATT), Percentage

	Year of certification (k0)	One year after certification (k1)	Two years after certification (k2)
ISO 9001 + ISO 14001	4,3%***	8,4%***	11,4%***
ISO 9001 + ISO 45001	5,9%***	8,3%***	10,0%***
ISO 9001 + UNI/PdR 125	11,8%***	10,4%***	-
ISO 9001 + ISO 27001	5,9%**	8,0%*	8,2%*

***p<0,01, **p<0,05, *p<0,10

Source: Prometeia analysis

Table 7 - Revenue increase attributable to ISO 9001 certification. Average Treatment effect on the Treated (ATT), Percentuale

	Year of certification (k0)	One year after certification (k1)	Two years after certification (k2)
ISO 9001	3,18%*	6,51%**	8,17%***

***p<0,01, **p<0,05, *p<0,10

Source: Prometeia analysis

Tables 8 to 11 report the results for the additional economic performance variables to which the analysis is extended. These include: gross operating margin (GoM); output per employee; production costs (prod. costs); cash flow over revenue (cash flow); and labour cost over revenue (labour cost). These results should be interpreted with caution, particularly for less widespread schemes, as statistical significance is strongly influenced by data availability. The findings appear to be more robust for certifications with a larger number of observations, such as UNI EN ISO 14001, while they are more limited for less common schemes, such as ISO/IEC 27001. For this reason, Tables 8–11 report only statistically significant coefficient estimates.

Despite these limitations, two main findings emerge: an increase in labour productivity, measured in terms of production value per employee, and a rise in production costs following certification. These two results should be interpreted jointly.
The increase in production costs can be interpreted in light of two mechanisms: on the one hand, the costs of compliance with the standards required by certification; on the other, an upgrading of production processes. In this sense, the rise in costs does not necessarily represent a signal of inefficiency, but may instead reflect investments in production processes, consistent with the observed increase in productivity.

From a quantitative perspective, the estimated coefficients are modest in magnitude but systematically positive and increasing over time. This further suggests that the impact of certifications unfolds gradually and through incremental improvements in operational efficiency.

Table 8 - ISO 9001 + **ISO 14001**. Average Treatment effect on the Treated (ATT), Percentage

	Year of certification (k0)	One year after certification (k1)	Two years after certification (k2)
GoM	-	-	-
Output per employee	1,6%***	2,6%***	2,8%***
Prod. costs	0,8%*	1,1%*	1,4%**
Cash flow	-	-	-
Labour cost	-	-	-

***p<0,01, **p<0,05, *p<0,10

Source: Prometeia analysis

Table 9 - ISO 9001 + **ISO 45001**. Average Treatment effect on the Treated (ATT), Percentage

	Year of certification (k0)	One year after certification (k1)	Two years after certification (k2)
GoM	-	-	-
Output per employee	1,3%**	3,1%***	3,4%***
Prod. costs	-	-	-
Cash flow	-	-	-
Labour cost	-	-	-

***p<0,01, **p<0,05, *p<0,10

Source: Prometeia analysis

Table 10 - ISO 9001 + **UNI/PdR 125**. Average Treatment effect on the Treated (ATT), Percentage

	Year of certification (k0)	One year after certification (k1)	Two years after certification (k2)
GoM	-	-	-
Output per employee	3,8%***	-	-
Prod. costs	2,8%***	-	-
Cash flow	-	-	-
Labour cost	-	-	-

***p<0,01, **p<0,05, *p<0,10

Source: Prometeia analysis

Table 11 - ISO 9001 + **ISO 27001**. Average Treatment effect on the Treated (ATT), Percentage

	Year of certification (k0)	One year after certification (k1)	Two years after certification (k2)
GoM	-	-	-
Output per employee	-	-	-
Prod. costs	-	-	-
Cash flow	-	-	-
Labour cost	-	-	-

***p<0,01, **p<0,05, *p<0,10

Source: Prometeia analysis

The analysis now focuses on the impact of ESG certifications on environmental, social, and governance sustainability dimensions (Table 12). In this case, the variables of interest are represented by the composite indices described in the previous section (E, S, and G). For each index, the analysis focuses on the certifications specifically attributable to the corresponding dimension. For example, when assessing the impact of accredited certifications on environmental performance (Index E), only firms holding an environmental certification are considered as treated.

The results show a positive and statistically significant effect of ESG certifications on sustainability performance across all dimensions considered, although with different timing and intensity.

In terms of comparison across dimensions, the estimated impact appears to be more pronounced for the environmental component, followed by the social component and, lastly, the governance component. Moreover, the environmental dimension shows a positive and significant effect already in the year of certification. This result is consistent with an anticipation effect. Firms tend in fact to initiate improvements in their environmental performance even before formal certification, also in response to regulatory constraints or market pressures, and certification helps to make these practices more structured. In this sense, certification also performs a signalling function, making commitments and standards that are already partly in place more visible to external stakeholders.

In contrast, the social and governance dimensions exhibit a more gradual evolution. The effect is null or negligible in the year of certification and becomes positive only in subsequent years, suggesting that interventions in these areas require longer time horizons to translate into measurable improvements. This pattern indicates that these schemes entail deep changes in organisational processes, corporate culture, and management systems, the effects of which tend to emerge in the medium term.

These results are consistent with the economic literature on the subject, which shows that Certifications improve firms' ESG performance through a variety of channels. On the one hand, they strengthen internal processes and management systems, thereby improving operational efficiency and the ability to monitor performance. On the other hand, they generate an external reputational and informational effect, making firms' commitments to stakeholders more credible and verifiable. These effects may also translate into greater attractiveness to investors and partners, contributing to an increase in firm value in the medium to long term[19].

One aspect to consider in order to correctly interpret these results is that the indices are constructed by aggregating numerous heterogeneous variables with different units of measurement, which are then normalised. As a result, at this stage the analysis mainly captures the direction of change in aggregate performance, since variations in these composite indicators are not easily interpretable in light of the many underlying variables. A more precise assessment of the economic magnitude of these effects is deferred to the following chapter.

Table 12 - Increase in sustainability performance attributable to ESG certification. Average Treatment effect on the Treated (ATT), Percentage

	Same year as certification (k0)	One year after certification (k1)	Two years after certification (k2)
Environment	2,3%**	5,3%***	10,6%***
Social	0,0%	1,8%*	6,8%***
Governance	0,1%	1,9%*	2,1%*

***p<0,01, **p<0,05, *p<0,10

Source: Prometeia analysis

[19] *See for instanc e Zhao, W., Zhang, K., & Shin, N. (2026). Diversified certification and ESG performance: the double-edged roles of media attention and internationalisation. Humanities and Social Sciences Communications*

3 The Monetisation of ESG Impacts

3.1 Introduction

This chapter aims to monetise the environmental and social contributions associated with certifications accredited by Accredia, in order to provide a broader assessment of their overall societal impact. The approach adopted is part of the wider field of sustainability analysis, which seeks to extend the scope beyond the traditional purely economic and financial perspective, by also incorporating environmental and social dimensions as relevant elements in the overall evaluation. From this perspective, these dimensions represent key determinants of value creation for both society and individuals in the medium to long term.

From this perspective, the monetisation of impacts makes it possible to construct a unified framework in which heterogeneous effects are translated into a common metric, making them comparable. This allows not only the quantification of the social and environmental value generated by certifications, but also its comparison with other economic magnitudes, thereby supporting decision-making processes more effectively, both at firm level and at policy level.

The impacts considered include, among others, the reduction of greenhouse gas emissions and air pollutants, the decrease in water emissions, the reduction of non-recyclable waste generation and water consumption, as well as improvements in occupational safety conditions, the strengthening of equal opportunities and inclusion, and increased investment in training and human capital development. These dimensions reflect the main areas of impact attributable to the environmental and social components of ESG, contributing to a broader and more systematic assessment of the effects generated by certifications.

The final output of the module consists of **an estimate of the monetary value of the environmental and social impacts generated by certified firms**. This integrates the economic assessments developed in the previous modules, thereby enabling a broader analysis of the value created by certifications accredited by Accredia, within a framework of extended performance measurement and support for the definition of sustainability-oriented strategies.

3.2 The importance of monetisation

The monetisation of impacts represents an increasingly central tool in sustainability analysis, as it makes it possible to translate heterogeneous effects into a common and easily interpretable metric.

Organisations are in fact increasingly interested in understanding the value created by their activities in monetary terms, in order to improve the measurement, management, and communication of impact, with growing attention to the integrated quantification of value generated across economic, environmental, and social dimensions.

In the case of the environmental dimension, physical accounting constitutes an essential prerequisite for measuring impacts on nature. However, it does not allow for the direct comparison of the relative severity of different environmental pressures. While it is indispensable for quantifying impacts in absolute terms, physical accounting needs to be complemented by homogeneous metrics that make it possible to assess and compare the significance of different environmental damages; in this context, the monetisation of impacts represents the most widely used approach. In recent years, this approach has also been progressively extended to the social dimension, encompassing aspects such as the value of human health, gender equality, and inclusion.

More specifically, the monetisation of impacts facilitates the understanding of the overall impact generated by a project or a set of activities, and makes it possible to compare results across different contexts. This is particularly important when the benefits of two different policies are not directly comparable, such as in the case of emissions reductions versus increases in employment. In the absence of a common metric, such effects would in fact be measured using heterogeneous indicators (for example, tonnes of CO_2 avoided and number of jobs created), making it very difficult to conduct an integrated assessment or to compare the value generated by interventions acting on different dimensions of sustainability. Monetisation makes it possible to translate both impacts into an economic value, allowing their relative weight to be compared and their contribution to value creation to be assessed in a more systematic and consistent manner. This approach also supports reporting and communication to stakeholders, making sustainability performance easier to interpret and contributing to the gradual integration of impact metrics into structured ESG reporting systems. Finally, a clear monetary valuation enables firm management to make resource allocation criteria more transparent, strengthening the link between strategic decisions and the impacts generated.

These elements are contributing to the growing diffusion of monetisation also in the for-profit sector, where there is increasing interest in translating sustainability impacts into financial values, not least in light of developments in European sustainability regulation. For example, as discussed in Chapter 1, the Corporate Sustainability Reporting Directive recognises the relevance of advanced impact measurement tools and promotes the integration of monetised indicators into reporting systems, with the aim of strengthening their comparability, consistency, and informational usefulness.

The following paragraph provides a summary of the main impact monetisation methodologies and describes the framework adopted in this study, highlighting its distinctive features and the main motivations underlying its choice.

3.3 The Model and Data Used for the Monetisation of Impacts

When examining the most widely used monetisation methodologies, two main broad categories can be identified: direct valuation methods and indirect valuation methods based on proxies.

Direct valuation methods are based on observable and measurable economic values. In these cases, impacts are monetised using existing data, such as cost savings or increases in income generated by a specific intervention. One example is employment integration programmes, where the benefit can be quantified through the increase in the income of the individuals involved. Similarly, this category includes situations in which there is an increase in revenue or a reduction in public expenditure, such as savings for the healthcare system resulting from preventive interventions.

Indirect valuation methods, by contrast, are used when directly observable market prices are not available. In such circumstances, the economic value of impacts is estimated using proxy measures, that is, indirect indicators of value. Among these, the revealed preference approach infers value from observed market behaviour, such as increases in property prices following the regeneration of an area. The stated preference approach, on the other hand, is based on surveys designed to estimate individuals' willingness to pay (WTP) for a given benefit or their willingness to accept (WTA) compensation for a loss of well-being. Finally, subjective well-being measures are based on individuals' self-reported assessments of their well-being and make it possible to estimate, ex post, the monetary value required to achieve a given level of life satisfaction.

In recent years, numerous models have been developed for the monetisation of environmental impacts, including Eco-cost, Ecotax, Eco-value, the Environmental Prices Handbook, EPS, ExternE, LIME, MMG, Stepwise and Trucost. These models differ in terms of their methodological approach, scope of application and the types of impacts they consider, but they share the common objective of translating environmental externalities into comparable economic values.

In this project, the Environmental Priority Strategies (EPS) approach was adopted as the primary method for the monetisation of environmental impacts. Developed in accordance with the UNI EN ISO 14040 and UNI EN ISO 14044 standards on Life Cycle Assessment, as well as ISO 14008 on the monetary valuation of environmental impacts, the EPS approach is based on the concept of Willingness to Pay (WTP), namely society's willingness to incur a cost in order to avoid environmental damage. Within this framework, monetisation reflects the value that society places on preventing environmental damage, thereby enabling the internalisation of the negative externalities associated with economic activities. In particular, this method assigns unit monetary values to environmental impacts (for example, €/kg of emissions), enabling a direct and comparable assessment across different types of damage. These values are derived from estimates of damage along the cause–effect chain and are already aggregated across the various impact dimensions considered. In this way, it is possible to attribute a monetary value to the impacts of environmental externalities across different dimensions, including human health, biodiversity, biological productivity, resource availability, access to water, and labour productivity. With regard to non-recyclable waste, which is not included in the EPS framework, the waste management cost estimated by ISPRA was used to determine the unit value.

Table 13 presents the environmental indicators considered in this analysis, also grouping Them according to the type of environmental impact to which they contribute.

For social impacts, a literature review was conducted in order to identify the most appropriate proxy measures. Given the lower availability of standardised metrics compared with the environmental dimension, the monetisation of social impacts requires the use of heterogeneous methodologies, selected according to the specific type of impact considered. For example, in the case of training, the Human Capital Approach is used, valuing the expected increase in income; for the gender pay gap, the analysis considers the income recovery associated with a reduction in the pay differential; and for workplace injuries, the average social cost is applied, also including costs borne by the public system. The social indicators considered, grouped according to the type of impact, are presented in Table 14.

By contrast, the monetisation of governance indicators is not envisaged, as there are currently no established and widely accepted methodologies that allow for a robust and comparable monetary valuation beyond traditional economic performance metrics.

Table 13 - Indicators considered for the monetary valuation of environmental impacts, by type of impact

Type of impact	Indicators considered
Air pollution-related impacts	Emissions to air of: • Arsenic • Cadmium • Carbon monoxide • Chromium • Mercury • Nickel • Non-methane volatile organic compounds • Nitrogen oxides • Polycyclic aromatic hydrocarbons • Lead • Fine particulate matter • Sulphur oxides
Climate change-related impacts	Emissions to air of: • Methane • Carbon dioxide • Hydrofluorocarbons • Nitrous oxide • Perfluorocarbons • Sulphur hexafluoride
Resource use-related impacts	Generation of non-recyclable waste
Water pollution-related impacts	Emission to water of: • Nitrogen • Phosphorus
Water resource use-related impacts	Water consumption

Table 14 - Indicators considered for the monetary valuation of social impacts, by type of impact

Type of impact	Indicators Considered
Employment	Number of employees
Equal opportunities	Disability Pay and gender inequality Female employees Women in managerial positions Women on the Board of Directors
Health	Workplace accidents
Training	Training hours provided

3.4 Application to accredited certified companies

The scope of the analysis includes all companies that, over the period 2012–2024, have held at least one certification accredited by Accredia in the environmental or social domain. Companies for which financial statement data are not available are excluded from the analysis, as such information is required for the estimation of externalities.

Despite the increasing availability of data on firms' performance across ESG dimensions, such data remain partial and are still predominantly concentrated among larger companies, which publish sustainability reports or are included in structured emission monitoring systems. To address these information limitations, the analysis relies on the use of sectoral proxies, which make it possible to estimate the average impacts associated with firms belonging to a specific industry sector.

As an illustrative example, analyses based on official data (Istat) indicate that in the "Lime, plaster and cement" sector, average emissions amount to 920 kg per €1,000 of turnover. Therefore, a company with €1 million in turnover will have estimated emissions of $920 \times 1{,}000 = 920{,}000$ kg of CO_2. Similarly, in the social domain, official statistics (Istat) show that in the engineering services sector there is an average of 13 training hours per employee. A company with 1,000 employees will therefore have $13 \times 1{,}000 = 13{,}000$ hours of annual training.

It should be emphasised that, at the level of individual firms, the use of sectoral proxies may not fully capture the specificities of environmental and social impact levels.

However, when these estimates are aggregated across the entire sample, they are generally robust and capable of providing reliable and informative insights, consistent with the objective of the analysis.

Through the integration of observed data and sector-specific proxies, a comprehensive and internally consistent database was developed. On this basis, the monetisation of impacts was carried out by multiplying the estimated physical values by the corresponding monetary coefficients.

The monetisation of the impact of certification on firms is based on the principle of assessing, in monetary terms, the difference between what occurs in certified companies and what would plausibly have occurred in the absence of certification. In other words, a counterfactual scenario is constructed to represent the expected evolution of environmental and social performance had the company not undertaken the certification process.

To perform this comparison, the empirical evidence estimated in Chapter 2 is used to identify the average effect of certification on the key variables of interest. These estimated effects are then applied to firms from the point at which they obtain certification and throughout subsequent periods, thereby enabling the evolution of impacts over time to be reconstructed.

The available estimates allow the effect of certification to be observed directly during the first years following its introduction, distinguishing between the year in which certification is obtained and the subsequent two years. The coefficients used to quantify these effects are derived from the estimates reported in Table 12 of Section 2.4 and provide the empirical basis for assessing the impact of certification on the various variables considered.

Based on this evidence, the trajectories of the environmental and social indicators are reconstructed for each certified firm by applying the estimated effects in the years following certification.
For illustrative purposes, consider a firm that records CO_2 emissions of 540 thousand tonnes in the year it first obtains an environmental certification. In this context, the counterfactual scenario—that is, in the absence of certification—is estimated by applying the ATT effect to the observed value, yielding an estimated level of 540,000 × (1 + ATT (k0)) = 552 thousand tonnes of CO_2. The ATT coefficient for the year of certification, ATT (k0) is equal to 2.3% and is taken from Table 12 in Section 2.4..
The two scenarios, and the difference between them, can then be assessed in monetary terms using the approach described in the previous section. For example, assuming a unit monetary value of €135 per tonne of CO_2 emissions, the difference between the observed and counterfactual scenarios is estimated at €1.6 million.
A more detailed version of this example is provided in the Methodological Note.

For periods beyond the second year, a prudent assumption is made that the observed effect remains constant over time. This assumption reflects the fact that the organisational changes, investments, and management practices introduced to obtain certification are typically structural in nature and are therefore expected to generate persistent benefits over time, at least for as long as the certification is maintained.

Conversely, if a firm loses its certification, the associated benefit is assumed to cease. Should the certification subsequently be regained, the effect is assumed to resume, following the same trajectory observed following the initial certification.

When interpreting the results, it is important to bear in mind that, for environmental indicators, certification is generally associated with a reduction in negative externalities, such as emissions and other forms of pollution. In other words, compared with a scenario in the absence of certification, certified firms tend to have a lower environmental impact. As regards social indicators, by contrast, the effect typically takes the form of an improvement in the observed conditions, for example in terms of employment, inclusion, and staff training.

Despite this difference in the direction of the effects, for the purposes of the analysis, both contributions are interpreted as benefits: in the first case, they represent costs avoided by society, while in the second they represent additional benefits generated for the economic and social system. This makes it possible to express all the observed changes as a consistent measure of the value created.

This approach therefore makes it possible to systematically and consistently estimate the contribution of certification to firms' environmental and social performance, enabling an overall assessment of the value generated at an aggregate level.

3.5 Results

The application of the methodology described in the previous sections makes it possible to estimate the total monetary value of the environmental and social impacts generated by certifications accredited by Accredia.

In a hypothetical counterfactual scenario, in the absence of certification, environmental Costs would be higher, while social benefits would be lower. Overall, over the 2012–2024 period, the estimated reduction in environmental costs associated with Environment-related accredited certifications amounts to approximately €36 billion, corresponding to a 6.3% decrease relative to the scenario without certification.

With regard to the social dimension, accredited certifications have instead generated benefits of €6.6 billion, equivalent to a 1.1% increase compared with the corresponding counterfactual scenario.

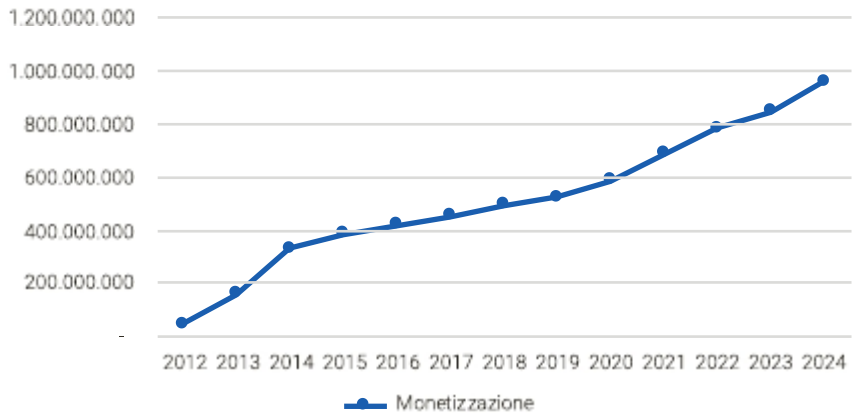
The difference between the two components reflects the varying intensity of the effect of accredited certifications on the environmental and social dimensions highlighted in Chapter 2, with the benefits generated in the environmental domain being overall more significant in terms of economic valuation.

Figures 8 and 9 show the dynamics of the net monetary benefits generated by accredited certifications (i.e. the difference between the observed and counterfactual scenarios) over the 2012–2024 period. The results indicate a substantial increase over time, consistent with the rising number of certifications obtained by Italian firms documented in the previous chapter. In 2024, environmental and social benefits amount to approximately €4.5 billion and nearly €1 billion, respectively.

Figure 8 - Monetary benefit of environmental certifications by year, in value terms

Source: Prometeia analysis

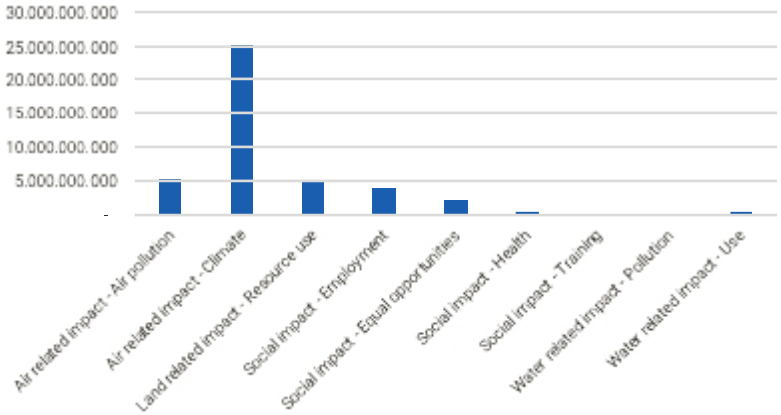
Figure 9 - Annual monetary benefit of social certifications



Source: Prometeia analysis

It is also possible to disaggregate these incremental benefits generated by certification According to the impact categories into which the environmental and social indicators are structured (Tables 13 and 14). This disaggregation makes it possible to carry out a more detailed analysis of the specific ESG components in which certifications generate greater monetary value (Figure 10).

Figure 10 - Monetary benefits by impact type – cumulative over the 2012–2024 period



Source: Prometeia analysis

The most significant benefits are concentrated in the environmental dimension: in particular, it is within the category of climate change-related impacts that accredited certifications generate the highest value, with a substantial gap compared with the other categories. This is followed by the categories related to air pollution reduction and resource use, where the benefits are still significant but more limited. Among the social components, the economic value generated by accredited certifications is highest in the categories related to employment and equal opportunities.

A purely aggregate analysis does not, however, capture the significant heterogeneity across sectors. To highlight this phenomenon, consider the differential impact generated by certifications (i.e. the difference between the observed and counterfactual scenarios) across the various groups of firms in the portfolio, expressed as a share of their respective turnover. In the environmental domain, at the overall portfolio level, the reduction in environmental impact associated with certification represents 0.24% of firms' turnover.
In relative terms, the recycling sector (IAF 24; 2.1%) shows the highest incidence, followed by the lime, plaster and cement sector (IAF 16; 1.8%) and the manufacture of refined petroleum products (IAF 10; 1%). In absolute terms, the largest values are instead recorded in the manufacture of refined petroleum products (€8,812 million) and in recycling (€4,444 million). These results reflect the high emissions intensity and substantial resource use that characterise these sectors, in which certification-related interventions can lead to more significant reductions in environmental impacts and, consequently, higher economic benefits.

A similar degree of heterogeneity also emerges with regard to social benefits. Across the portfolio as a whole, the additional social impact generated by certifications amounts to 0.04% of companies' revenue. In relative terms, however, the benefits are higher in the hotels and restaurants sector (IAF 30; around 0.3%), the healthcare sector (IAF 38; 0.25%), and the printing sector (IAF 9; 0.13%). In absolute terms, the largest values are concentrated in the logistics sector (IAF 31), at around €834 million, and the machinery and equipment sector (IAF 18), at around €739 million. Overall, social benefits are relatively higher in labour-intensive sectors.

The results therefore show that, in specific sectors, the benefits generated by certification are significantly higher than the average values observed for the overall sample. In particular, while environmental benefits tend to be concentrated in sectors characterised by high emissions intensity or intensive resource use, social benefits are relatively higher in labour-intensive sectors.

Overall, this suggests that the economic value generated by certification depends significantly on the structural characteristics of the sectors in which it is adopted, in particular the intensity of environmental externalities and the composition of production factors.

This evidence is further confirmed by a more granular disaggregation of the analysis by sector and impact type, using the categories introduced in Tables 13 and 14. Focusing on the main impact categories in terms of differential monetary benefits generated by certification, as shown in Figure 11, Table 15 reports the five sectors with the highest values of cost savings / impact increases relative to turnover. This disaggregation highlights how an analysis focused on a single indicator—such as CO_2 emissions—may be insufficient to capture the complexity and multidimensional nature of the environmental and social impacts associated with economic activities. Indeed, different sectors are characterised by heterogeneous impact profiles, in which specific dimensions (such as resource consumption, pollutant emissions, occupational safety, or effects on local communities) may carry very different and, in some cases, dominant weights relative to others. Relying on a single metric therefore risks underestimating or overlooking relevant impact areas, thereby compromising a more accurate overall assessment.

Similarly, it clearly emerges that the relevance of different environmental and social issues varies significantly across sectors, reflecting the specific characteristics of production processes, the intensity of factor inputs, and interactions with the external context. In this framework, certifications tend to be more effective when they are aligned with the main sources of impact in the relevant sector, that is, when they address the dimensions in which the greatest creation (or destruction) of value for society and the environment is concentrated.

Table 15 - Monetary benefits by impact type – Main sectors – Cumulative, 2012–2024

Group	Sectors	Monetary benefit (Million)	Benefitin (% of revenue)
Air pollution	Lime, gypsum, concrete, cement and related products	188	0,43%
	Metals and metal products	1902	0,32%
	Pharmaceutical products	590	0,22%
	Basic chemicals	832	0,19%
	Mining and quarrying	63	0,19%
Climate change-related impacts	Lime, gypsum, concrete, cement and related products	576	1,31%
	Recycling	2701	1,28%
	Refined petroleum products	6651	0,97%
	Mining and quarrying	314	0,96%
	Agriculture	484	0,88%
Resource use-related impacts	Recycling	1650	0,78%
	Refined petroleum products	1962	0,29%
	Construction	463	0,07%
	Non-metallic mineral products	49	0,05%
	Lime, gypsum, concrete, cement and related products	22	0,05%
Employment	Hotels and restaurants	190	0,19%
	Other services	456	0,13%
	Healthcare	104	0,11%
	Printing	0,1	0,09%
	Recycling	131	0,06%
Equal opportunities	Hotels and restaurants	125	0,12%
	Healthcare	98	0,10%
	Other services	162	0,04%
	Shipbuilding	29	0,04%
	Printing	0,03	0,03%

Source: Prometeia analysis

4 Conclusions and Main Evidence

The analyses carried out enable the role of accredited certifications to be framed within the broader process of integration between sustainability, the productive system, and sustainable finance. In a context characterised by growing attention to the quality of ESG information and the progressive evolution of the European regulatory framework, certifications emerge not only as tools for technical compliance, but also as instruments capable of supporting the transparency, comparability, and verifiability of corporate performance.

The empirical evidence collected in this study also enables a further exploration of the relationships between certification, economic performance, and sustainability, highlighting how certified management systems may contribute both to improvements in firms' organisational performance and to the generation of broader environmental and social benefits. In light of the results obtained, it is possible to summarise some of the main elements emerging from the analysis.

Accredited Certifications in the Context of the Sustainable Transition

The analysis shows that accredited certifications represent an increasingly important tool within the transition towards sustainable economic models. In a context characterised by growing integration between climate policies, European regulation, and sustainable finance, the availability of reliable, comparable, and verifiable ESG information plays a central role in the functioning of markets and in the efficient allocation of resources. In this context, the Quality Infrastructure and, in particular, the system of accredited certifications, help to strengthen the credibility of sustainability information and support the integration of ESG factors into the decision-making processes of firms and financial operators.

An Empirical Contribution to the Literature on Certification and ESG Performance

From an empirical and methodological perspective, this study contributes to the strand of literature analysing the relationship between certified management systems, economic performance, and corporate sustainability. The existing literature has progressively shown that certifications may affect not only firms' internal organisation and process efficiency, but also the quality of ESG information, corporate reputation, and, more generally, firms' ability to respond to the growing demands of markets, investors, and regulators.

Within this framework, the study proposes an integrated approach that combines different levels of analysis that are often addressed separately in the literature. In particular, the analysis jointly considers firms' economic and financial performance and the environmental, social, and governance dimensions, assessing the effects of certification both in terms of corporate competitiveness and sustainability. This perspective is further complemented by a monetary valuation of ESG impacts, aimed at translating heterogeneous effects into a common metric and providing a synthetic measure of the value generated for society.

From a methodological perspective, the analysis is based on a counterfactual approach that combines matching techniques with Difference-in-Differences models under staggered treatment adoption. This framework makes it possible to compare the evolution of certified firms with that of control groups with similar characteristics, thereby reducing the risk that the results are driven solely by pre-existing structural differences between certified and non-certified firms. In this way, the study focuses not only on observed differences across firms, but also on the dynamics of the effects associated with the adoption of certification over time.

Another key aspect concerns the construction of an integrated dataset, obtained by combining administrative information on certifications accredited by Accredia, financial statement data, and ESG indicators from different sources. This integration makes it possible to observe firms longitudinally and to analyse in a coordinated manner the diffusion of certifications, economic performance, ESG dimensions, and the monetised impacts associated with certified management systems.

The Growing Centrality of ESG Information in European Regulation

The evidence emerging from the study is set within a rapidly evolving European regulatory context, in which sustainability is playing an increasingly central role in industrial, financial, and prudential policies. Instruments such as the CSRD, the European Taxonomy, the SFDR Regulation, the European Green Bond framework, and the ESG rating regulation are progressively reshaping the ways in which firms and financial actors produce, use, and verify ESG information.
In this context, the quality, comparability, and verifiability of sustainability data become essential conditions for the functioning of sustainable finance. Firms are required not only to improve their environmental and social performance, but also to demonstrate it through structured, consistent, and credible information. At the same time, banks, investors, and supervisory authorities require reliable data in order to properly integrate ESG risks into capital allocation processes, risk assessment, and portfolio construction.

The Role of Accredited Certifications in Supporting Sustainable Finance

In this context, accredited certifications may play a role in addressing the growing demand for reliable ESG information. Through independent verification systems based on internationally recognised standards, they help strengthen the transparency, comparability, and traceability of the information used in financial markets and reporting processes.

Certifications may also help reduce information asymmetries between firms and the financial system, improving the readability of ESG information and contributing to more effective mechanisms for assessing sustainability-related risks and opportunities. This aspect is particularly relevant in a context where access to credit, the cost of capital, and participation in production value chains are increasingly influenced by firms' ability to demonstrate the quality of their ESG practices.

More generally, the TIC system and the accreditation infrastructure may help strengthen the effectiveness of the European regulatory framework, supporting the operational implementation of sustainable finance policies and providing technical tools capable of making ESG information used by economic and financial actors more reliable and verifiable.

Growth of Certification and Diffusion across the Productive System

The empirical evidence shows that the use of accredited certifications is now widely spread Across the Italian productive system and has recorded significant growth in recent years. Alongside the established centrality of quality and governance-related certifications, there is a progressive strengthening of the environmental and social components, consistent with the evolution of the European regulatory framework and the growing attention of markets to ESG issues. This trend indicates that certifications no longer represent exclusively tools for technical compliance, but are increasingly integrated into corporate strategies related to competitiveness, risk management, and sustainability.

Improvement in Economic and Sustainability Performance

The analysis also confirms the existence of a positive relationship between accredited certifications and firm performance. Certified firms in fact exhibit, on average, higher levels both in terms of economic and financial performance and across ESG dimensions.
The econometric analyses, based on counterfactual methodologies, suggest that this relationship does not depend exclusively on pre-existing structural differences between certified and non-certified firms, but also reflects a specific contribution associated with the adoption of certification.

In particular, the positive effect on turnover tends to emerge already in the year of certification and to consolidate in subsequent periods, consistent with the gradual nature of the organisational changes introduced by management systems. Certifications therefore appear to affect firm performance through a range of complementary channels: improved internal efficiency, strengthened organisational processes, enhanced capacity to monitor performance, and improved corporate reputation among stakeholders.

Positive effects are also observed across the environmental, social, and governance dimensions. The evidence shows that ESG certifications are associated with significant improvements in composite sustainability indicators, albeit with different timing across components.
The environmental dimension exhibits faster and more pronounced effects, also in relation to the presence of interventions and investments that often precede the formal attainment of certification. By contrast, the social and governance components display more gradual dynamics, consistent with the more structural nature of the changes required in terms of organisational structure, managerial culture, and human resource management.

Monetisation of ESG Impacts and Value Generated for Society
Another contribution of the study concerns the monetisation of the environmental and social impacts associated with accredited certifications. This approach makes it possible to translate heterogeneous effects into a common metric, providing a synthetic measure of the value generated for society. The results highlight overall significant environmental and social benefits, with a greater contribution from the environmental dimension, in particular with regard to climate change-related impacts. The social dimension also makes a significant contribution, particularly with regard to employment, inclusion, and equal opportunities. The monetary valuation of impacts also makes it possible to broaden the analytical perspective beyond traditional economic and financial assessments, offering a more comprehensive view of the contribution of certifications to sustainability and to the creation of social and environmental value.

The Role of Quality Infrastructure in ESG Governance
Overall, the evidence collected suggests that accredited certifications may play an important role in strengthening the effectiveness of sustainability policies and in fostering greater integration between economic, environmental, and social objectives. In a context where European regulation places increasing emphasis on the quality of ESG disclosures, the management of climate-related risks, and the transparency of information used in financial markets, the TIC system and the Quality Infrastructure emerge as supporting elements in the governance of sustainable finance.
The ability of accredited certifications to make corporate processes more structured, verifiable, and comparable may help strengthen stakeholder trust, reduce the risk of greenwashing and social washing, and support a more effective allocation of capital towards activities aligned with the objectives of the sustainable transition.

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Methodological Note

1. The Dataset

The construction of the dataset represents the preliminary step of the entire analysis, as it enables the integration of different types of information—administrative, accounting, and subsequently ESG data—into a single, coherent dataset at firm and year level. The aim is to obtain a longitudinal panel that allows the observation over time of both the adoption of certifications and the evolution of firms' performance, making it possible to compare treated and untreated units within a non-experimental setting.

The starting point is the Accredia dataset of accredited certifications, which represents the main source of information for the identification of the treatment. This is an administrative dataset constructed from information provided by certification bodies accredited by Accredia. The dataset is particularly large, comprising over 2.4 million observations relating to approximately 190,000 firms over the 2012–2024 period. For each firm, detailed information is available on the type of certification adopted and its period of validity. A methodologically relevant aspect concerns the operational definition of certification status: a firm is considered certified in a given year only if the certification is active for at least six months. This choice avoids very short-lived certifications generating spurious variation in the treatment variable and ensures greater temporal consistency in the classification of firms.

The certifications contained in the dataset are mapped into a classification consistent with the ESG framework, through a matching procedure that assigns each scheme to one of the three dimensions—environmental, social, or governance (Table 1). This step is necessary to transform a heterogeneous set of technical standards into comparable analytical variables. The classification is defined uniquely for each certification, although some schemes have cross-cutting content; assigning a prevailing dimension helps avoid duplication and maintain a clear structure for the empirical analysis.

The second pillar of the dataset is the Prometeia dataset of firm financial statement, based on Orbis (Moody's), which provides detailed financial and accounting information on a very large set of Italian firms. This dataset is characterised by very broad coverage, both in terms of number of firms and temporal depth, and includes key variables used to describe firms' size, profitability, and financial structure. A central methodological aspect concerns the treatment of financial statement time series, which are reconstructed using a chain-linking index method.

In operational terms, this approach consists of calculating year-on-year percentage changes in economic variables and chaining them over time to obtain a consistent series. Unlike a direct comparison of absolute values far apart in time, which may be distorted by structural changes in the firm (mergers, acquisitions, changes in scope), the chain-linking index makes it possible to track the "incremental" evolution of variables while preserving the dynamic consistency of the series. In practice, each year is used as the base for the following one, and the resulting series reflects the cumulative composition of changes, making it particularly suitable for longitudinal analyses and over-time comparisons.

The integration between the Accredia dataset and the Prometeia dataset is carried out through a matching procedure based on the firm's tax code and the year of observation, which makes it possible to construct a firm-year panel in which information on certifications and economic-financial variables is simultaneously available for each unit. This step represents a crucial stage of the analysis, as it enables the observation of the same firm before and after the adoption of certification, a necessary condition for the application of the counterfactual methodologies used in the study. The matching process is not complete, as the two datasets differ in nature and coverage; in particular, a portion of the firms included in the Accredia dataset does not appear in the financial statement databases. The integration rate is approximately 65%, a figure that mainly reflects the absence of accounting information for smaller firms or for those not subject to reporting requirements. Despite this reduction, the resulting dataset remains large, with over 1.2 million observations and more than 120,000 firms, ensuring an adequate level of representativeness and robustness for the subsequent analyses.

The final output is a panel-structured dataset, in which each observation represents a specific firm in a given year. This structure makes it possible to analyse both cross-sectional differences between certified and non-certified firms, as well as within-firm variation over time. Overall, the resulting dataset constitutes an integrated data infrastructure that combines sample breadth, temporal depth, and richness of variables, forming the basis for all the empirical analyses developed in the remainder of the study.

Table 1 - Mapping between certifications and ESG categories

Environment	Social	Governance	Non-ESG
D.M. 2020/188	ISO 39001	Corsi ENEL e TERNA	AVSQ MIA
ISO 14001	PAS 24000	CRMS FP 07	EN 9100
ISO 50001	UNI/PdR 42	EASI	EN 9110
PSV	UNI/PdR 125	ISDP 10003	EN 9120
Reg. UE 333/2011	ISO 45001	ISO 20121	FAMI-QS
Reg. UE 715/2013		ISO 22301	FSSC 22000
Remade		ISO 27001	ISO 13485
UNI CEI 11352		ISO 27701	ISO 19443
UNI EN 16636		ISO 28000	ISO 21001
UNI/PdR 88		ISO 37001	ISO 22000
		ISO 37301	ISO 29001
		ISO 55001	ISO 29990
		ISO 9001	ISO 3834
		ISO/IEC 20000	UNI 11871
		ISO/IEC 27017	UNI/PdR 74
		ISO/IEC 27018	Corsi ENEL e TERNA
		ISO/IEC 27035	Eusoma Guidelines
		SRG 88088	ISO 18295
		UNI ISO 22222	ISO 22716
		UNI/PdR 33	Reg. UE 910/2014
		UNI/PdR 43	SGCMF 10002
			UNI 11926
			UNI EN 15085-2
			UNI ISO 29991
			UNI ISO 29994
			UNI/PdR 44

2. The ESG Performance Dataset

The construction of the ESG performance dataset represents one of the most complex stages of the analysis, as it requires the integration and harmonisation of heterogeneous data sources, characterised by significant differences in terms of coverage, structure, and data quality. The aim is to transform a fragmented set of elementary indicators into synthetic and comparable measures of the environmental, social, and governance dimensions, consistent with the empirical framework of the study.
The starting point consists of four main sources, selected to ensure as comprehensive a coverage as possible of the ESG dimensions. The first is Refinitiv (now LSEG Data & Analytics), which provides a wide set of standardised indicators for listed firms at the international level, covering all ESG dimensions through more than 400 variables. This source includes, among others, indicators related to employee training, accident rates, the pay gap, and various aspects of corporate governance.
The second source is the EU ETS system, which collects verified data on carbon dioxide emissions from installations covered by the European Emissions Trading System. Although limited to a single variable, this dataset provides broad coverage of firms with the highest environmental impact. The third source is the E-PRTR register, which contains detailed information on emissions to air, water, and soil of a wide range of pollutants, significantly enriching the environmental dimension. Finally, the Non-Financial Reporting Observatory (NFS) allows ESG indicators to be extracted directly from corporate reports through automated text-processing techniques, thereby expanding coverage, particularly for the social and governance dimensions. Figure 1 provides a schematic representation of these datasets.

The integration of these sources makes it possible to obtain an extremely rich dataset, but it also introduces several important challenges. First, missing values are widespread, both because firms do not report all variables and because time series are often incomplete. Second, coverage is uneven across sources: some, such as Refinitiv, focus on large firms, while others, such as ETS or E-PRTR, cover specific production segments. Finally, the variables are expressed in different and not directly comparable units of measurement, including physical quantities, percentages, and qualitative indicators. These characteristics therefore require a structured harmonisation process in order to integrate all available information and construct the composite ESG indices discussed in the study. The construction of these indicators follows a sequence of operational steps.
First, each variable is assigned to one of the three ESG dimensions (Environment, Social, Governance). This classification is not purely mechanical, but requires a careful assessment of the informational content of each indicator.
At the same time, the direction of the effect is defined, that is, the direction in which each variable contributes to performance: an increase in emissions, for example, represents a deterioration in the environmental dimension and is therefore treated as a negative effect, whereas an increase in training hours contributes positively to the social dimension.

Figure 1 - Data sources for the ESG dimensions

Refinitiv/LSEG	**ETS System (Emission Trading System)**	**E-PRTR Register (European Pollutant Release and Transfer Register)**	**NFS Observatory (Non-Financial Statements)**
Refinitiv (now LSEG Data & Analytics) provides standardised ESG data for thousands of listed companies worldwide, covering hundreds of indicators across environmental, social and governance topics.	The EU ETS system collects data on verified CO_2 emissions from industrial and energy installations subject to the obligation to purchase and trade emission allowances in the European carbon market.	The E-PRTR Register collects annual information on emissions to air, water and soil, as well as on transfers of waste and pollutants from European industrial facilities subject to mandatory environmental reporting requirements.	The NFS Observatory collects information published by the main companies subject to mandatory non-financial reporting requirements. The database includes ESG indicators extracted from reports using AI techniques.
Firms: **120** Certified: **90** Non-certified: **30**	Firms: **850** Certified: **500** Non-certified: **350**	Firms: **2.300** Certified: **300** Non-certified: **2.000**	Firms: **230** Certified: **180** Non-certified: **50**
429 variables, including: • Total training costs • Pay gap • Total injury rate • Fatalities among direct employees • Fatalities among indirect employees • Total working days lost • Labour health and safety controversies • Etc.	**1** variable • Carbon dioxide (CO_2) emissions to air	**109** variables, including: • Emissions of nitrogen oxides (NO_x) to air • Emissions of sulphur oxides (SO_x) to air • Ammonia emissions to air • Discharges of benzene to water bodies • Discharges of fluoranthene to water bodies • Etc.	**95** variables, including: • Share of women on the Board of Directors (%) • The sustainability committee is part of a body within the Board of Directors • Cubic metres of water consumed per year • Tonnes of hazardous waste generated during the year • Percentage of revenue classified as sustainable activities according to the EU Taxonomy • Etc.
ESG Domain	**E Domain**	**E Domain**	**ESG Domain**

This step is essential to ensure interpretative consistency across heterogeneous variables. Subsequently, variables expressed in absolute levels are transformed into intensity indicators by scaling them relative to the firm's economic size, typically turnover. This procedure makes it possible to compare firms of very different sizes, avoiding that absolute magnitudes simply reflect the scale of production activity rather than its efficiency or sustainability. For instance, total emissions are converted into emissions per unit of turnover, while the number of accidents is normalised with respect to employment or economic size.

Once these harmonised variables have been constructed, data quality is addressed. To increase temporal coverage, a limited interpolation procedure is applied to internal gaps in the time series, avoiding any modification of values at the extremes, where the plausibility of estimates cannot be ensured. In parallel, outliers are treated through winsorisation, applying the three-standard-deviation rule: extreme values are brought back to predefined thresholds in order to reduce the influence of anomalous observations that could distort the averages.
The variables processed in this way are then aggregated to construct the synthetic indices for the three ESG dimensions. The aggregation is carried out using a simple average, without introducing differential weights across variables. This choice reflects the intention to avoid arbitrary assumptions about the relative importance of individual indicators, allowing each variable to contribute equally to the construction of the index. The result is a set of three composite indicators—one for each ESG dimension—which summarise the information contained in hundreds of elementary variables.

The final step consists of normalising the indices onto a common scale ranging from 0 to 100, using a min–max transformation. For a variable Y, this transformation can be described as follows:

$$Y_{norm} \quad \frac{Y \ \min(Y)}{\max(Y) \ \min(Y)} .* 100$$

The main advantages of the min–max transformation are twofold: on the one hand, it makes the interpretation of the results more straightforward; on the other, it preserves relative differences across firms and over time. In particular, being a monotonic increasing transformation, it does not alter the ranking of observations nor the direction of effects, and is therefore compatible with subsequent econometric analyses based on relative changes, such as Difference-in-Differences.

Overall, the procedure described makes it possible to transform a heterogeneous and incomplete set of ESG-related information into a structured and consistent dataset, in which firms' performance across the environmental, social, and governance dimensions is measured in a synthetic and comparable way.
This dataset represents the information base for all subsequent analyses on the impact of certifications on sustainability performance.

3. Empirical strategy

The analysis of the impact of ESG certifications on firm performance is based on a counterfactual approach, which is necessary in the absence of a randomised experiment. In this context, the main methodological challenge lies in the fact that firms that adopt certification are not randomly selected and may therefore differ systematically from those that do not. In particular, certified firms tend to be, even prior to certification, more structured, larger, or more productive. A simple comparison between certified and non-certified firms would therefore risk confounding the effect of certification with pre-existing differences between the two groups.

To address this issue, the analysis relies on a counterfactual framework: the aim is to compare the observed evolution of certified firms with the evolution they would have experienced in the absence of certification. Since this counterfactual scenario is not observable, it is approximated by constructing a control group of non-certified firms that are similar, in terms of observable characteristics, to treated firms in the period prior to certification adoption.

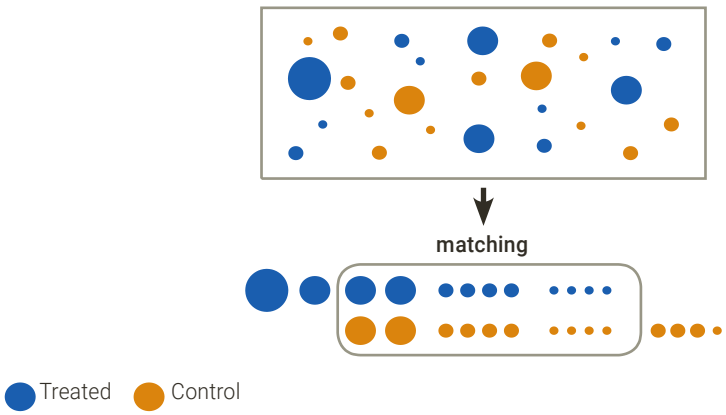
The construction of the control group is carried out through Propensity Score Matching (PSM). In operational terms, for each firm the probability of adopting an ESG certification is estimated based on a set of variables observed prior to treatment. Formally, for each firm *i*, the probability of receiving the treatment is estimated conditional on a set of observable covariates Xi:

$$p(\mathbf{X}_i) = P(D_i = 1 \mid \mathbf{X}_i)$$

These covariates include indicators of firm size, such as turnover and number of employees, variables related to production structure, such as fixed capital intensity, and financial variables, such as leverage and debt incidence. These are complemented by proxies for intangible capital investment and sectoral variables, which allow structural differences across industries to be taken into account. The result of this estimation is an indicator—the propensity score—which summarises the ex-ante probability of receiving the treatment.

The matching procedure consists of pairing each treated firm with one or more control firms with a similar propensity score. In this way, a balanced sample is constructed in which observable differences between the two groups are reduced (Figure 2).

Figure 2 - Graphical representation of the propensity score matching process

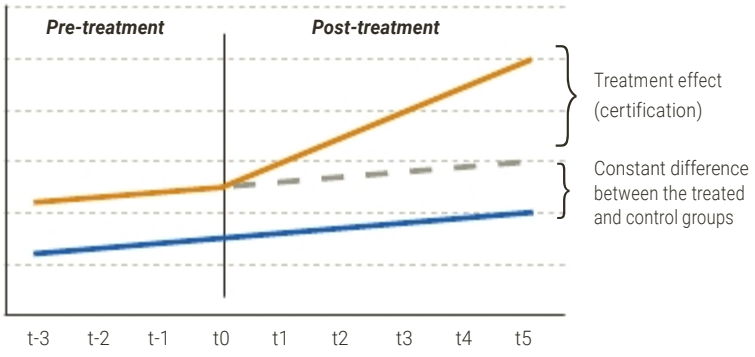


The idea is that, once conditioned on these characteristics, treated and control firms are comparable, making it more plausible that, in the absence of certification, they would have followed similar trajectories over time.

Once the control group has been constructed, the effect of certification is estimated using the Difference-in-Differences (DiD) methodology. The intuition underlying this approach is straightforward: rather than comparing the levels of the variables between certified and non-certified firms, it compares their changes over time (Figure 3). More specifically, the change in the performance of treated firms following certification is compared with the corresponding change observed for the control group over the same period. In this way, both initial differences between the groups and common trends affecting all firms are removed, isolating the effect attributable to certification.

A relevant feature of the context analysed is that firms do not adopt certifications at the same point in time, but rather in different years. This temporal heterogeneity, known as staggered adoption, introduces an additional layer of complexity to the analysis. In the standard DiD framework, the comparison is made between a treated group and a control group across two periods (before and after), whereas in the present setting there are multiple cohorts of firms that receive the treatment at different points in time. Under this structure, the use of the traditional approach may generate bias, as firms that have already been treated may be used as the control group for firms treated at a later date.

Figure 3 - Graphical representation of the main components of the Difference-in-Differences methodology



Source: Prometeia analysis

To address this complication, the recent econometric literature has developed new methods specifically designed for treatments occurring at different points in time allowing effects to be estimated accurately for each adoption cohort and each period.[20] In operational terms, for each certification year, the firms receiving the treatment are compared exclusively with firms that, in the same period, have not yet been treated (*not-yet treated*) or will never be treated (*never treated*). This approach prevents already treated units from being used as controls and makes it possible to obtain more robust estimates of the average treatment effect. Formally, for each cohort *g* and period *t*, the Average Treatment Effect on the Treated (ATT) is estimated as follows.:

$$ATT(g,t) = E[Y_{it}^{1} - Y_{it}^{0} \mid G_i = g]$$

The estimates are then aggregated according to time relative to certification adoption. In particular, the analysis focuses on three time points: the year of certification (k_0), the first year after certification (k_1) and the second year after certification (k_2). This choice reflects a balance between data availability and the interpretability of the results.

[20] *See for instance: Callaway, B., and Sant'Anna, P. H. C. (2021). Difference-in-differences with multiple time periods Journal of Econometrics e Goodman-Bacon, A. (2021). Difference-in-differences with variation in treatment timing. Journal of Econometrics*

A further key element of the empirical strategy concerns the definition of the treatment and control groups. This definition differs across the main strands of analysis considered in the study. For the analysis of the effect of ESG certifications on economic variables, treated firms are those that adopt an ESG certification after having already held the UNI EN ISO 9001 certification for at least two years. Consistent with this approach, the control group consists of firms that have also adopted UNI EN ISO 9001 but have not yet adopted any ESG certification during the period under consideration. This ensures that the comparison is made between firms sharing a minimum level of organisational maturity, thereby further reducing underlying differences between the two groups. By contrast, in the analysis of the relationship between UNI EN ISO 9001 certification and turnover, treated firms are those that have adopted this certification, while untreated firms are those with no certifications. Finally, in the analysis assessing the impact of ESG certifications on the composite indices measuring firms' ESG performance, the treated group consists of firms that have obtained the UNI EN ISO 9001 certification and, after an interval of at least two years, an ESG certification. The control group, by contrast, consists exclusively of firms that have obtained only the UNI EN ISO 9001 certification.

Overall, the empirical strategy combines three key elements—matching, Difference-in-Differences, and the treatment of staggered adoption—with the aim of credibly identifying the causal effect of ESG certifications on firms' performance, while minimising potential sources of bias arising from selection and the timing of treatment.

4. Validation of the empirical strategy

The validity of the adopted counterfactual approach crucially depends on the plausibility of the parallel trends assumption, according to which, in the absence of treatment, treated and control firms would have followed a similar evolution over time. This condition is not directly observable, but it can be indirectly assessed by examining the behaviour of the variables of interest in the periods prior to certification adoption.

To this end, the analysis employs an event study specification, which makes it possible to observe the evolution of the estimated effect as a function of time relative to treatment adoption. This model is described by the following equation:

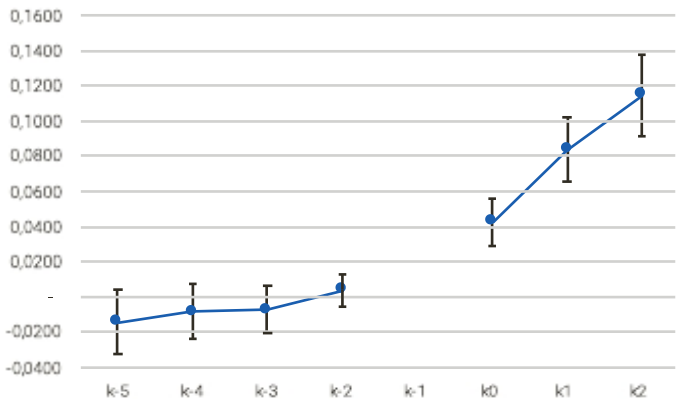
$$Y_{it} = \Sigma_k \beta_k \cdot 1(t - g = k) + \alpha_i + \gamma_t + \varepsilon_{it}$$

where Y_{it} is the outcome variable for firm i in year t, and the coefficients β_k measure the effect of certification across different periods relative to adoption, distinguishing between pre- and post-treatment years. The terms α_i and γ_t for time-invariant firm characteristics and common factors over time, while ε_i represents the residual component. This specification therefore allows us to test for the absence of pre-treatment differences and to analyse the dynamics of the impact of certification after adoption.

Figures 4 to 11 present the event study results for the main estimates reported in the analysis. In particular, Figures 4 to 7 provide a more detailed representation of the results shown in Table 6 of the study. Figure 8 reports the detailed results of the estimates in Table 7, while Figures 9 to 11 present the same exercise for the results shown in Table 12. In all cases, the post-adoption coefficients correspond to those reported in the study and carry the same interpretation. The pre-treatment coefficients are generally close to zero and not statistically significant, supporting the plausibility of the parallel trends assumption between treated and control firms.

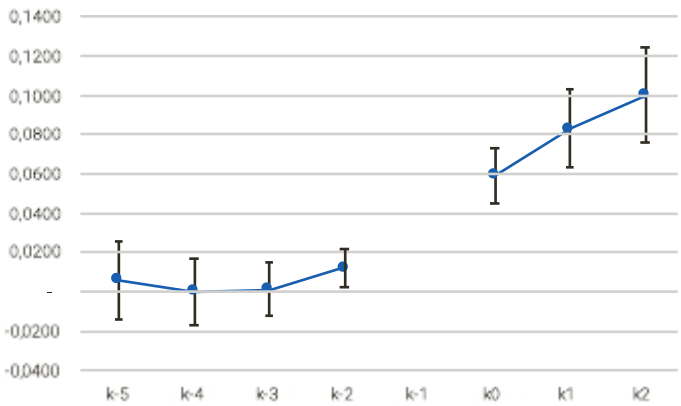
It should, however, be noted that the possibility of conducting more stringent tests for the presence of pre-treatment trends is limited by the structure of the data. In particular, the small number of periods available prior to certification adoption does not allow for more sophisticated tests on trend slopes, which would require greater temporal depth. This represents a limitation of the analysis, common to studies based on observational data with a relatively short time horizon.

Figure 4 - ISO 9001 + ISO 14001 - Average Treatment effect on the Treated (ATT), % of revenue



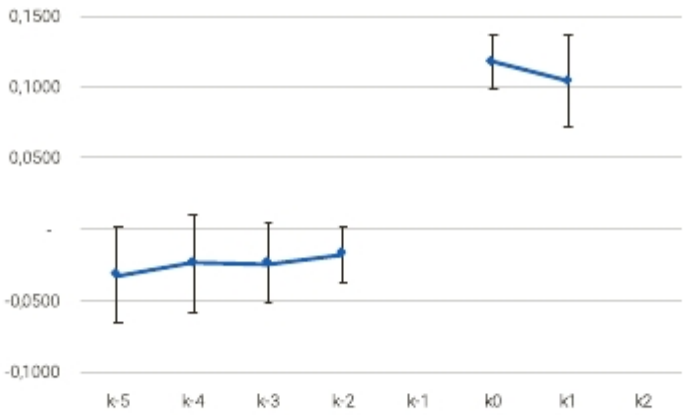
Source: Prometeia analysis

Figure 5 - ISO 9001 + ISO 45001 - Average Treatment effect on the Treated (ATT), % of revenue



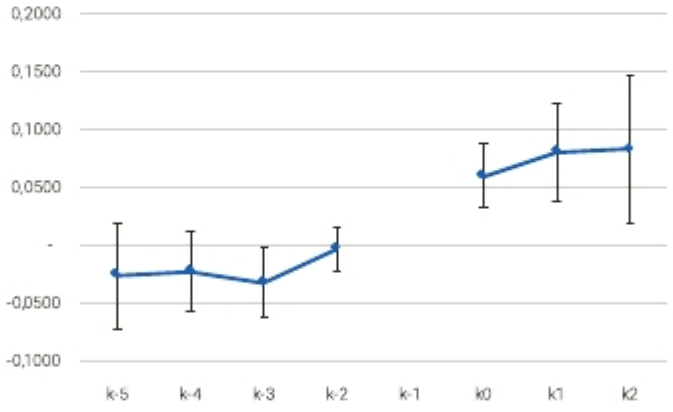
Source: Prometeia analysis

Figure 6 - ISO 9001 + UNI/PdR 125 - Average Treatment effect on the Treated (ATT), % of revenue



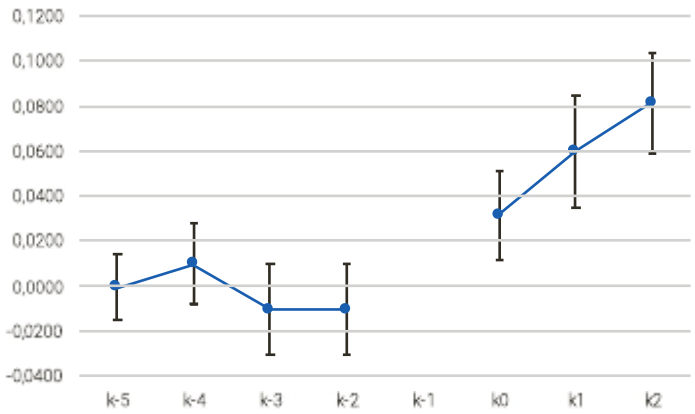
Source: Prometeia analysis

Figure 7 - ISO 9001 + ISO 27001 - Average Treatment effect on the Treated (ATT), % of revenue



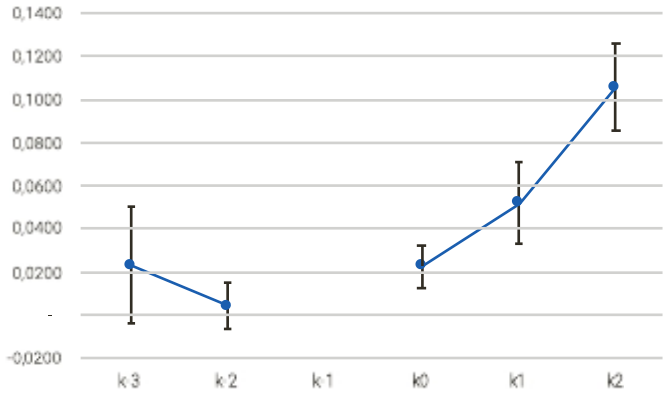
Source: Prometeia analysis

Figure 8 - ISO 9001 - Average Treatment effect on the Treated (ATT), % of revenue



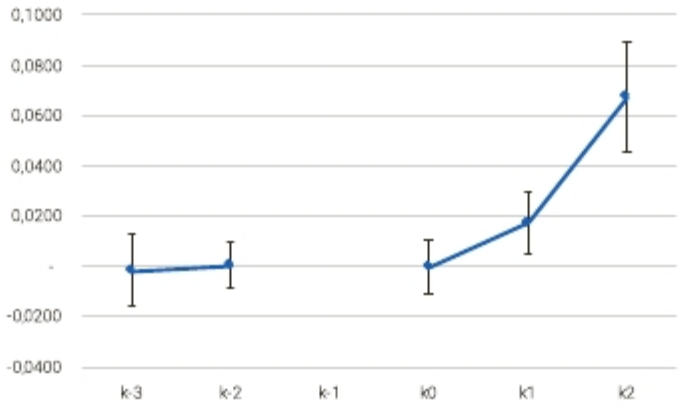
Source: Prometeia analysis

Figure 9 - Increase in Environment performance attributable to ESG certification - Average Treatment effect on the Treated (ATT), %



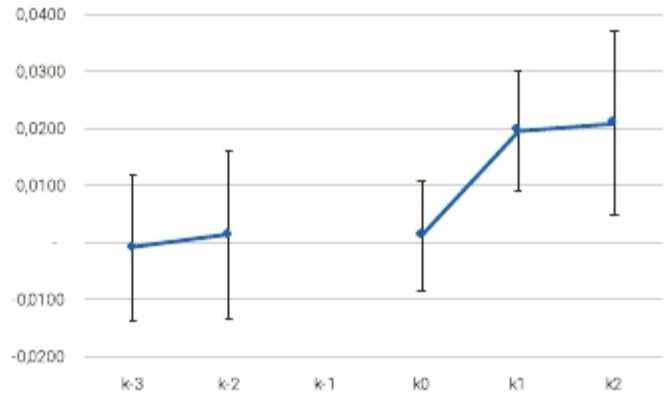
Source: Prometeia analysis

Figure 10 - mprovement in Social performance attributable to ESG certification - Average Treatment effect on the Treated (ATT), %



Source: Prometeia analysis

Figure 11 - Improvement in governance performance attributable to ESG certification - Average Treatment effect on the Treated (ATT), %

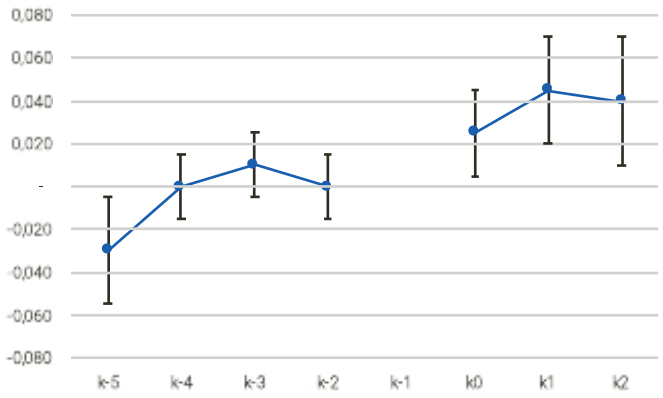


Source: Prometeia analysis

5. Sectoral heterogeneity in the effects of ISO 9001certification

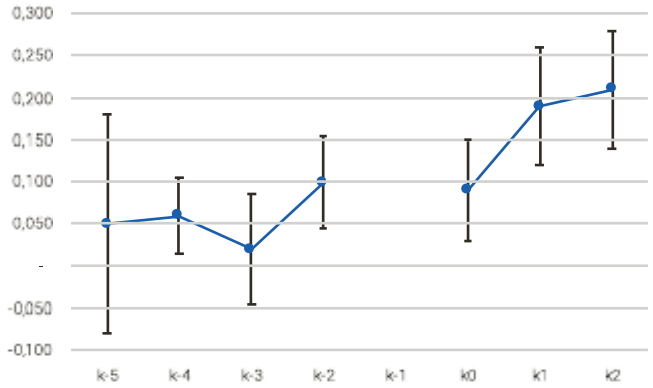
The rich availability of data on UNI EN ISO 9001 certification, owing to its widespread adoption, makes it possible to investigate heterogeneity in the effects of ISO 9001 certification on turnover across different industries. The analysis shows that the estimated impact is not uniform, but varies significantly depending on the structural characteristics of the sectors, suggesting that the mechanisms through which certification affects performance are not homogeneous (Figures 12–14).

Figure 12 - ISO 9001 - Average Treatment effect on the Treated (ATT), % of revenue - Industry (IAF sectors 3–23)



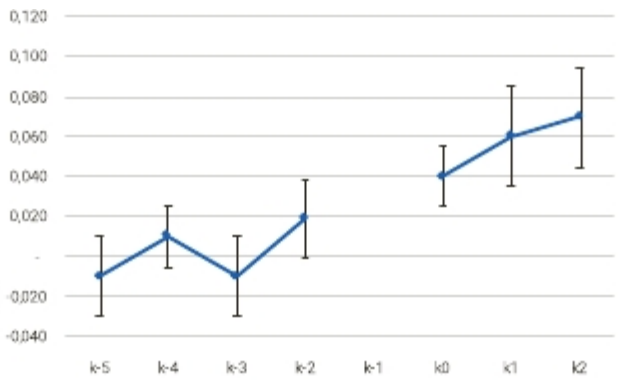
Source: Prometeia analysis

Figure 13 - ISO 9001 - Average Treatment effect on the Treated (ATT), % of revenue - Construction (IAF sector 28)



Source: Prometeia analysis

Figure 14 - ISO 9001 - Average Treatment effect on the Treated (ATT), % of revenue - Services (IAF sectors 29–39)



Source: Prometeia analysis

In particular, in the construction sector the effect is stronger and exhibits an increasing pattern over time. This result is consistent with the role of certification as a market entry requirement: in this context, UNI EN ISO 9001 often represents a necessary condition to participate in public tenders and procurement procedures or to operate as a supplier within certain supply chains. The observed impact therefore reflects not only internal process improvements, but also an expansion of business opportunities.

In the industrial sector, by contrast, the estimated effect appears more limited and relatively stable over time. This pattern is consistent with a context in which quality standards are already widely adopted and embedded in production processes. Under these conditions, certification tends to represent a necessary condition for maintaining competitiveness rather than a strongly differentiating factor. The observed economic effect is therefore more limited, while remaining positive.

In the services sector, finally, the impact is at intermediate levels and displays a more gradual dynamic. In this case, certification may play a more reputational role, helping to strengthen trust among clients and stakeholders rather than directly enabling access to new markets. The gradual increase in the effect over time is consistent with a process of progressive consolidation of benefits, linked to the greater visibility and credibility of certified firms.

It is worth noting that the differences observed across sectors also reflect statistical factors related to the varying size and composition of sectoral samples. In particular, sectors with smaller sample sizes exhibit greater variability in the estimates, resulting in wider confidence intervals. This does not affect the qualitative interpretation of the results, but suggests caution when interpreting the estimates for individual sectors.

Overall, the analysis shows that the effect of UNI EN ISO 9001 certification depends significantly on the context in which it is adopted. This supports the interpretation that certification operates through different channels—market access, process standardisation, and reputation—whose relevance varies across sectors, affecting the magnitude and dynamics of the observed impact.

6. The Counterfactual Scenario in the Monetary Valuation

The results of the econometric analysis provide an estimate of the average effect of ESG certifications on firms' ESG performance, expressed as the Average Treatment Effect on the Treated (ATT) (see Figures 9–11 in this methodological note or Table 12 of the study). These estimates are used as the basis for monetising the benefits of ESG certifications.

The approach assumes that, for each firm and for each year of observation, no differential effect is applied to the observed data in the absence of certification; conversely, once a firm is certified in a specific dimension, a percentage change equal to the corresponding ATT for the relevant certification year is applied (k_0, k_1, k_2).

For illustrative purposes, consider a firm that, in the year it first obtains certification, records CO_2 emissions of 540,000 tonnes (Figure 15). In this context, the counterfactual scenario —i.e. in the absence of certification—is estimated by applying the ATT effect to the observed value, resulting in 540,000 × (1 + ATT (k_0)) = 552,000 tonnes of CO_2.[21] This value represents an estimate of the environmental impact that would have occurred in the absence of certification. Extending the calculation to the entire observation period shown in Figure 15, an observed scenario of 3,056 thousand tonnes of CO_2 is obtained, compared with a counterfactual scenario estimated at 3,205 thousand tonnes of CO_2.

The economic value of the avoided environmental impact can be expressed as follows:

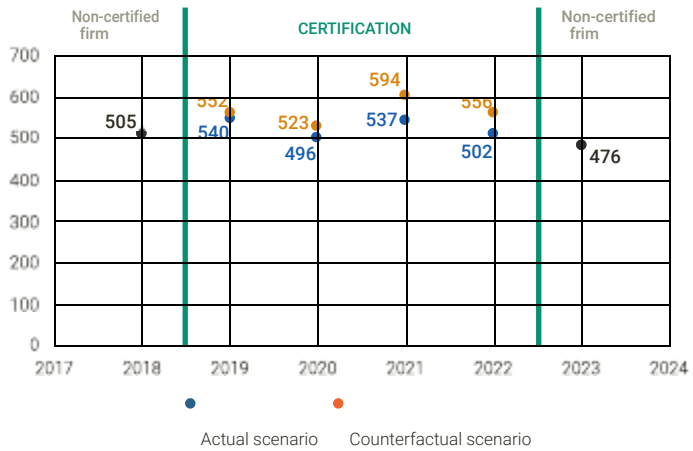
$$\Delta V = (E^{CF} - E^{OBS}) \cdot m_{CO_2}$$

where:
- E^{CF} denotes emissions in the counterfactual scenario
- E^{OBS} denotes emissions in the observed scenario
- m_{CO2} is the unit monetary value of CO_2 emissions

Assuming a unit monetary value of emissions equal to €135 per tonne of CO_2, and substituting the values, we obtain ΔV = (3205 - 3056) • 1000 • 135=149 000 • 135=20.1 *mln €*

[21] *The ATT coefficient (k_0), equal to 2.3%, is taken from Table 12 in Section 2.*

Figure 15 - CO_2 emission levels (kt) – Observed and counterfactual scenarios



Source: Prometeia analysis

For social indicators, the effect is reversed. In these cases, certification is associated with an improvement in the observed indicator, which is therefore higher than in the counterfactual scenario. For example, if the observed share of female employees is equal to 45%, the counterfactual scenario one year after certification is given by a share equal to 45% / (1 + ATT (k_1)) = 44.2%.

It is therefore important to emphasise that, in the case of environmental impacts, certification is associated with a reduction in negative externalities (such as emissions or pollution), whereas for social impacts it translates into an increase in positive externalities (such as employment, training, or inclusion). In other words, in the first case a reduction in a "social cost" is observed, while in the second an increase in a "social benefit" is recorded. However, for the purposes of the present analysis, in both cases the economic value is expressed in terms of the benefit generated and therefore takes a positive sign, regardless of the direction of the underlying change in the indicator.

Since ATT estimates are available only for the year of certification and the two subsequent years (k_1, k_2, k_3), it is assumed—on a cautious but consistent basis with the nature of the interventions considered—that the effect persists beyond the second year following certification, keeping the estimated impact constant at the level observed in the last available year.

This assumption reflects the fact that the investments and organisational changes required to obtain certification tend to generate lasting effects over time, as long as the certification is maintained.
Conversely, in the event that certification is lost, the differential effect is set to zero.
If the firm subsequently reacquires certification after having lost it, the model re-applies the effect starting from the year of re-certification, replicating the original dynamic profile of the estimated impact.

The process described enables the construction, for each firm, of two parallel trajectories—one observed and one counterfactual—representing, respectively, actual performance and performance estimated in the absence of certification. This dual representation is a key step in the analysis, as it allows the econometric results to be directly linked to the subsequent stage of monetary valuation. In this sense, the construction of the counterfactual at the individual firm level represents the bridge between the estimation of causal effects and the quantification of the economic value of impacts.

7. Monetisation of Impacts and **Application**

The monetisation of impacts represents the final stage of the analysis, in which the effects estimated through the econometric model are translated into monetary values. This allows heterogeneous dimensions—environmental and social—to be compared and expressed within a common metric, interpretable in terms of value generated for the system.

From a methodological perspective, the monetisation process is based on two distinct but complementary components: on the one hand, the physical quantification of impacts (e.g. emissions, employment, training), and on the other hand the assignment of a unit monetary value to these quantities. It is in this second step that the main methodological choices are concentrated, as for many ESG variables no observable market price exists.

For the environmental dimension, the analysis is primarily based on the Environmental Priority Strategies (EPS) framework, developed within the Life Cycle Assessment. This approach makes it possible to assign a monetary value to each environmental flow (e.g. kg of emissions of a given pollutant), expressed in euros per physical unit. These values are not estimated within the model but are directly drawn from the EPS framework, which integrates evidence from the economic and environmental literature and is based on the concept of willingness to pay, i.e. the public's willingness to bear a cost to avoid environmental damage. In other words, EPS provides a pre-constructed "conversion table" that consistently and comparably translates a wide range of environmental impacts into monetary values, avoiding the need to estimate each parameter from scratch.

A key feature of this approach is that monetisation takes place along the cause–effect chain: emissions or resource use are translated into final damages (e.g. human health, biodiversity, resource availability), which are then expressed in monetary terms. This ensures consistency across different types of impacts and makes it possible to aggregate heterogeneous quantities into a single economic indicator. In some specific cases, the EPS framework is complemented with alternative sources, for instance for components not directly covered (such as waste management costs), using values derived from institutional sources.

For the social dimension, the approach is necessarily more heterogeneous, as no unified framework comparable to the environmental one exists. Monetary valuations are therefore constructed using proxies derived from the economic literature and official statistical sources, selected according to the nature of each indicator. In general, the guiding principle is to associate each variable with a monetary measure that reflects its direct or indirect economic value.

For example, for variables related to employment and labour force participation, the monetary value is estimated using average wages, interpreted as a measure of the economic contribution of employment. Similarly, for indicators such as the gender pay gap or female representation, monetisation is based on wage differentials between groups, interpreted as a loss or gain in income. For training, a human capital approach is adopted, linking training hours to an expected increase in productivity and therefore in earnings. In the case of workplace injuries, valuation is derived from estimates of the social cost of accidents, which include both direct and indirect costs for the economic system.

A further methodological step concerns the handling of information limitations. The available ESG data in fact cover only a subset of firms and variables of interest. To extend the analysis to the full sample, sectoral proxies are used to estimate average indicator values based on firms' industry affiliation. In practice, average sector-specific coefficients (e.g. emissions per unit of turnover or training hours per employee) are computed and then applied to individual firms according to their economic characteristics. This approach inevitably introduces a degree of micro-level simplification, but it allows for robust and consistent estimates at the aggregate level, as discussed in the study.

Once unit monetary values have been defined and physical quantities have been reconstructed for each firm, monetisation is carried out directly by multiplying quantities by their respective coefficients. The final step consists of comparing, for each firm, the observed scenario with the counterfactual scenario constructed based on the estimated effects (ATT). The difference between the two scenarios represents the net benefit attributable to certification, expressed in monetary terms.

This approach enables the aggregation of results at the system level, yielding an overall measure of the value generated by certifications. In this sense, monetisation is not merely a descriptive exercise, but a natural extension of the counterfactual analysis: the effects estimated by the econometric model are translated into changes in physical quantities and subsequently into economic value, enabling an integrated assessment of impacts across the different ESG dimensions.

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