Finanza sostenibile

The sustainability premium of Italian bonds

L. Alessi, M. Gentile

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Il premio di sostenibilità delle obbligazioni italiane

*L. Alessi, M. Gentile**

Sintesi del lavoro

Lo studio analizza l'esistenza di un premio al rischio specifico per le obbligazioni sostenibili italiane per verificare se gli investitori effettuino una valutazione di mercato del profilo di sostenibilità (ambientale, sociale e di *governance*, ESG) dei *bonds*. L'analisi è stata condotta sugli *yield at issuance* di un campione di obbligazioni italiane, appartenenti ai settori *corporate* e finanziario, risultanti in essere al 30 giugno 2025. Sono stati applicati diversi approcci metodologici (analisi univariata, analisi di regressione ad effetti fissi, tecniche di *propensity score matching*) con l'obiettivo di verificare in modo statisticamente robusto la presenza di un eventuale premio di sostenibilità al netto di fattori di controllo riconducibili alle caratteristiche standard delle obbligazioni.

Le evidenze empiriche indicano l'esistenza di un premio di sostenibilità negativo e statisticamente significativo sull'intero campione, con una marcata rilevanza nel comparto *corporate*, mentre non emerge un premio significativo nel settore finanziario, in linea con la letteratura internazionale di riferimento. Infine, i risultati delle analisi pongono in risalto che accanto alle determinanti tradizionali dei rendimenti (quali l'affidabilità creditizia e le condizioni di liquidità), rilevante è il ruolo del *rating* ESG degli emittenti. Queste evidenze mostrano come la *performance* ESG dell'emittente sia rilevante tanto quanto la classificazione di sostenibilità dell'obbligazione che nello studio si effettua sulla base dei principi ICMA.

In ulteriori sviluppi della ricerca, il premio a rischio e la metodologia sviluppata nello studio potranno essere impiegati per valutare gli impatti dell'evoluzione regolamentare europea sul mercato domestico delle obbligazioni "verdi" (ad esempio nell'ambito del processo di revisione del Regolamento UE sui *green bond*) o di regolamentazioni afferenti ad altre tipologie di titoli obbligazionari (es. obbligazioni tokenizzate). Le potenzialità delle tecniche statistiche potrebbero essere approfondite, inoltre, per valutare un eventuale sviluppo di indicatori di *early warning* a supporto della vigilanza.

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The sustainability premium of Italian bonds

*L. Alessi, M. Gentile**

Abstract

The study examines whether Italian sustainable bonds carry a distinct risk premium, aiming to understand whether investors incorporate the environmental, social and governance (ESG) profile of these instruments into market valuations.

The analysis is based on issuance yields for a sample of Italian bonds, belonging to corporate and financial sectors, outstanding as of 30 June 2025. To test for the existence of a potential sustainability premium, the study employs a set of complementary methods, including univariate analysis, fixed-effects regression models and propensity score matching, while controlling for standard bond characteristics.

Empirical findings underscore the presence of a negative and statistically significant ESG risk premium in the overall sample and, in particular, within the corporate sector, while no comparable effect is identified in the financial segment consistently with existing literature and major international evidence. Furthermore, together with traditional bond characteristics (such as credit quality, issuer liquidity conditions, and the presence of embedded options), the issuer ESG rating shows a significant association with return dynamics. This suggests that the issuer ESG performance is as important as the bond sustainability label according to ICMA principles.

In the future, the risk premium and the methodology developed in this study could be employed to assess the impact of the evolution of the European regulatory framework on the domestic market for green bonds other than sovereign issuances (for example, within the context of the review process of the EU Green Bond Regulation), as well as of regulatory interventions affecting other types of debt securities (e.g. tokenised bonds). Moreover, the potential of the statistical techniques could be further explored to assess the possible development of early warning indicators in support of supervisory activities.

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1 Introduction

Sustainable bond markets have expanded rapidly over the past decade, with green bonds consolidating their position as the dominant segment across advanced economies. Sharp increases in global issuance, widespread adoption of taxonomies and international standards and growing reliance on second-party opinions helped enhancing transparency and credibility. Within the European Union, these dynamics are particularly pronounced, given that green bonds represent the largest share of environmental, social and governance (ESG) issuance, supported by well-developed regulatory frameworks and strong investor demand for instruments aligned with environmental objectives (OECD, 2025).

The EU sustainable bond market continues to expand, albeit at a more moderate pace than in previous years. Based on ESMA (2025), the outstanding amount of EU ESG-labelled bonds reached approximately EUR 2.25 trillion in the second quarter 2025, driven primarily by the continued growth of green bonds, which remain the dominant segment within the sustainable fixed-income universe. Quarterly green bond issuance remained broadly aligned with its long-term average, reflecting resilient investor demand and stable market access for both public and private issuers. Liquidity conditions for green bonds also show signs of gradual improvement: bid-ask spreads for green bonds tightened slightly relative to comparable conventional bonds, indica-ting enhanced market depth and sustained investor interest.

Borsa Italiana (2026) confirms the continued expansion of the sustainable bond segment across Italy's fixed-income markets (MOT, Euronext Access Milan and EuroTLX). The stock of ESG-labelled bonds (green, social, sustainable, SDG-linked, transition bonds) has grown steadily over time, rising to nearly 700 billion euro by February 2026.

In light of this growing trend, sustainable bonds have attracted increasing attention in recent years, as investors, policymakers, and financial institutions seek to understand whether and to what extent ESG factors are reflected in asset prices. A growing strand of literature investigates the existence of a *greenium*, which is a risk premium attached to green assets, shown to be generally negative. More recently, the focus has been broadened to the whole sustainability segment, investigating the existence of a sustainability premium, defined as a yield differential between sustainable bonds and comparable conventional ones. A sustainability premium may arise when market participants value the ESG characteristics embedded in these financial instruments.

Most of the existing literature focuses on green bonds, with a general consensus on the existence of a negative *greenium*. In other words, investors tend to accept a lower remuneration to hold green bonds compared to conventional bonds, ceteris paribus, as they perceive these assets as safer. Although empirical studies adopt heterogeneous methodologies and offer mixed results, they generally document that the dynamics of green bond pricing evolve over time. Additional contributions document that green bonds can exhibit safe-haven–like characteristics under specific market conditions and function as hedges or diversifiers across several market segments during periods of heightened uncertainty. Moreover, international empirical evidence underscores the importance of external reviews and certification mechanisms. Rigorous verification frameworks are shown to enhance instrument credibility and bolster investor confidence. Lastly, sectoral heterogeneity is substantial: green bonds issued by financial institutions typically do not exhibit a *greenium*, whereas the effect appears stronger in industrial and renewable energy sectors, where the use of proceeds is more closely aligned with the issuer's core business model.

Broadening the analysis to the whole ESG segment, results are more mixed. For example, Balitzky *et al.* (2023) conclude that risk premia are not systematic across the broadly defined sustainable bond universe, as they find no consistent pricing advantage for ESG-labelled bonds. Credit quality, maturity and liquidity remain the primary determinants of bond yields; any observed specific premium is episodic rather than structural, reflecting market conditions rather than sustainability-driven pricing mechanisms.

The research question addressed in the paper is whether a sustainability premium exists in the Italian market, also considering its implications for reducing financing costs. The objective is to assess whether issuing sustainable bonds leads to a measurable decrease in issuers' cost of funding. To the best of our knowledge, this paper constitutes the first empirical investigation exclusively dedicated to quantifying the sustainability related premium within the Italian ESG bond market.

The sample includes only bonds issued by non-financial corporates and financial institutions, to enhance sample consistency by limiting heterogeneity in issuer objectives, risk profiles, and pricing mechanisms, which are substantially different for sovereign and supranational issuers. Moreover, excluding sovereign and supranational bonds mitigates confounding effects arising from

policy-driven pricing, preferential regulatory treatment, and non-market demand, which may bias estimates[1].

We develop an econometric framework inspired by Fatica *et al.* (2021) with the objective of isolating the sustainability premium by controlling for a range of bond characteristics (i.e., use of proceeds, embedded options and maturity) as well as issuer-specific features (i.e., liquidity, credit quality, leverage, size and ESG performance). To assess the robustness of our findings, we apply matching-sample techniques. The analysis is conducted on a yield-at-issuance dataset comprising both conventional and sustainable bonds included in the corporate and financial sectors outstanding up to 30 June 2025.

The time span covered does not allow for a consolidated assessment of the impact of the recently introduced EU Green Bond framework. Nonetheless, the paper develops and evaluates a methodological approach that may be employed to monitor the evolution of the regulatory environment, including the effects stemming from the introduction of the new standards.

We document that a negative and significant sustainability premium exists in the Italian bond market, in particular looking at bonds issued by non-financial corporates. On the contrary, no significant premium can be detected with reference to bonds issued by financial institutions. A negative risk premium is in line with the literature on international bond markets and can be explained by the investors' perception of these assets as less risky in the context of a sustainability transition. An alternative explanation is preference-based, whereby investors except lower returns owing to their attitude towards sustainability. Moreover, we show that the ESG performance of the issuer is at least as important as the ESG label of the bond.

The paper is structured as follows. The next section provides an overview of relevant literature. Section 3 covers the policy background. Section 4 describes the dataset. Section 5 presents the results of the univariate analysis, while the following section describes the econometric framework and the main results. Section 7 presents the results from a propensity score matching exercise. Section 8 concludes.

1 We detected only five ESG sovereign bonds and one ESG supranational bond outstanding on the 30th of June 2025. Excluding these instruments implies discarding only a marginal portion of the overall sustainable sample. Moreover, given such a limited sample size, a dedicated analysis on sovereign and supranational issuers would not be feasible.

2 Review of the literature

In this section, we review the main theoretical frameworks and empirical findings that have shaped the understanding of the *greenium* in fixed-income markets.

The literature offers two main interpretations of the *greenium*. According to the first, green bonds benefit from a lower cost of financing because they enhance issuers' environmental reputation, broaden the investor base, and mitigate regulatory, transition, or reputational risks (e.g., Ehlers and Packer, 2017; Flammer, 2021). The alternative interpretation attributes the *greenium* to investors' sustainability preferences: environmentally motivated investors are willing to accept lower returns in exchange for holding assets aligned with their ethical or climate objectives, generating excess demand for green bonds and consequently lower yields relative to comparable conventional bonds (e.g., Baker *et al*., 2018; Zerbib, 2019). Importantly, while these interpretations differ in their economic rationale, they do not affect the methodological approach used to measure the *greenium*, which is typically based on yield differentials between green bonds and otherwise comparable conventional bonds.

The existing literature explores its determinants, magnitude, and implications for pricing efficiency and the scaling up of sustainable finance. MacAskill et al. (2021) conduct a systematic literature review to assess the existence and determinants of the *greenium*. The study synthesizes findings from 76 peer-reviewed articles and working papers published between 2010 and 2020. Approximately 60% of reviewed studies report a generally negative and statistically significant *greenium* (56% of primary market studies and 70% of secondary market studies), though its magnitude varies widely. Issuer credibility, external reviews, and use-of-proceeds transparency are consistently associated with stronger *greenium* effects; moreover, more developed green bond markets show clearer pricing advantages. The review highlights the heterogeneity of methodological approaches across studies, which partly explains differences in results.

Among the first papers studying the green bond market, Zerbib (2019) uses a matched sample of green and conventional bonds, finding that green bonds exhibit a statistically significant negative yield discount attributable to investor pro-environmental preferences. The effect is stronger for bonds with external certification and for issuers with high environmental credibility, suggesting that transparency and trust enhance the pricing benefit. Karpf *et al.* (2018) also find a negative and significant *greenium* in the U.S. municipal bond market, evolving over time in line with an increasing investor valuation of environmental attributes and improved credit quality among green issuers. Fatica

et al. (2021) study a large sample of green and conventional bonds, controlling for credit risk, issuer characteristics, and market conditions, finding that a *greenium* exists for green bonds issued by supranational institutions and corporates, but not for financial institutions. External reviews and repeated issuance are associated with a pricing advantage, suggesting that credibility and reputation are key drivers of the *greenium*. For financial institutions, the lack of a *greenium* may stem from investor difficulty in verifying the environmental impact of the bond proceeds.

A strand of literature further investigates how external validation influences the magnitude and existence of the *greenium*. Allman *et al*. (2022) find that external reviews reduce funding costs, especially when the review is conducted by reputable entities such as audit firms or rating agencies. Bachelet *et al*. (2019) show that while green bonds issued by institutional entities tend to be characterized by higher liquidity and negative premia, green bonds from private issuers show negative premia only when accompanied by third-party certification of their environmental credentials. Baker *et al*. (2022) find that US green municipal bonds are typically issued at a small premium relative to comparable conventional bonds, which is more pronounced when bonds are externally certified as green and when they are not issued simultaneously with conventional bonds from the same issuer. Similarly, Dorfleitner *et al*. (2022) underscore the role of external validators whose presence can enhance investor confidence and contribute to more favourable pricing of green financial instruments.

With reference to the characteristics and the credibility of the issuer, Hachenberg *et al*. (2018) find that green bonds issued by corporate and financial institutions tend to offer slightly lower yields than comparable conventional bonds, while government-related green bonds do not consistently exhibit this pricing advantage. Lau *et al*. (2022) show that the *greenium* varies significantly across issuers, highlighting that greenwashing risk and issuer reputation are key drivers of this heterogeneity. Grishunin *et al*. (2023) analyse the European corporate green bond market, reporting that non-financial corporations tend to exhibit higher *greenium* levels compared to financial institutions. This suggests that investors may perceive green investments by industrial firms as more impactful or credible. Additionally, issuers operating in environmentally intensive sectors show more pronounced yield advantages, indicating that the market rewards firms that undertake meaningful transitions toward sustainability. Petreski *et al*. (2025), focusing on Swedish real estate firms, show that frequent green bond issuers experience lower financing costs, including a reduction in the cost of equity, as consistent green financing builds investor trust and mitigates greenwashing concerns. The issuer ESG profile is another powerful lever

to increase credibility: Fornari *et al.* (2026) find that while the green label alone is associated with an average premium of around 16 basis points, this premium nearly doubles when the issuer's environmental score is particularly high. Green certification and periods of heightened climate uncertainty further amplify this effect. Finally, based on a structural model, Agliardi *et al.* (2021) explain the heterogeneity in *greenium* estimates based on the correlation between the green project and the issuer's core economic activity. When this correlation is strong, the green bond may enhance the issuer's creditworthiness, while weak alignment may result in a higher perceived risk.

A few papers focus on green bond market developments during the COVID-19 pandemic. Liberati *et al.* (2025) find that green bonds generally exhibit lower yields than comparable conventional bonds, indicating strong and persistent excess demand for sustainable assets, which pushes prices up and returns down. Interestingly, the *greenium* widened during the COVID-19 pandemic, while it partially normalized as market conditions stabilized. The paper interprets this negative *greenium* primarily as a market-driven phenomenon, rooted in excess demand rather than purely ethical preferences. Moreover, the study underlines that the intensity of the *greenium*'s post-pandemic contraction varied significantly across issuing sectors. This suggests that investor perception of climate risk and green credibility could be heterogeneous in relation to the core business of the issuer. Ayaydin *et al.* (2022) focus on both primary and secondary markets and show that. during the COVID-19 pandemic green bonds exhibited greater resilience, with lower yield increases compared to brown bonds. Cicchiello *et al.* (2022) carry on an event study on the European green bond over 2020, showing that green bonds exhibited higher risk exposure and lower resilience during the initial phase of the crisis, but also benefited more during the recovery, reflecting investor optimism and confidence in sustainable finance. Arat *et al.* (2023) find that green bonds exhibited a negative premium of 1.6 basis points before the pandemic, which widened to 3.5 basis points during periods of extreme market stress. Fatica *et al.* (2024) show that during the pandemic outbreak, green bonds experienced lower net sales, on average, than equivalent conventional bonds, and independently of issuers' fundamentals. Lastly, considering a more extended time-span around the COVID-19 pandemic, Pietsch *et al.*(2025) find that the *greenium* in the euro-area rises notably between 2020 and early 2022 and weakens again thereafter: a surge in retail demand, especially for green bonds issued by banks, coincides with periods when the *greenium* becomes more pronounced, while tighter monetary conditions and worsening economic environments reduce retail appetite and make the *greenium* disappear.

Finally, the emergence of green bonds has prompted analyses on their impact on market stability. Wulandari *et al.* (2018) find that liquidity risk significantly influences green bond pricing, especially in the early stages of market development. As the market matures and liquidity conditions improve, this effect diminishes. Looking at volatility, Franklin (2025) links the *greenium* to reduced secondary market volatility, suggesting that green bonds may offer greater price resilience over time compared to conventional bonds. Overall, the OECD Global Debt Report (2024) notes that *greenium* effects could be heterogeneous and depend heavily on issuer credibility, external validation, and market conditions. Mispricing risks and greenwashing could undermine investor trust and lead to market corrections, posing threats to financial stability (Paterlini *et al.*, 2025).

3 Policy background

From a regulatory standpoint, the evolution of the European Union's sustainable bond regime reflects a shift from voluntary standards, such as the ICMA Green Bond Principles, to the harmonized structure introduced by the EU Green Bond Standard. Regulation (EU) 2023/2631 on 'European Green Bonds and optional disclosures for environmentally sustainable and sustainability-linked bonds' entered into force on 9 December 2023 and applies since 21 December 2024. Although the Regulation establishes binding requirements exclusively for the "European Green Bond" (EUGB) designation, it nonetheless expands its influence by providing optional pre- and post-issuance disclosure templates for bonds marketed as environmentally sustainable and for sustainability-linked bonds, thereby creating a first layer of harmonized transparency obligations across ESG instruments.

The standard's legal architecture is anchored in the EU Taxonomy Regulation (Regulation EU 2020/852), which defines environmentally sustainable economic activities and to which EUGB proceeds must be fully aligned, subject to a limited flexibility margin allowing up to 15% of allocations to taxonomy-eligible activities for which technical screening criteria have not yet been established. Within this framework, Regulation (EU) 2023/2631 lays down the mandatory content, structure and disclosure requirements of the pre-issuance European Green Bond factsheet. In particular, it requires issuers of European Green Bonds to provide, in a standardised ex ante format, detailed information on the planned use and allocation of proceeds, the taxonomy-aligned economic activities to be financed, the expected environmental contributions, and the internal processes for project evaluation, selection and management of pro-

ceeds. The Regulation further requires that the factsheet be reviewed and approved by an external reviewer prior to issuance. In addition, it establishes a mandatory ESMA registration and supervisory framework for external reviewers. Overall, this new regulatory framework supports an integrated disclosure regime designed to enhance transparency, comparability, and accountability across green bond markets.

4 Data

The sample includes active financial and corporate bonds issued by Italian firms from 2014 as recorded on the 30th of June 2025. It consists of 3,363 bonds, of which 195 are classified as ESG financial instruments according to the ICMA principles.

ICMA standards provide structured guidelines on key elements such as the use of proceeds, project evaluation, reporting, and external verification. They operate on a voluntary, market driven basis rather than as legally binding regulations, helping issuers design sustainable bonds that align with internationally recognized best practices. Explicit rules on use of proceeds ensure that funds are directed toward projects with measurable environmental or social benefits, while the project evaluation and selection requirements clarify how these projects fit into the issuer's broader sustainability strategy. Comprehensive reporting expectations promote ongoing disclosure of allocation and impact data, enhancing accountability throughout the life of the bond. Additionally, the encouragement of external reviews provides an independent assessment that reinforces the credibility of sustainability claims.

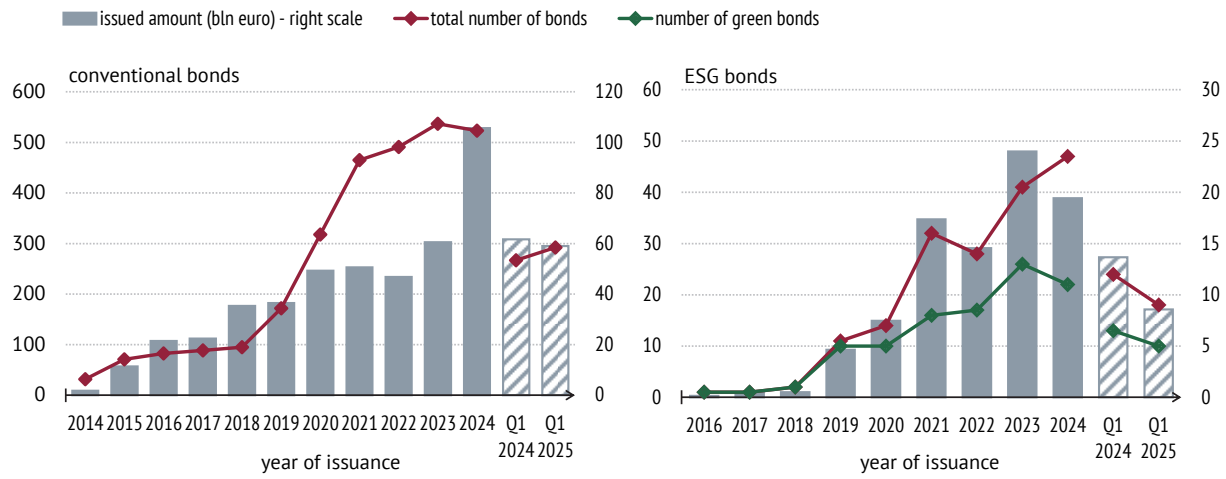
Specifically, the dataset includes 115 green bonds (representing approximately 3% of the total sample, 9% in terms of amount issued, and approximately 60% of the sustainable bond sample), 43 sustainability-linked bonds, 30 social bonds and 7 sustainability bonds. Notwithstanding the sustained increase of ESG bond issuances registered in more recent years, the size of the Italian sustainable bond market remains quite small (Figure 1). Indeed, based on our dataset, the total issued amount ratio between ESG bonds and conventional ones is approximately equal to 19 basis points.

Around half of ESG bonds originate from the corporate sector (56%), of which 15% are issued by multi-utilities, 14% by electric utilities, and 13% by natural gas pipeline transportation firms. The remaining 44% of Italian sustainable bonds have been issued by financial institutions, predominantly banks (77%). Over time, the differences between the corporate and financial sectors,

both in terms of the number of instruments and the volume issued, appear to have gradually diminished (Figure 2).

Some characteristics of Italian ESG bonds are broadly aligned with those of conventional bonds. They predominantly exhibit medium to long-term maturities at issuance (over five years; 66%) and are largely issued as plain-vanilla or zero-coupon instruments (73%). As for issuer characteristics, ESG bonds and conventional bonds issuers display similar average levels of leverage ratio (computed as the amount of total debt divided by total assets), short-term liquidity ratio (computed as the amount of short-term cash divided by total assets) and firm size (defined as the book value of total assets; Table a.1 in the Appendix).

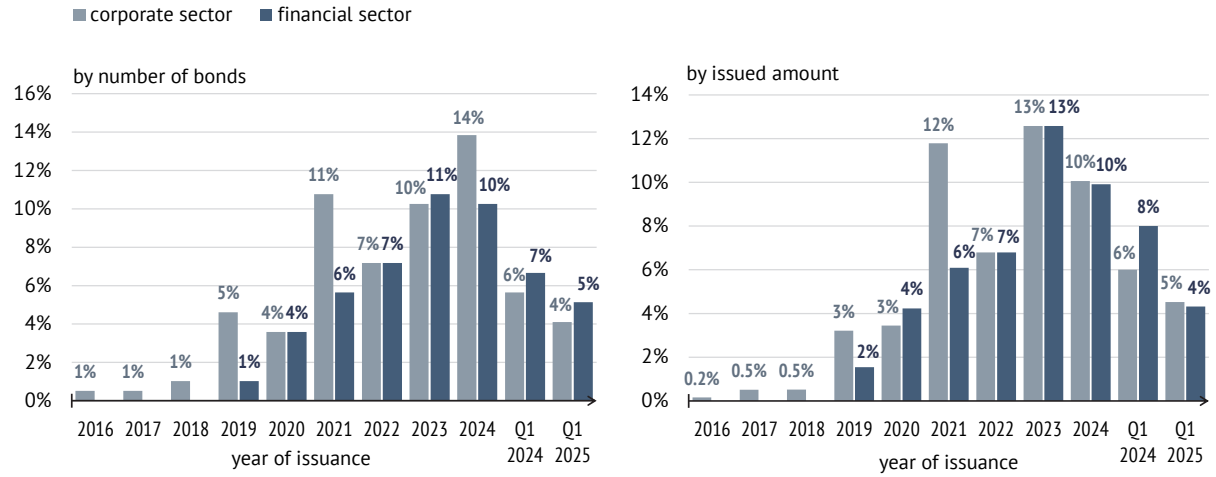
Figure 1 – Italian bond sample
(30 June 2025)



Source: our computations on LSEG data. The sample is composed of active bonds up to 30 June 2025. ESG bonds are identified on the base of ICMA principles.

An additional control variable is the bond grade, which is a categorical assessment that classifies a bond as either investment grade or high yield based on the credit ratings assigned by Standard & Poor's (S&P) and Fitch. Bonds rated BBB– or above by S&P/Fitch are categorized as investment grade, indicating relatively low credit risk. Bonds rated below these thresholds are classified as high yield (or speculative grade), reflecting a higher probability of default. The bond grade classification is typically derived from the issue-level credit rating when available and reflects the default risk of the specific security.

Figure 2 –Sectoral distribution of Italian sustainable bonds
(30 June 2025)



Source: our computations on LSEG data.

Issuers' ESG performance is proxied using the ESG ratings produced by LSEG, which provide a comprehensive assessment of firms' environmental, social and governance practices. The LSEG methodology aggregates a wide set of qualitative and quantitative indicators into standardized scores, enabling a consistent comparison of sustainability performance across firms and sectors.

A substantial share of Italian ESG bonds is classified as investment grade[2] (71%), and in approximately 55% of cases, sustainable bonds are issued by firms with a medium/high LSEG ESG score[3]. Conventional bonds, by contrast, are less frequently rated as investment grade (15%) and are issued by firms with sound ESG performance in only about 26% of cases (Table a.1 in the Appendix and Table 1).

The presence of an external reviewer is taken into consideration by building up a dummy variable which is equal to 1 when the bond is either CBI Certified, as verification by an approved verifier is mandatory under the Climate Bonds Standard, or when the issuer has obtained a second party opinion. This provides an independent assessment of alignment with recognized market principles and enhances methodological rigor relative to self-declared environmental claims. Defining this variable allows to differentiate between bonds supported by formal external scrutiny and those lacking such assurance.

2 Refinitiv classifies bonds as investment grade or high yield by integrating information regarding external credit ratings from S&P and Fitch.

3 Reported ESG score are provided by Thomson Reuters Eikon. Given that ESG score ranges from 0 to 100, we consider it medium/high it is above 50.

In addition, seasoned issuers of ESG bonds are well represented in the dataset. Frequent issuers tend to display more consistent disclosure practices, stronger sustainability commitments, and greater market credibility. Their repeated engagement in the ESG bond market provides a richer historical record, thereby enabling more robust comparisons of pricing dynamics over time and mitigating noise associated with one-off issuance effects.

Lastly, the use-of-proceeds framework constitutes a foundational principle governing ESG bond issuance. It requires issuers to allocate the capital raised exclusively to projects that deliver measurable environmental, social, or governance benefits, in accordance with predefined eligibility criteria and internationally recognized guidelines such as the ICMA principles. This mechanism enhances transparency and accountability by obliging issuers to articulate, ex ante, the categories of eligible expenditures (e.g. renewable energy and energy-efficiency investments, social infrastructure, governance-enhancing initiatives) and to report, ex post, on both the allocation of funds and the resulting impact metrics.

ESG bonds in the sample exhibit high-quality features, as the majority have undergone external verification (81%) and have largely been issued by seasoned market participants (66%; Table 1). Moreover, Italy-domiciled sustainable bonds are associated with use of proceeds specifically related to sustainable finance (clean transport, energy efficiency, circular economy, etc.) in 77% of the cases. In the remaining 23% of the cases, the prevailing use of proceeds is general purpose (around 15%). In particular, almost all sustainable bonds issued by financial institutions are associated with a sustainable use of proceeds (around 98%). These high standards largely reflect the fact that we focus on ICMA-aligned bonds, meaning that our sample effectively represents a 'best-in-class' set of ESG instruments.

Table 1 – Key features of Italian sustainable bonds

	all ESG bonds	corporate ESG bonds	financial ESG bonds
external reviewer	159	83	76
repeated ESG issuer	129	68	61
sustainability related use of proceeds	153	70	83
issuer with an ESG score >50	108	59	49
investment grade bond	139	74	65
total number	*195*	*110*	*85*

Source: our computations on LSEG data.

Moreover, 65% of the bonds in the sample are issued by firms that exclusively issue conventional bonds, whereas only 1% of issuers specialize in the sustainable bond market (Table 2)[4].

Table 2 – Issuers of sustainable bonds

	number of issuers	number of bonds
issuers only of sustainable bonds	20	31
issuers of sustainable bonds and conventional bonds	46	1,145
issuers only of conventional bonds	825	2,187
total number	*891*	*3,363*

Source: our computations on LSEG data.

5 Univariate analysis

The sustainability risk premium is measured as the yield difference between ESG and conventional instruments. A first way to test for the existence of a specific premium associated with sustainability is to perform a univariate analysis, comparing the mean and median yields of two groups: securities classified as ESG and conventional ones. If the yield differential between conventional and ESG instruments is significant and negative, this points in the direction of the presence of a sustainability premium, suggesting that ESG securities are perceived as less risky and that issuers benefit from a price advantage and reduced funding costs.

In line with Fatica *et al.* (2021) we consider yields at issuance, instead of current yields, because the former allows an unbiased measure of the premium that investors attribute to ESG securities. Indeed, the yield at issuance captures the market's perception of the bond's sustainability features at the time of pricing, reflecting investor demand and ESG preferences without distortions from subsequent market movements, interest rate changes, or liquidity shifts. Unlike current yields, the yield at issuance offers a cleaner and more reliable indicator of the initial premium and ensures comparability across different issuances. At the same time, this approach does not allow to model repricing dynamics over time or the impacts of regulation entered into force after issuance.

4 Referring to the second raw of Table 2, almost half of the bonds are issued by four financial issuers, which issue 18% of the ESG bonds in the sample.

Table 3 reports mean and median yield to maturity at issuance for sustainable and traditional bonds considering the whole timespan. Considering the whole sample, results point to the presence of a negative risk premium for ESG securities. However, this result loses robustness once sectoral differences are introduced. Indeed, only bonds issued by non-financial corporates continue to exhibit this pattern, whereas for bonds issued by financial institutions the mean and median yield difference is not statistically different from zero. Moreover, average yield differentials between ESG and conventional bonds are not statistically significant either when restricting the sample to issuers with a medium-high ESG performance.

An interesting question is then whether a yield differential can be detected based on the ESG performance of the issuer, i.e. by comparing bonds (both ESG and conventional) issued by firms with a medium/high ESG score vs. bonds issued by firms with a low or no ESG score. As shown in the lower part of Table 3, a more reliable sustainability profile of the issuer is consistently associated with a significant reduction in bond risk premia, considering both conventional and ESG bonds.

Table 3 – Univariate analysis results

	avg. yield – sustainable bonds	avg. yield – conventional bonds	mean difference test	Mann–Whitney median test
whole sample	3.6	4.1	-***	-***
non-financial corporates	3.5	4.9	-***	-***
financials	3.6	3.8	n.s.	n.s.
medium/high ESG performance	3.2	3.2	n.s.	n.s.

	ESG score			
	avg. yield – medium/high ESG score issuers	avg. yield – low/no-ESG-score issuers	mean difference test	Mann–Whitney median test
whole sample	3.2	4.5	-***	-***
non-financial corporates	2.9	5	-***	-***
financials	3.2	4	-***	-***

Source: our computations on LSEG and Factset data. Yields at issuance have been winsorized by dropping values lower than zero or higher than the 99% percentile. The mean difference test is performed under the hypothesis of unequal variances. *** pvalue <0.001; ** p-value < 0.01; * pvalue < 0.1; "n.s" stands for "not significant".

In other words, issuers with higher ESG scores enjoy a lower cost of funding not only on their ESG bonds but also on their conventional issuances. However, this result could be due to other characteristics of issuers with higher ESG scores, which have a positive impact on their creditworthiness. To control for these other factors, we turn to the multivariate analysis in the next section.

6 Multivariate analysis

In this section we estimate the following econometric model in line with Fatica *et al.* (2021) and similar studies:

$$yield_{b,i,t} = \beta_0 + \beta_1 ESG_{b,i,t} + \beta_2 X_{b,i,t} + \delta_i + \varphi_t + \varepsilon_{b,i,t} \qquad (1)$$

where $yield_{b,i,t}$ is the yield at issuance of bond *b* issued by issuer *i* in time *t*; $ESG_{b,i,t}$ is a dummy variable equal to one if a bond is sustainable based on ICMA principles. A sustainability premium is identified when the coefficient $\beta_1$is significantly different from zero.

The vector X is the set of standard control variables selected based on the literature (Fatica *et al.*, 2021, Balitzky *et al.*, 2023, Gu et al., 2017, Gozzi *et al.*, 2015; Chen *et al.*, 2011). In more detail, we construct dummy variables to identify callable bonds and financial instruments whose declared primary purpose relates to ESG objectives (i.e., sustainable use of proceeds). The inclusion of embedded-option specification is essential to accurately identify the sustainability premium, as these contractual features have a direct and economically meaningful impact on bond yields. Moreover, as proxy for the bond's potential liquidity and overall marketability, the issued amount is included in the set of explicative variables by computing sample decile categories both directly on the total issued amount and after sorting by issuer and time. Tenor is a categorical variable which identifies the following three classes: short-term (less than five years), medium term (between five and ten years) and long-term (more than ten years). In addition, we construct dummy variables capturing the presence of an external review, investment-grade status, whether the issuer has a medium/high ESG score, and whether the issuer is a repeated ESG issuer. We further include controls for the issuer's size, leverage ratio and short-term liquidity. Time fixed effects are incorporated to account for global time-varying unobservable factors and are operationalized through the interaction of bond maturity and issue date (φ_t). Finally, the issuer fixed effect δ_i absorbs time-invariant firm-specific characteristics, while $\varepsilon_{b,i,t}$ denotes the error term.

As documented in Table a.1 in the Appendix, several observations are missing for issuer size, leverage, and short-term liquidity ratios. These data gaps arise because the analysis is conducted using yields at issuance. Consequently, issuer-level characteristics, including balance-sheet variables, must be measured at the time each bond was issued, which dates back several years for many securities in the sample. As illustrated in Figure 1, issuance dates extend as far back as 2014, naturally resulting in incomplete coverage of issuer financial information. To mitigate these limitations, we rely on two data providers (LSEG and FactSet) for both issuance-yield data and the relevant control variables.

Table 4 summarizes the control variables included in the empirical analysis, together with their definitions and the expected direction of their association with bond yields. The expected signs reported in the table reflect well-established relationships in the bond-pricing literature. For ESG-related variables, the presence of an external reviewer, repeated issuance of ESG instruments, and higher ESG scores are all expected to be associated with lower yields. These characteristics signal, indeed, stronger transparency, more credible sustainability commitments, and reduced information asymmetry, which may translate into lower perceived risk for investors.

Table 4 – Control variables and expected effect on bond yields

control variables	definitions	expected effect on bond yields
external reviewer	dummy variable equal to 1 when the issuer has obtained a second-party opinion	–
repeated ESG issuer	dummy variable equal to 1 when the issuer has issued more than one ESG bond	–
ESG score	Source: LSEG	–
callable	embedded callable option	+
investment grade	bond grade based on S&P/Fitch ratings	–
issuer size	total assets	–
leverage	debt / total assets	+
short-term liquidity ratio	short-term cash flow / total assets	–

Regarding bond-level controls, the presence of a callable feature is typically associated with higher yields. Since callability grants the issuer the option to redeem the bond when market rates fall, investors demand compensation for bearing this reinvestment risk, which results in a yield premium. With respect to standard issuer-level controls, larger issuers tend to have lower yields, as firm size is often interpreted as a proxy for financial stability and lower credit risk. Investment-grade status similarly implies a negative relationship with yields, reflecting higher creditworthiness. Balance-sheet indicators follow conventional expectations: higher leverage is generally linked to higher yields, as more indebted firms face greater default risk; by contrast, stronger short-term liquidity conditions are expected to reduce yields, since they signal a healthier financial position and a lower probability of short-term distress.

Fixed effects are included to absorb systematic differences across bonds. In particular, we include maturity, issue date, and issuance size as follows: maturity is constructed as a categorical variable (0-5 years, 5-10 years and >10 years); time refers to the month and year of issuance; bond size is a categorical variable based on the decile of the bond amount; issue size is a categorical variable based on the decile of the bonds issued by that issuer on that

day. Their individual association with yields is not directly estimated in the model[5].

In the next section, we present the main findings from the fixed effects regression model.

Main results

Table 5 reports the main results for the whole sample in Col. 1, as well as for the subsamples including non-financial companies in Col. 2 and financial institutions in Col. 3. Looking at Col. 1, the yield deviation between ESG and conventional bonds is negative and statistically different from zero when we apply the fixed effect regression model on the full sample. This suggests that ESG features are perceived as providing meaningful risk mitigation relative to traditional bonds. Indeed, *ceteris paribus*, when the bond is defined as sustainable on the basis of ICMA principles, the estimated yield at issuance decreases by approximately 0.96 percentage points relative to conventional securities. Beyond statistical significance, benchmarking the sustainability premium against the average yield level indicates that it amounts to approximately 23% of the mean yield, which is 4.2% in the whole sample. This strong result can be explained by the high quality of our ESG sample, as we have only included bonds identified as sustainable ones on the basis of ICMA principles. Other papers, such as Balitzky *et al.* (2023), do not find evidence of a significant sustainability premium, possibly because their sample also includes self-labelled ESG bonds.

Following the literature, we also try to identify whether, within the subsample of ESG bonds, external certification, consolidated experience in sustainable bond issuance or a clearly sustainable use of proceeds can yield an additional benefit in terms of a lower yield. However, the lack of variation in these characteristics makes it difficult to isolate and estimate their individual effects. In other words, the structure of the sample does not provide sufficient heterogeneity for these factors to be statistically distinguished or rigorously evaluated. Therefore, these variables are not attached significant regression coefficients, reflecting the fact that almost all ESG bonds on the basis of ICMA principles are repeat issuances that are externally reviewed, and most of them

5 Maturity effects are absorbed through time-interacted fixed effects. This specification allows controlling for the term structure of interest rates and its time variation, including so-called yield *curve twists*, namely non-parallel changes across different maturities.

declare a sustainable use of proceeds (Table 1). In order to evaluate the relevance of these characteristics one would need to broaden the definition of ESG bonds to bonds that do not necessarily follow ICMA principles[6].

The issuer's ESG score, instead, plays an important role in determining bond yields. *Ceteris paribus*, when the issuer's ESG score is medium/high, the estimated yield at issuance decreases by approximately 0.6 percentage points relative to securities issued by entities that are either unrated from an ESG perspective or exhibit poor ESG performance. This suggests that the market does not merely consider the presence of a "sustainability label" on the security, but rather the quality of the issuer's overall ESG performance.

This pricing premium suggests that investors consider ESG issuers as more resilient, better governed, and/or less exposed to long-term environmental and social risks. Financial market participants may also value the non-financial benefits associated with ESG investing, such as alignment with sustainability objectives or compliance with institutional mandates.

Looking at control variables, callable bonds do not demand a significantly higher yield considering bonds issued by both financial and non-financial corporates. At the same time, the investment grade classification, reflecting the issuer's creditworthiness, contributes to significantly reduce yields. In particular, investment-grade bonds exhibit a reduction of approximately 1.2 percentage points in the yield at issuance respect to high yield or not-rated securities. With respect to the issuer balance sheet, the coefficients attached to size and liquidity are negative and significant, as expected. Larger issuers typically benefit from greater market visibility and lower perceived default risk, which translate into lower yields. Similarly, stronger liquidity positions reduce rollover risk and enhance an issuer's financial flexibility, further contributing to lower yield premiums demanded by investors.

The results shown in Col. 2 and 3 show that the two market segments, i.e. bonds issued by non-financial companies and financial institutions, respectively, behave differently to some extent. The yield difference between ESG bonds and conventional bonds is negative and significant also with respect to the corporate subsample. Moreover, also in the corporate sector, the ESG profile of the issuer plays a substantial role in explaining the observed variability, as bonds issued by medium/high ESG score corporates are associated with a significantly lower yield compared to bonds issued by other corporates.

6 In our sample, self-labelled sustainable bonds are not identified, therefore we can not to perform this test.

Table 5 – Yield at issuance regression analysis

	all sample	corporate sector	financial sector
ESG bond	**-0.9648****	**-1.2390****	0.0203
	(0.488)	(0.603)	(0.379)
external reviewer	0.0242	0.2199	0.1656
	(0.686)	(0.769)	(0.457)
repeated ESG issuer	-0.0481	-0.3485	-0.8024
	(0.725)	(0.808)	(0.565)
sustainable use of proceeds	0.6920	1.0158	
	(0.456)	(0.635)	
external reviewer x repeated ESG issuer	0.2609	0.9738	1.0791
	(0.979)	(1.055)	(0.656)
external reviewer x sustainable use of proceeds	-0.3645	-0.7957	1.0284
	(0.704)	(0.810)	(0.645)
repeated ESG issuer x sustainable use of proceeds	-0.1752	0.1207	
	(0.757)	(0.911)	
external reviewer x repeated ESG issuer x sustainable use of proceeds	0.7994	0.2734	
	(1.079)	(1.210)	
medium /high ESG score	**-0.5691*****	**-0.4687***	0.0433
	(0.197)	(0.249)	(0.156)
investment grade	**-1.1801*****	**-1.6434*****	**-0.7428*****
	(0.247)	(0.261)	(0.133)
callable	0.1605	-0.2491	**0.6444*****
	(0.196)	(0.205)	(0.144)
ln(size)	**-0.3270*****	**-0.1997*****	-0.0051
	(0.054)	(0.075)	(0.042)
leverage ratio	-0.2924	0.4595	-0.3116
	(0.437)	(0.511)	(0.433)
short-term liquidity ratio	**-1.9426****	**-2.1400****	
	(0.954)	(0.958)	
Constant	**6.8661*****	**6.1297*****	**3.7094*****
	(0.431)	(0.519)	(0.477)
Observations	680	576	973
R-squared	0.6413	0.6943	0.5496
Adjusted R-squared	0.5270	0.5844	0.4388
FE	Yes	Yes	Yes

Source: our computations on LSEG and Factset data. The table presents OLS regression results of the model in Eq. 1. The reduction in the number o observations respect to the sample size is primarily due to missing data for size, leverage, and the short-term liquidity ratio (Table a.1). Missir explicative variables in the financial sector specification are due to multicollinearity issues. Robust standard errors in in parentheses; *** p<0.01, p<0.05, * p<0.1.

These results do not hold when considering the subsample including financial institutions. Indeed, in line with international evidence (Fatica *et al.*, 2021), we find that also in the Italian market, bonds issued by financial institutions tend not to exhibit a sustainability risk premium. Moreover, the ESG score of the issuer loses significance as well. These results, taken together, show that investors perceive ESG signals from banks as weaker and less credible compared to corporate issuers. As documented in the literature, financial institutions do not benefit from a green premium, in contrast to non-financial corporates, due to limited signalling effectiveness and only modest changes in lending behaviour following green bond issuance. Price advantages are recognised above all when there is coherence between the use of proceeds of the bond and core business of the issuer. With respect to this, a large part of corporate issuers in our sample belongs to subsectors where proceeds are more easily traceable owing to the core business of the issuers, such as utilities.

With respect to control variables, the issuer's credit quality remains a key determinant of yield levels considering both subsamples. In this regard, creditworthiness continues to outweigh other characteristics, including ESG features, in shaping investors' required returns. Finally, firm size and liquidity conditions prove to be highly relevant determinants for non-financial issuers, while they turn out not to be significant or could not be tested for financial issuers due to an insufficient number of observations.

Overall, our results indicate that also in the Italian market sustainability considerations are becoming a relevant complement to conventional financial determinants in bond pricing.

7 Propensity score matching

As a robustness check for the estimation of the risk premium associated with ESG bonds, this section shows the results from a matching analysis. The aim of the exercise is to compare ESG and conventional bonds by pairing bonds that are very similar based on a set of characteristics, except for the fact that one is an ESG bond and the other is a conventional bond. In this set-up, ESG bonds are the 'treated' ones, while conventional bonds are the control group. This approach allows us to account for the potential selection bias arising from systematic differences between sustainable and conventional bonds, thereby improving the validity of estimated treatment effects. In other words, the analysis aims to ensure that the observed differences in yields are not driven by confounding factors but can be more reliably attributed to the ESG feature itself.

The similarity between an ESG and a conventional bond is measured by the propensity score. In general, the propensity score is the probability that a unit (i.e., an individual, firm, or observation) receives a particular treatment given its observed characteristics. Calculating a propensity score allows to summarize all observed explicative factors into a single scalar, thereby reducing the dimensionality of the matching problem. In our case, we estimate the probability of a bond being ESG given explicative variables. Formally, the propensity score is defined as follows:

$$p(Xi) = Prob(ESG\ bond = 1 \mid Xi)$$

and obtained via a logit specification, where X_i is the matrix of covariates (e.g., maturity, issue date, size, issued amount, leverage).

Sustainable bonds are then matched to conventional securities based on proximity in estimated propensity scores, using the nearest-neighbour matching algorithm. Under this approach, similarity between treated and control observations is determined by minimizing the difference $\left[p_i - p_j \right]$, ensuring that matched units have comparable probabilities of receiving the treatment based on their observed characteristics. This method aims to approximate the counterfactual outcome for each treated unit by selecting the most statistically similar control.

The treatment effect is computed as the difference between the yield at issuance of a ESG bond ($Y_i(1)$) and the yield at issuance of the matched conventional bond ($\widehat{Y}_i(0)$). These differences are, then, averaged over all the N sustainable bonds:

$$\frac{1}{N}\sum_{i:ESG\ bond_i}\left[Y_i(1) - \widehat{Y}_i(0)\right].$$

Inference relies on robust standard errors to account for heteroskedasticity and the additional uncertainty introduced by the matching procedure. If the average difference is found to be significantly different from zero, this provides evidence of a risk premium attributable to sustainability-related factors. Conversely, if the average difference is not statistically distinguishable from zero, no such risk premium can be inferred.

As we have shown in the previous section, no sustainability premium can be detected for bonds issued by financial institutions. Therefore, in this section we focus on the subgroup of corporate bonds. We estimate the following two alternative model specifications: in the first model, we estimate propensity scores only based on bond characteristics; in the second specification, we also include issuer characteristics.

The upper part of Table 6 shows the results of the analysis by focusing on bond characteristics only. Consistently with the results from the fixed-effects regression models, we find evidence of a negative and statistically significant ESG risk premium in the corporate bond segment.

However, the columns show that the quality of the matching is rather low, as there is hardly any improvement in the similarity of treated and control groups once we move from considering the whole sample (raw data) to considering only matched control bonds (matched data). In particular, standardized differences do not generally decrease in absolute terms, and the variance ratios do not generally get closer to 1.

Table 6 – Propensity scores matching results for the corporate sector

	model not including issuer's characteristics			
	standardized differences		variance ratio	
	raw data	matched data	raw data	matched data
maturity (categories)	0.05	-0.14	0.98	0.69
issuance date (quarter)	0.26	0.30	0.66	0.42
issuance date (month)	-0.26	0.09	1.19	1.24
callable	0.34	-0.21	0.82	0.85
log(amount)^2	1.26	-0.06	0.76	0.99
average difference	**-0.89*** **			

	model including issuer's characteristics			
	standardized differences		variance ratio	
	raw data	matched data	raw data	matched data
maturity (categories)	0.12	0.30	0.94	0.71
issuance date (quarter)	0.36	-0.12	0.68	0.68
issuance date (month)	-0.26	0.10	1.16	1.11
callable	0.37	0.05	0.76	0.95
log(amount)^2	1.48	0.01	0.40	0.81
Investment grade	1.67	0.00	1.67	1.00
medium/high ESG performance	1.03	0.00	1.98	1.00
log(size)	1.36	-0.02	0.68	1.40
leverage ratio	0.55	-0.03	0.80	0.88
short-term liquidity ratio^2	-0.18	0.23	0.05	1.09
average difference	-0.09			

Source: our computations on LSEG and Factset data.

The bottom part of Table 6 shows results based on a larger set of variables, including issuer characteristics (i.e., ESG performance, investment grade, liquidity conditions, size). As shown by standardized differences and variance ratios, the model fit improves when traditional factors explaining bond price dynamic are included. Once issuer-specific explanatory factors are introduced, the significance of the yield differential between ESG and conventional bonds disappears. These findings confirm the relevance of standard issuer-level characteristics bond pricing, suggesting that investors could look at issuers' characteristics, such as ESG performance and creditworthiness, more than at the ESG label of the individual bond. If investors mainly price issuers' fundamentals, the ESG label could be used as an imperfect signal of issuers' characteristics.

8 Conclusions

The estimation of a potential sustainability premium is increasingly central to the work of supervisory authorities, as it provides insight into whether financial markets correctly price ESG attributes and whether mispricing could signal emerging risks or market inefficiencies. A growing body of empirical literature highlights the complexity of this analysis.

Against this backdrop, this paper investigates the presence and determinants of a sustainability premium for bonds issued by Italian-domiciled entities. We apply complementary empirical strategies: univariate analyses, a fixed-effects panel regression and a propensity score matching framework. We find that a negative and statistically significant sustainability premium emerges in the whole sample of the non-financial corporate bond segment, while no comparable effect is observed for financial issuers. Moreover, the issuer-level ESG performance plays a substantial role in explaining yields for both ESG and conventional bonds. This means that also in the Italian market, in line with most international evidence, the ESG dimension is becoming an integral part of bond pricing together with traditional bond characteristics (i.e., creditworthiness, liquidity conditions).

The existence of a statistically significant and negative risk premium translates into a benefit not only for issuers, who experience a reduction in financing costs, but also for investors, who appear to perceive Italian ESG bonds as identifiable within the price discovery process and as potentially safer assets, namely assets that require a lower risk premium.

The European Green Bond (EUGB) regulatory framework may help address several structural inefficiencies currently evident in the market. By enhancing the identifiability of ESG-labelled instruments, improving disclosure

standards, and strengthening the credibility of external reviewers, the EUGB Standard has the potential to reduce information asymmetry and mitigate risks of adverse selection or greenwashing. Based on the results of this study, we could expect bonds issued under the new EUGB standard to be associated with a more negative *greenium* compared to green bonds not issued under the same standard, *ceteris paribus*. In this context, the empirical strategies adopted in the study could be deployed for regulatory monitoring and impact analysis purposes.

The methodology displays significant potential, as it can be extended beyond the sustainable bond segment to measure impacts across the bond market more broadly.

As research agenda, the risk premium and the methodology developed in this study could be employed to assess the impact of the evolution of the European regulatory framework on the domestic market for green bonds other than sovereign issuances (for example, within the context of the review process of the EU Green Bond Regulation), as well as of regulatory interventions affecting other types of debt securities (e.g. tokenised bonds), in line with the targets set out in the 2026 Plan of Regulatory Activities[7]. Such indicators would enable the monitoring of the evolution of the regulatory framework for the purposes of impact analysis.

Moreover, the potential of the statistical techniques could be further explored to assess the possible development of early warning indicators in support of supervisory activities. Indeed, with appropriate adaptations, such as fine-tuning the model for predictive purposes and implementing a continuous maintenance process, the resulting estimates could be used as a benchmark within a rolling-window framework. Alert indicators could be based on the comparison between the model-predicted yield at issuance and the observed yield at issuance. Excessive discrepancies may signal potential risks and should therefore prompt further investigation.

As next steps, the research could be expanded by broadening the sample from Italian issuers to all bonds listed on the Italian markets, enabling a more comprehensive assessment of market-wide dynamics. Moreover, instead of relying solely on the yield at issuance, the analysis could incorporate current yield measures to better capture the temporal evolution of pricing and risk premia. Finally, once a larger number of social and sustainable bonds, as well as bonds issued under the EUGBS, will become available, the research could be extended by analysing these sub-classes of ESG bonds separately.

7 CONSOB, 2026; https://www.consob.it/documents/d/asset-library-1912910/piano_attivita_regolazione_2026.

Appendix

Table a.1 – Distribution of the bonds included in the sample by standard features

		all bonds	conventional bonds	ESG bonds
maturity	0-5 years	1,416	1,350	66
	5-10 years	1,591	1,482	109
	>10 years	356	336	20
	total	3,363	3,168	195
bond structure	plain vanilla / zero coupon	1,864	1,721	143
	structured bond	1,499	1,447	52
	total	3,363	3,168	195
bond grade	missing values	2528	2485	43
	high yield	202	189	13
	investment grade	633	494	139
	total	3,363	3,168	195
ESG issuer's rating	missing values	2,402	2315	87
	<=50	17	17	0
	>50 and <=75	430	380	50
	>75	514	456	58
	Total	3,363	3,168	195
size	number of missing values	1,140	1,126	14
	average value (bln euro)	163	164	159
leverage ratio	missing values	1,531	1,513	18
	average ratio	0.3	0.3	0.3
short-term liquidity ratio	missing values	2,514	2,028	86
	average ratio	0.2	0.2	0.1
option embedded bond	callable	1,230	1,115	115
	puttable	6	6	0

Source: our computations on LSEG data. The size measures the total asset of the issuer; leverage is the ratio between total debt and total assets; cash value of total assets is the ratio between short term cash and total assets.

References

Agliardi, E., Agliardi, R. (2021). Corporate green bonds: Understanding the greenium in a two-factor structural model. Environmental and Resource Economics, 80(2), 257–278.

Allman, E., Lock, B. (2022). External Reviews and Green Bond Credibility, ICEA Working Paper, https://iceanet.org/wp-content/uploads/2022/06/Allmann.pdf.

Arat, E., Hachenberg, B., Kiesel, F., Schiereck, D. (2023). Greenium, credit rating, and the COVID-19 pandemic, Journal of Asset Management, 24(7), 547–557.

Ayaydin, H., Danisoglu, S., Guner, Z. N. (2022). For the love of the environment: An analysis of green versus brown bonds during the COVID-19 pandemic. Finance Research Letters, 47(Part A), 102576.

Bachelet, J. M., Becchetti, L., Manfredonia, S. (2019). The green bonds premium puzzle: The role of issuer characteristics and third-party verification, Sustainability, 11(4), 1098.

Baker, M., Bergstresser, D., Serafeim, G., Wurgler, J. (2018). Financing the response to climate change: The pricing and ownership of U.S. green bonds. NBER Working Paper.

Baker, M., Bergstresser, D., Serafeim, G., Wurgler, J. (2022). The pricing and ownership of U.S. green bonds, Annual Review of Financial Economics, 14, 415–437.

Balitzky, S., Reiche, P. (2023). The European Sustainable Debt Market – Do Issuers Benefit from an ESG Pricing Effect? ESMA Report No. ESMA50-524821-2938, https://www.esma.europa.eu/sites/default/files/2023-10/ESMA50-524821-2938_The_European_sustainable_debt_market_-_do_issuers_benefit_from_an_ESG_pricing_effect_0.pdf.

Borsa Italiana (2026): Statistics – Green, Social and Sustainable Bonds (January 2026); https://www.borsaitaliana.it/finanza-sostenibile/statistiche/statistiche-green-e-social-bond.en.htm.

Cicchiello, A. F., Cotugno, M., Monferrà, S., Perdichizzi, S. (2022). Credit spreads in the European green bond market: A daily analysis of the COVID-19 pandemic impact, Journal of International Financial Management & Accounting, 33, 383–411.

Dorfleitner, G., Utz, S., Zhang, R. (2022). The pricing of green bonds: external reviews and the shades of green, Review of Managerial Science, 16, 797–834.

Ehlers, T., Packer, F. (2017). Green bond finance and certification. BIS Quarterly Review.

ESMA (2025). ESMA Report on Trends, Risks and Vulnerabilities – TRV Risk Monitor No. 2, 2025, https://www.esma.europa.eu/sites/default/files/2023-10/ESMA50-524821-

2938_The_European_sustainable_debt_market_-_do_issuers_benefit_from_an_ESG_pricing_effect_0.pdf.

Fatica, S., Panzica, R. (2024). Sustainable investing in times of crisis: Evidence from bond holdings and the COVID-19 pandemic. Journal of Banking & Finance, vol. 166, 107238.

Fatica, S., Panzica, R., Rancan, M. (2021). The Pricing of Green Bonds: Are Financial Institutions Special? Journal of Financial Stability, vol. 54(C), 100873.

Flammer, C. (2021). Corporate green bonds. Journal of Financial Economics, vol. 142(2), 499-516.

Fornari, F., Pianeselli, D., Zaghini, A. (2026). Environmental score and bond pricing: It better be good, it better be green. Journal of International Money and Finance, Vol. 161, 103498.

Franklin, A. (2025). Greeniums and the economics of sustainable finance transactions. In Structuring Sustainable Finance Transactions (pp. 211–224). Springer.

Grishunin, S., Bukreeva, A., Suloeva, S., Burova, E. (2023). Analysis of Yields and Their Determinants in the European Corporate Green Bond Market. Risks, 11(1), 14.

Karpf, A., Mandel, A. (2018). The changing value of the 'green' label on the US municipal bond market. Nature Climate Change, 8(2), 161–165.

Hachenberg, B., Schiereck, D. (2018). Are green bonds priced differently from conventional bonds? Journal of Asset Management, 19(6), 371–383.

Lau, P., Sze, A., Wan, W., Wong, A. (2022). The economics of the greenium: How much is the world willing to pay to save the Earth? Environmental and Resource Economics, 81(2), 379–408.

Li, R., Li, Z., Hu, K., Gan, K. (2024). The spillover effects of green bond issuance: A study based on Chinese firms' stock price synchronicity. Economic Change and Restructuring, Vol. 57, 12.

Liberati, D., Marinelli, G. (2025). Was COVID-19 a wake-up call on climate risks? Evidence from the greenium. Empirical Economics. Advance online publication.

MacAskill, S., Roca, E., Liu, B., Stewar, R.A., Sahin, O. (2021). Is there a green premium in the green bond market? Systematic literature review revealing premium determinants", Journal of Cleaner Production, Vol. 280/124491.

OECD (2024). Global Debt Report 2024, OECD Publishing, https://www.oecd.org/en/publications/global-debt-report-2024_91844ea2-en.html.

OECD (2025), Sustainable Bonds: Trends and Policy Recommendations, OECD Publishing, Paris.

Paterlini, S., Nicolodi, A., Gentile, M., Foglia Manzillo, V., Sancilio, M., Deriu, P. (2025). Greenwashing Alert System for EU Green Bonds. The CONSOB-University of Trento Prototype, CONSOB Quaderno Fintech n.14; SSRN Electronic Journal. https://doi.org/10.2139/ssrn.5379964

Pietsch, A., Salakhova, D. (2025). Pricing of Green Bonds: Greenium dynamics and the role of retail investors. Journal of International Financial Markets, Institutions and Money, Vol. 104, 102211.

Petreski, A., Schäfer, D., Stephan, A. (2025). The Reputation Effect of Repeated Green-Bond Issuance and Its Impact on the Cost of Capital. Business Strategy and the Environment, 34(2), 2436–2448.

Wulandari, F., Schäfer, D., Stephan, A., Sun, C. (2018). The impact of liquidity risk on the yield spread of green bonds, Finance Research Letters, 27, 53–59.

Zerbib, O. (2019). The effect of pro-environmental preferences on bond prices: evidence from green bonds, Journal of Banking Finance, Vol. 98, p. 39

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