BANCA D'ITALIA
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(Markets, Infrastructures, Payment Systems)

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Banca d'Italia
Via Nazionale, 91 - 00184 Rome - Italy
+39 06 47921

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How important are ESG factors for banks' cost of debt? An empirical investigation

by Stefano Nobili,* Mattia Persico* and Rosario Romeo*

Abstract

The paper examines the relationship between banks' ESG (environmental, social and governance) scores and their funding costs. It also provides empirical insights into the question of whether investors consider changes in ESG scores when making investment decisions. The analysis focuses on bonds issued by euro-area banks between 2015 and 2022. The findings show that banks with better ESG ratings see a positive impact on their cost of funding; among individual scores (E, S, G), governance (G) proves to be the most significant in the reduction of the cost of funding. Then, based on a panel event study model, the analysis shows that ESG rating changes have a significant effect on banks' bond yields: the spread to maturity tends to increase after downgrades and decrease after upgrades. Additionally, the results indicate that the effects of downgrades and upgrades are not symmetrical: in the medium term, the impact of the latter is actually more significant and persistent.

JEL Classification: C23, G11, G12, G14, G21, G23.

Keywords: ESG ratings, bond yield spreads, panel event study.

Sintesi

Il lavoro esamina la relazione tra i rating di sostenibilità (ESG - Environmental, Social, Governance - *score*) delle banche e il loro costo di finanziamento e fornisce evidenze empiriche sugli effetti delle variazioni nei rating ESG sulle decisioni d'investimento degli investitori. L'analisi si concentra sulle obbligazioni emesse da banche dell'area euro tra il 2015 e il 2022. I risultati mostrano che le banche con più elevati rating ESG sono state in grado di finanziarsi a un costo inferiore; considerando singolarmente i fattori di sostenibilità (E, S, G), quello di *governance* (G) risulta essere il più significativo nel ridurre il costo del finanziamento. Inoltre, utilizzando un modello *panel event study*, l'analisi mostra che le variazioni dei rating ESG hanno un impatto significativo sul rendimento delle obbligazioni: lo spread a scadenza tende ad aumentare dopo una riduzione del punteggio ESG e a diminuire dopo un aumento. I risultati indicano che gli effetti delle diminuzioni e degli aumenti non sono simmetrici: nel medio termine, l'impatto di questi ultimi è infatti più significativo e persistente.

* Bank of Italy, Directorate General for Markets and Payment Systems.

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1. Introduction[1]

Eurozone banks will find themselves increasingly reliant on market funding in the upcoming years, with the gradual phasing out of long-term refinancing operations (TLTRO III). One significant factor that could influence the cost of financing for banks in the market is their exposure to environmental, social and governance (ESG) factors. Investors are progressively incorporating ESG considerations into their investment decisions. ESG ratings, which offer a comprehensive evaluation of companies' sustainability performance based on a variety of indicators, could have the potential to exert an impact on the funding costs of financial intermediaries. In this paper we investigate the relation between the ESG ratings and banks' cost of funding through two distinct analyses: firstly, we explore the effect of ESG ratings on banks' bond yields at issue; secondly, we examine the impact of rating changes on bond yields to maturity during time, to analyse deeper whether yields do respond to ESG scores.

Recognizing the growing demand to provide markets with useful information for decisions that take climate related aspects into account, central banks and supervisory authorities are highly committed to fostering the banks' disclosure of ESG factors (Loizzo and Schimperna, 2022). At the beginning of 2022, EBA published specific technical standards (ITS) on the prudential disclosure of ESG risks, in order to require credit institutions to provide qualitative information on how they are taking into consideration ESG factors in their governance, business model, strategy and risk management framework and quantitative information on climate-change-related transition and physical risks; in December 2023, EBA circulated the roadmap on the implementation of the EU Banking Package, and, in January 2024, it launched a public consultation on draft Guidelines on the management of environmental, social and governance (ESG) risks, which include new rules requiring banks to systematically identify, disclose and manage risks arising from ESG factors as part of their risk management. The European Central Bank has set the end of 2023 as the deadline for significant euro area banks to incorporate ESG factors into banks' disclosures (European Central Bank, 2022).

In recent years, an increasing number of studies have explored the connection between a firm's ESG attributes and various dimensions of corporate financial performance. These dimensions encompass, but are not limited to, stock returns, bond yields, and access to credit markets (see Friede et al., 2015; Brooks and Oikonomou, 2018; Albuquerque et al., 2019; Matos, 2020; and Gillan et al., 2021, for a comprehensive review). Much of the prior empirical research has concentrated on the stock market, particularly in the United States, and has confined the analysis to a single provider of ESG rating data.

We instead focus on the euro area bank bond market, using multiple data providers to analyze the link between ESG factors and banks' cost of bonds. Banks typically turn to the debt market more frequently than the equity market, especially when they need to refinance maturing debt securities. When a bank resorts to the debt market, socially aware investors can exercise their stakeholder activism by deciding whether or not to purchase its bonds, thereby influencing its yields at issue (Oikonomou et al., 2014). The euro area debt market is characterized by market concentration (Boermans and Vermeulen, 2016) and the dominant presence of institutional investors (Darmouni and Papoutsi, 2022). As emphasized by Oikonomou et al. (2014), a heightened level of institutional

[1] Any views expressed in this paper are the authors' and do not necessarily represent those of the Bank of Italy. We are grateful to Patrizia Ceccacci, Gioia Cellai, Alberto Locarno, Franco Panfili, Antonio Scalia, Stefano Siviero and an anonymous referee for valuable comments and suggestions. In addition, we wish to thank Johnny Di Giampaolo, Fabrizio Ferriani, Enrico Foscolo and Pier Luigi Migliorati for their support in understanding the data.

participation proves to be desirable when examining the relation between ESG factors and banks' cost of debt, owing to two primary reasons. Firstly, the consensus holds that institutional investors are better informed than private investors. Consequently, it is more likely that they will factor in a complicated issue such as ESG when allocating their resources. Secondly, high institutional participation reduces the availability of free float bonds, facilitating bondholders in overseeing and influencing corporate management when they need to by simply selling the corresponding corporate bonds. This, in turn, should amplify the cost of debt for companies deemed "non-ESG compliant."

The empirical impact of ESG factors on the financing costs of firms, particularly financial institutions, remains an issue. Past research generally indicates a lower cost of financing for more sustainable companies in terms of bond yields, with a predominant focus on the U.S. market. However, it is not to be excluded that the results of many empirical studies conducted in the last ten years have been influenced by the enormous and, in some ways, unrepeatable growth in the number of investors who have integrated environmental, social, and governance (ESG) information into their investment decisions. Globally, over 4,000 wealth managers and asset owners, representing over $100 trillion, have subscribed to the Principles for Responsible Investment (PRI), requiring investors to incorporate ESG issues into investment analysis and decision-making processes (Berg et al., 2023). According to the Global Sustainable Investment Alliance (GSIA, 2023), the volume of investment products explicitly integrating ESG information surpassed $30 trillion in 2022. Nevertheless, these remarkable growth rates recorded in recent years are not guaranteed to continue in the future.

Oikonomou et al. (2014) examined the impact of sustainability dimensions in the primary and secondary bond markets in the United States. They found lower risk premiums and higher credit ratings for companies with fewer social misbehaviors. Díaz and Escribano (2021) demonstrated that 'green' energy companies, identified through the Dow Jones Sustainability Index, enjoy a sustainability premium when issuing bonds compared to their 'brown' competitors.

In the European bond market, results are mixed. Menz (2010) showed marginal statistical significance in the link between corporate social responsibility and bond prices, while Stellner et al. (2015) proved that sustainable companies are rewarded in terms of ratings and yield spreads. Ferriani (2022) documented a statistically significant ESG premium, and Barth, Hübel, and Scholz (2022) reported that higher ESG ratings have mitigated credit risk. Letta and Mirante (2023) suggest that a better ESG performance may be associated with lower credit spreads.

Concerning the Japanese bond market, Okimoto and Takaoka (2021) found that better ESG performance is negatively correlated with credit spreads, although the impact varies across different pillars of ESG scores and credit ratings.

Finally, Naumer and Yurtoglu (2020) analyzed the role of ESG-related news on financing costs (represented by CDS spreads) for a sample of large European and U.S. companies from 2006 to 2016. The results showed that favorable (unfavorable) news is associated with lower (higher) CDS spreads.

Most studies focus on non-financial companies, while financial institutions have received much less attention, which is surprising given that bond issuance is a significant source of external capital for many banks, and understanding the determinants of the actual cost of bond for banks is crucial. This paper aims to contribute to filling this gap by examining the role of banks' sustainability performance

in their funding costs. ESG scores play a pivotal role as determinants of corporate financing costs due to their ability to identify certain components of intrinsic business risk, such as banks' exposure to climate risk. Additionally, ESG scores can capture investor preferences for more sustainable banks, going beyond what can be explained by business fundamentals and bond characteristics.

In the current business landscape, an increasing number of investors are turning to ESG ratings to obtain third-party assessments of corporations' ESG performance. ESG rating agencies offer investors the ability to evaluate financial institutions (and companies) based on their ESG performance. In the banking and financial sector, ESG factors, and the transparency associated with them, take on particular significance due to the role that intermediaries play in economic development (Levine, 2005; Shen and Lee, 2005; Beck et al., 1999, 2010). The safety and soundness of financial institutions create various external benefits for society (Wu and Shen, 2013).

By publishing information on ESG factors, companies demonstrate respect for the contract with the community to pursue sustainable goals ("legitimacy theory") and provide indications of the sustainability of results in the long term, placing all stakeholders at the center of corporate strategies ("stakeholder theory"). Stakeholder theory asserts that there is intrinsic and instrumental value derived from stakeholder engagement (Donaldson and Preston, 1995; Roberts, 1992). Banks dedicated to long-term sustainability build stronger relationships with stakeholders, generating moral capital, and exhibit increased transparency, resulting in reduced information asymmetry. This, in turn, can lead to heightened demand for their stocks or bonds.

Furthermore, banks, drawing substantial resources from society such as deposits, are obligated to contribute to the community more prominently than many other industries. Recognizing their dependence on society's resources, banks can consider disclosure of ESG factors as a way to enable the community to assess how banks give back to society.

Socially conscious banks should also face lower litigation risks, which could impact future cash flows and jeopardize the ability to fulfill existing obligations. Consequently, investors may require a lower rate of return.[2] Moreover, socially aware banks can reap benefits from attracting customers, employees, and investors, avoiding environmental sanctions (Edmans and Kacperczyk, 2022), and identifying a range of risks early on. These risks include strategic, operational, reputational, and financial risks, all of which have the potential to impact future performance and business value (Ng and Rezaee, 2015).

Wu and Shen (2013) argue that one way to integrate ESG into modern banking theories is by considering the role of a bank's reputation. In the essay by Chemmanur and Fulghieri (1994), it is demonstrated that banks with high reputation are motivated to conduct more rigorous evaluations of the unobservable prospects of borrowers before granting loans, in contrast to low-reputation banks. Bushman and Wittenberg-Moerman (2012) further show that high-reputation banks are associated with greater profitability and better credit quality of borrowers. Therefore, based on the aforementioned emphasis on reputation, banks with better ESG scores would likely select and attract

[2] A word of caution on this matter is linked to some recent lawsuits in the US against investment funds employing sustainability strategies as they may be seen as contravening the principle of return maximization (e.g., Financial Times, December 18, 2023).

a greater number of creditworthy borrowers, contributing to increased profits and improved asset quality.

Finally, as demonstrated in previous studies (e.g., Neitzert and Petras, 2021), ESG ratings have a positive impact on bank's default risk, serving as an effective approach to risk management. Consequently, companies with higher ESG scores experience reduced funding costs compared to their riskier competitors (El Ghoul et al., 2011).

Our study is conducted on a sample of Eurozone banks with available ESG data spanning the period 2015–2022. We undertake two distinct analyses that demonstrate a significant association between ESG ratings and financing costs.

Firstly, we examine the impact of ESG on banks' funding costs, measured by the spread at issue. We initiate our study in the primary bond market as it allows for a more direct analysis of corporate funding costs. In this analysis, we compare results using ESG ratings from various sources (MSCI, Refinitiv Eikon, and Sustainalytics), also considering the contributions of individual sub-components (E, S, G). Given previous research indicating some disagreement and, in some cases, low correlation among ESG ratings (i.e., Berg et al., 2022), the availability of multiple scores is crucial to eliminate the possibility that the interaction between ESG scores and financing costs is solely determined by a specific rating agency's sustainability assessment. Our focus on Europe is motivated by the region's pioneering role in sustainability practices (Ho et al., 2012).

Controlling for bond and bank characteristics, our findings reveal a significant and negative correlation between ESG performance and the spread at issue. Investors value ESG factors and favorable ESG practices are linked to lower bond yields. Examining the varied impact of different ESG dimensions on bank bond yields, we observe that the effect is primarily driven by governance and social factors. Our results suggest that implementing best practices in corporate governance and reducing litigation risk enhance a bank's ability to secure more favorable funding conditions in the market.

Secondly, to investigate deeper whether spreads do respond to ESG ratings, we turn to a panel event study design, examining the impact of ESG rating changes on banks' bond yields to maturity (calculated as daily average by month).[3] This provides empirical insights into the question of whether investors take risks related to ESG factors into account when making investment decisions.[4]

Methodological issues are addressed as in Freyaldenhoven et al. (2021). We use a panel event analysis methodology (see also Schmidheiny and Siegloch, 2019; Clarke and Tapia-Schythe, 2021), based on the following considerations (Berg et al., 2023). First, this allow us to make causal inferences about the effects of ESG rating changes, as the identifying hypothesis of parallel trends for treated and untreated banks should be valid. Second, we can analyze the effects of downgrades and upgrades

[3] This second analysis is conducted using exclusively the ESG data from the MSCI provider, which represents one of the most influential for this data. Concerning the US market, Berg et al. (2023) find that the aggregate holdings of ESG funds react consistently to MSCI ESG rating. This alleviates the concern that disagreement in the measurement of ESG performance may weaken the effect preferences for ESG performance have on bond markets.
[4] See Ferriani and Natoli (2021) on the effect of ESG risk perception on investment fund flows.

separately. Third, we can estimate and visualize the dynamic effects of treatment (ESG rating changes).

Results show that investors react strongly to changes in the ESG rating. The impact on banks' bond yields is significant over the months following ESG rating changes, i.e. spread to maturity tends to increase after ESG rating downgrades and tends to decrease after ESG rating upgrades.

The effects of downgrades and upgrades are not symmetrical. Our findings show that, in the (four) months after an ESG rating change, upgrades are more significant than downgrades to influence the bond spread to maturity. ESG score upgrades have a more significant medium-term effect on bond spread to maturity, i.e. banks' cost of debt is more persistently sensitive to increases in ESG score than to decreases.

The remaining part of the paper is organized as follows. Section 2 presents the results of the econometric analyses about the correlation between spread at issue and ESG factors. In section 3 our focus is the impact of an ESG rating announcement on banks' spread to maturity. Section 4 concludes.

2. ESG's effect on banks' funding costs measured by the spread at issue

2.1 Data

We examine euro-denominated fixed-rate plain vanilla bonds[5] issued by euro area banks between 2015 (the year of the Paris Agreement on climate change) and 2022. Our initial dataset comprises 134 European banks located in 13 different countries[6]: 50 of these are Significant Institutions, while 29 are Less Significant Institutions with total assets over €30bn and 55 are LSI with total assets under €30bn (for further details on the country of location, see table 1A in the Appendix). It is compiled from multiple sources, with data on issuances, including issue date, maturity date, and seniority obtained from Refinitiv Eikon. The spread at issue is calculated as the difference between the yield at issue and the yield of German government bonds.[7] We take the logarithm of this spread to adjust for the significant positive skewness in the spread distribution and use it as the dependent variable in our models.

Credit ratings on issuers are obtained combining long term rating from Standard & Poor's, Moody's and Fitch: for each bank we used the agency which reports a rating for the highest number of years (in order to have coherent ratings we used for a single bank the same agency for the entire period).[8]

Initially, we consider various bank characteristics (such as total assets, liquid assets, equity, revenue, capital ratios, return ratios, NPL ratio, Ebit, and interest coverage ratio), sourced from Orbis, a Moody's Analytics Company data provider. However, in the final analysis, we use only total assets

[5] No optionality, no perpetual bonds, no step-up.
[6] Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Slovakia and Spain.
[7] For the yield at issue, we use data from Refinitiv and Bloomberg when they are available; otherwise we calculate the yield using the coupon plan. We use the yield curve of German fixed-rate government bonds as reference rate for the euro area; these yields are obtained from Bloomberg: for each bond in the sample, we interpolate (through cubic interpolation) on the government bond yield curve the maturity of the bond, thus eliminating any distortions arising from differences in maturity between the corporate bond and the sovereign bond. We can then subtract these yields from the ones of the corresponding corporate bonds to calculate the spread at issue.
[8] In case two agencies report a rating for the same number of years, we prefer S&P's on Moody's and Moody's on Fitch.

and the interest coverage ratio. Total assets serve as a control variable since larger banks generally face lower business and financial risks, and are therefore expected to have lower credit spreads. The same rationale applies to the interest coverage ratio, representing the ratio of a bank's earnings before interest and taxes (Ebit) over its interest expenses, which should be negatively correlated with spreads.

To enhance the robustness of our empirical results, we include additional control variables in the models to account for factors specific to the corporate bonds. Years to maturity (*tenor*) is considered, as bonds with longer maturity are expected to have higher credit spreads. Additionally, the nominal amount issued for each bond is included as it represents economies of scale in underwriting, potentially creating an inverse relationship with bond spreads (Oikonomou et al., 2014).

All the banks' data are referred to the end of the year before the issue. Then, we add information on the composite ESG score at the issuer level, which is obtained from three different data providers: MSCI, Refinitiv Eikon and Morningstar (Sustainalytics).[9]

The MSCI ESG rating evaluates firms' management of financially relevant sustainability risks and opportunities across three pillars: environment (E), social aspects (S), and governance (G). Under these dimensions, MSCI calculates 10 themes scores composed by 33 "key issues" (e.g., Carbon Emissions, Health and Safety, or Corruption and Instability), utilizing a wide range of indicators from corporate disclosure, internal modeling, and news reports.

MSCI assesses firms' performance on environment and social pillar based on the company's exposure (exposure score) and its capability to manage it (management score). The exposure score and the management score are combined to derive the key issue score: companies facing higher exposure should have stronger management practices in place to mitigate it, in order to obtain an adequate key issue score level.[10] The methodology used to evaluate a company's performance on the Governance pillar is different: because it is universally relevant and closely intertwined, governance is assessed through an approach that quantifies both the gap between a company's governance practices and what is considered best practice, and identifies the governance risks faced by its investors. A deduction-based scoring model is applied, where each company starts with the maximum score (equal to 10), and then scoring reductions are applied based on the assessment. Performance across all issues is aggregated in a raw ESG score, weighted based on MSCI's assessment of the financial materiality of different issues. This raw ESG score is then benchmarked against the raw ESG scores of industry peers, resulting in a peer group–adjusted final ESG score. This score ranges from 0 to 10, where 0 indicates poor management of ESG risks.

Refinitiv ESG scores are designed to gauge a company's relative ESG performance, commitment, and effectiveness based on company-reported data. These scores encompass 10 main themes distributed across three pillars: environmental (including sub-pillars for Emissions, Innovation, and Resource use), social (incorporating sub-pillars for Community, Human rights, Product

[9] They are referred to the year before the issue.
[10] Key issue scores range from 0 to 10 and are derived from a non-linear combination of exposure and management scores (both ranging from 0 to 10): for example, for the Carbon Emissions score, if the exposure is equal to 10, the maximum level of score is 7, obtainable with a management score of 10.

responsibility, and Workforce), and governance (containing sub-pillars for CSR strategy, Management, and Shareholders).

The scores for these ten categories are weighted according to the number of issues they encompass to calculate the overall ESG Score. Aggregating ESG scores is done based on the 10 category weights, which are determined using a magnitude matrix.[11] The final score ranges from 0 to 100, where a lower value indicates a poorer ESG performance. In addition, Refinitiv also reports the ESG Combined Score that combines the ESG score with 23 ESG controversy topics related to business ethics, anti-competition behaviors, accounting and reporting practices and so on. Our analyses are conducted taking into account both metrics.

Morningstar (Sustainalytics) has been providing sustainability (ESG) ratings for over 40,000 mutual funds and 75,000 companies worldwide since 2016 and 2018, respectively. In September 2019, Sustainalytics introduced its enhanced ESG Risk rating. The motivation for reassessing the methodology was that the old ESG rating primarily focused on "managed risk" without considering the extent of ESG risk exposure a company faced. Under the old ESG rating, a company was evaluated based on its general preparedness to address ESG risks and opportunities on an industry-relative basis.

The old ESG rating, on a scale from 0 to 100, positioned a firm with a high ESG rating as a leader in managing ESG risks within an industry. A drawback was the inability of investors to compare ESG scores across industries. To address this issue and better reflect ESG risk exposure, Sustainalytics introduced a new rating called "ESG Risk", which first identifies the material ESG risks in each industry. Although the new ESG Risk rating still uses a scale from 0 to 100, it is inverted relative to the old rating. After the methodology change, a firm with low exposure to ESG risk is assigned a low ESG Risk rating, rather than a high ESG rating, as under the previous rating regime. To maintain consistency in our data, we have converted the 2014-2018 ESG scores to the new scale, reversing the order. In our data, a bank with low exposure to ESG risk is assigned a high ESG score.

Among the banks with available MSCI ESG ratings, our sample consists of 1,287 bonds. When considering the other two ESG sources (Refinitiv and Morningstar), we have 1,763 and 1,355 bonds, respectively. Descriptive statistics on the sample are reported in Table 1.

[11] The magnitude matrix assigns a weight to each category. Category weights are based on an objective and data-driven approach to determine the relative importance of each category to each individual industry group. The category weights are obtained as a combination of industry medians, based on the relative proportion that a particular sector contributes to the overall gross number in the full ESG universe, and transparency, based on the level of disclosure of each data point in a given industry group. (for further details, see Environmental, Social and Governance Scores from Refinitiv, May 2022).

Table 1: Descriptive statistics

	N	Mean	St. Dev.	25 perc.	Median	75 perc.
Log Spread at issue	1287	-3.9349	1.3454	-5.1344	-4.7079	-3.7966
MSCI - ESG Score	1287	6.5336	1.5431	5.4000	7.0000	7.1000
Morningstar - ESG Score	1355	75.0300	3.4700	74.300	74.8700	76.5900
Refinitiv - ESG Score	1763	73.5700	16.7400	69.5900	73.7200	86.0800
MSCI - E Score	1287	6.2109	2.0291	5.6000	6.0000	7.4000
MSCI - S Score	1287	5.0027	0.6742	4.7000	5.0000	5.3000
MSCI - G Score	1287	4.9755	1.1602	4.1000	5.1000	5.9000
Rating issuer	1287	7.0979	2.1379	6.0000	7.0000	8.0000
Log Bank size (*)	1287	19.7665	1.1672	19.7225	19.8495	20.8910
ICR (**)	1268	0.4518	3.7967	0.1459	0.2914	0.6821
Log Amount issued	1283	9.7038	2.5757	8.0470	9.9035	11.5129
Tenor (years)	1287	5.1701	4.0736	2.5007	5.0027	7.0055
Euro Short Term Rate	1287	-0.3262	0.1605	-0.4131	-0.3628	-0.3201
GDP Consensus Economics t+1	1287	1.8118	1.2470	1.0000	1.6000	2.1000

(*) Size in terms of total assets. (**) ICR is the interest coverage ratio defined as Ebit/Interest expenses.

On average, the aggregate ESG score of MSCI is 6.5 and it is around 75 both for Morningstar (Sustainalytics) and Refinitiv. Regarding the three subcomponents of the MSCI's ESG scores, we observe a similar aggregate value for S and G components (about 5) and a higher value for E component (6.21).

The distribution of the composite ESG score is displayed in Figure 1. We observe some heterogeneity across rating providers: the distribution shows a quite negative skewness in the case of Refinitiv where the mode is about 73, whereas it is very concentrated for Morningstar with a slightly negative skewness and a mode equal to 75. The distribution tends to be somewhat more symmetrical for MSCI, except for a heavy right tail (values between 9 and 10). Concerning the three subcomponents of the MSCI ESG scores, we notice that the S distribution is almost symmetrical, instead the E and G distributions have a slight negative skewness.

Figure 1: ESG Score distribution

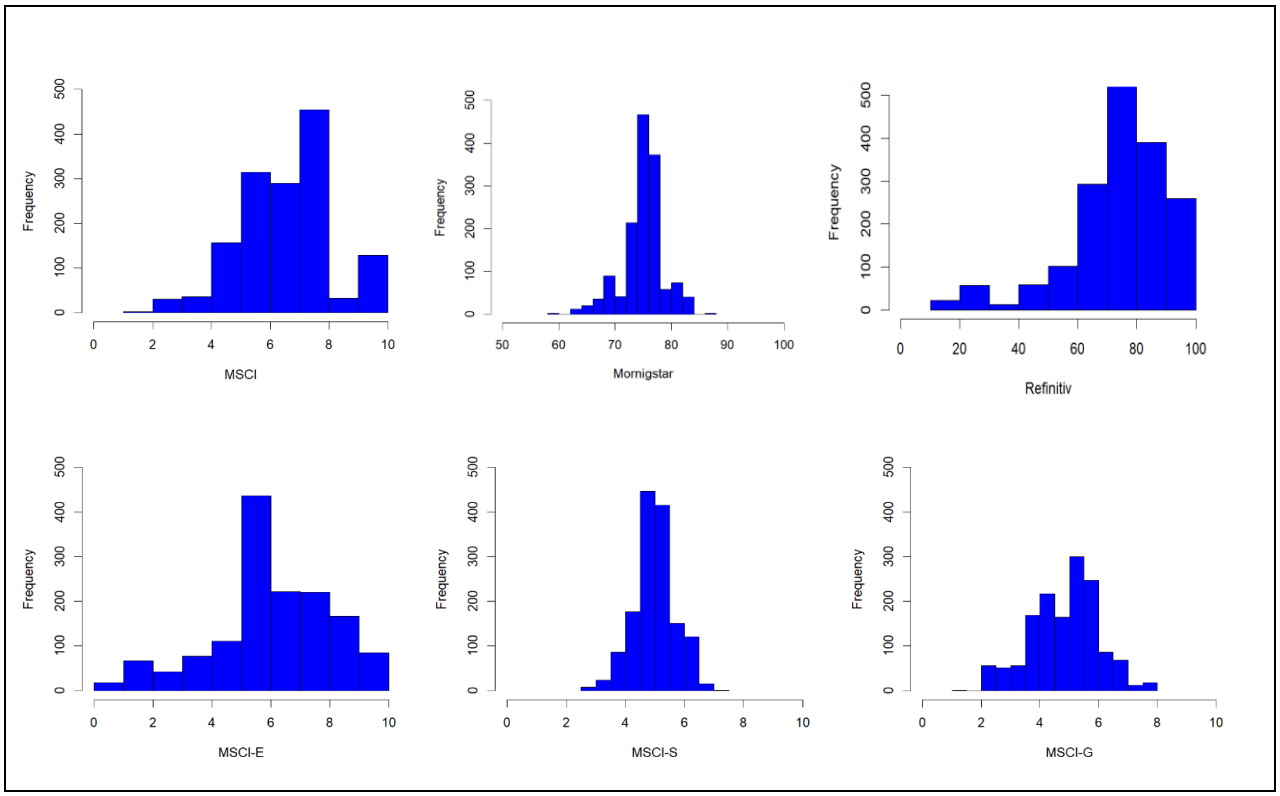
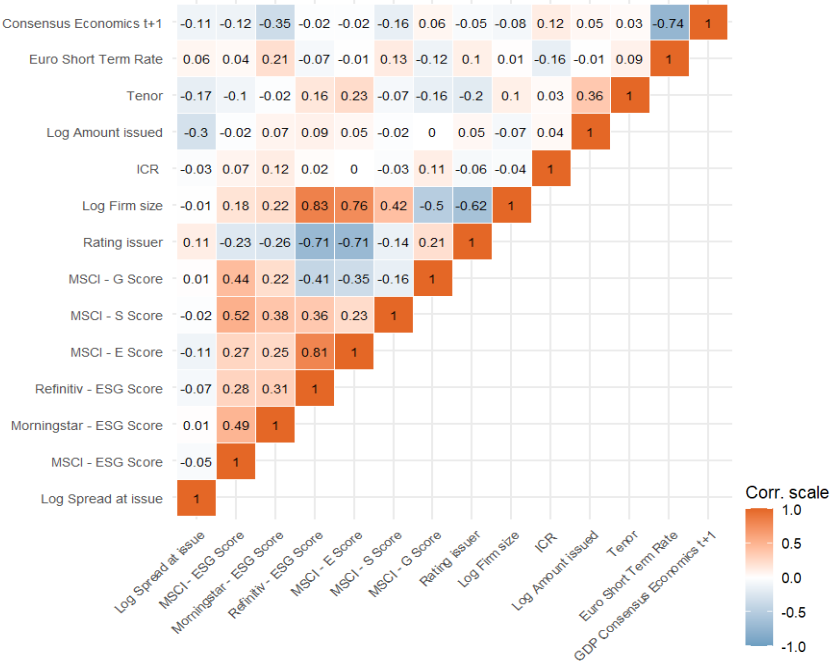


Figure 2 shows the correlation matrix of all the variables used for the econometric model (see the next subsection). As expected, the correlation between the ESG scores of different providers is positive although not extremely high, a fact already underlined in other empirical studies (e.g. Dorfleitner et al., 2015, Berg et al., 2022 and Ferriani, 2022). The subcomponents of the MSCI ESG scores are positive correlated with the composite ESG rating, especially the S- subcomponent (0.52). We notice that, as expected, the correlation between the issuer rating and the ESG scores is negative; in the case of MSCI composite score and MSCI E- subcomponent is quite high (-0.71).[12]

As regards the correlations with the spread at issue, we can notice that, at the univariate level, there is a quite negative relation with the amount issued.

[12] Only the MSCI G- subcomponent is positively correlated with the issuer rating, but the sign changes taking into account the effect of the other control variables of the econometric model (see the next section).

Figure 2: Correlation matrix



2.2 *Results*

To assess the impact of the ESG scores on banks' cost of financing we estimate the following pooled regression model:

$$Log\ Spread\ at\ issue_{j,i,t} = \alpha_i + \gamma_t + \beta_1 ESG\ Score_{i,t-1} + \beta_2 Rating\ issuer_{i,t-1} + \beta_3 Log\ Firm\ size_{i,t-1} + \beta_4 ICR_{i,t-1} + \beta_5 Log\ Amount\ issued_{j,i,t} + \beta_6 Tenor_{j,i,t} + \varepsilon_{j,i,t}$$

where *Log Spread at issue* is the logarithm spread at issue of the bond j issued by bank i on its placement day, where t is the year of placement. The term α_i represents the fixed effect at the level of single bank, invariant over time; the term γ_t represents the time fixed effect, invariant over banks. *ESG score* is the value of ESG rating assigned by one of the three considered data providers (MSCI, Morningstar and Refinitiv). *Rating issuer* is the long-term rating of the issuer, converted in numerical terms such that a higher value indicates a worse credit standing. *Log Bank size* is the logarithm of total asset of the issuer, *ICR* is the interest coverage ratio defined as Ebit/Interest expenses, *Tenor* is the maturity in years, *Log Amount issued* is the log amount of the bond issuance expressed in euro. Regarding bond characteristics, we have also considered three dummies that identify the type of seniority (Non preferred, Preferred, unsecured) and other two dummies that indicate if the security is listed and if it is eligible for ECB refinancing operations. In order to control for changes in the macroeconomic environment year by year, in alternative specifications of the model, we have replaced the time fixed effect with the *GDP Forecast Consensus Economics* variable.[13]

We lag the ESG measures and control variables, which helps mitigate potential endogeneity problems and simultaneity bias that may arise due to possible contemporaneous bidirectional causality between ESG and credit risk. We also cluster standard errors at the bank level to take into account the heteroskedasticity and autocorrelation of the error terms.

[13] For robustness check, we also consider the Euro Short Term Rate variable.

In our initial empirical specification, we limit the set of explanatory variables to the ESG composite rating, along with bank and time fixed effects. We consider three different sample sizes according to the different data coverage of providers. Both the MSCI and Morningstar data exhibit statistically significant and negative relations between ESG scores and the spread based on the yield at issue (see Table 2.1). In this basic exercise, the ESG scores from Refinitiv display the expected sign, although they are not statistically significant.[14]

Table 2.1 – Bond spread at issue and ESG scores: baseline results (variable sample size)

Dep. Variable: ***Log Spread at issue***	(1)	(2)	(3)
MSCI ESG Score	-0.1152 ** (0.0463)		
Morningstar ESG Score		-0.0271 *** (0.0094)	
Refinitiv ESG Score			-0.0020 (0.0047)
Bank fixed effects	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes
Observations	1287	1355	1763
R^2	0.1381	0.1769	0.1377
Robust standard errors in parentheses. * p<0.1 ** p<0.05 *** p<0.01.*			

The same econometric analysis was repeated using the sample of bonds for which ESG ratings from all three providers are simultaneously available (1153 securities). The results of this elaboration confirm the previous ones and in the case of MSCI ESG rating the coefficient shows a higher level of significance (see Table 2.2).

Table 2.2 – Bond spread at issue and ESG scores: baseline results (fixed sample size)

Dep. Variable: ***Log Spread at issue***	(1)	(2)	(3)
MSCI ESG Score	-0.1059 *** (0.0331)		
Morningstar ESG Score		-0.0447 *** (0.0077)	
Refinitiv ESG Score			-0.0038 (0.0049)
Bank fixed effects	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes
Observations	1153	1153	1153
R^2	0.2130	0.2141	0.2086
Robust standard errors in parentheses. * p<0.1 ** p<0.05 *** p<0.01.*			

[14] In all the analyses reported in this paragraph, for Refinitiv we also conducted regressions considering the ESG Combined Score instead of the ESG score. The results are substantially analogous to those reported for the ESG score.

By adding control variables, the significance of MSCI and Morningstar ESG scores are confirmed (Table 3 and Table 2A, 3A and 4A in appendix). Refinitiv ESG rating maintains the expected negative sign, but remains not significant.

As expected, the rating of issuer is strongly significant to determinate bond spread at issue. Regarding bond characteristics, we can notice that the logarithm of amount issued, which could be thought of as a proxy for bond liquidity, is significant and with a negative (expected) sign. However, the tenor is significant but unexpectedly exhibits a negative sign. One possible explanation for this unexpected result is that the signal of this variable may be affected by distortions arising from differences in duration and convexity between the bank and the sovereign bonds. The macroeconomic variable *GDP Forecast Consensus Economics* is significant and with expected sign.

Table 3 – Bond spread at issue and ESG score: augmented specifications

Dep. Variable: ***Log Spread at issue***	(1)	(2)	(3)
MSCI ESG Score	-0.1135 ** (0.0537)		
Morningstar ESG Score		-0.0395 *** (0.0117)	
Refinitiv ESG Score			-0.0032 (0.0051)
Rating issuer	0.1756 *** (0.0661)	0.2151 *** (0.0576)	0.2174 *** (0.0536)
Log Bank size	0.0222 (0.2377)	0.3823 * (0.2285)	0.0346 (0.3019)
ICR	-0.0002 (0.0054)	0.0029 (0.0053)	-0.0032 (0.0045)
Log Amount issued	-0.1972 *** (0.0218)	-0.1770 *** (0.0206)	-0.1915 *** (0.0195)
Tenor	-0.0492 *** (0.0090)	-0.0311 *** (0.0082)	-0.0341 *** (0.0075)
GDP Consensus Economics t+1	-0.0924 *** (0.0185)	-0.0937 *** (0.0191)	-0.0421 *** (0.0160)
Dummies Seniority	Yes	Yes	Yes
Dummy Exchange Listed	Yes	Yes	Yes
Dummy ECB Eligible	Yes	Yes	Yes
Bank fixed effects	Yes	Yes	Yes
Time fixed effects	No	No	No
Observations	1264	1324	1592
R^2	0.2176	0.2261	0.2142

Robust standard errors clustered at bank level in parentheses. * $p<0.1$ ** $p<0.05$ *** $p<0.01$.*

As robustness checks, we use alternative specifications for the dependent variable (e.g., the difference between the yield at issue and the issuer country's government bond yield, see Table 5A in Appendix), and the results are consistent. In this scenario, we observe the same significance of the MSCI ESG score and a higher R-squared. The negative and statistically significant relationship between the MSCI ESG score and the spread at issue is also confirmed when considering geographical fixed effect of the regression (instead of at bank level).

In another empirical exercise we investigate the relation between the log spread at issue and the ESG rating at the subcomponent level, namely the environmental (E), social (S), and governance (G) scores.[15] To this purpose, we re-estimate the models in Tables 2 and 3 but we replace the composite MSCI ESG rating with all the three individual scores (E, S, G). The results are shown in Table 4 and 5.

Table 4 – Bond spread at issue and MSCI ESG subcomponents score: baseline results

Dep. Variable: Log Spread at issue	(1)	(2)	(3)	(4)
MSCI - E Score	-0.0650 *			-0.0231
	(0.0380)			(0.0320)
MSCI - S Score		-0.2200 *		-0.1978
		(0.1241)		(0.1218)
MSCI - G Score			-0.1394 ***	-0.1222 ***
			(0.0466)	(0.0418)
Bank fixed effects	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes
Observations	1287	1287	1287	1287
R^2	0.1348	0.1365	0.1377	0.1400

Robust standard errors clustered at bank level in parentheses. p<0.1 ** p<0.05 *** p<0.01.*

All the subcomponents are significant if considered individually. When they are estimated in the same specification, the subcomponent G is the most significant; the subcomponent S is significant, at a level of 10%, in the specification with control variables. Our results suggest that implementing best practices in corporate governance and controlling litigation risk as well as reducing the financing environmental impact enhance a bank's ability to secure more favorable funding conditions in the market, by demonstrating that the bond market evaluates the sustainability standards of banks.

[15] Based on the MSCI data available to us, the assigned weights for the environmental, social, and governance pillars in the composition of the final score are approximately 15%, 50%, and 35%, respectively.

Table 5 – Bond spread at issue and MSCI ESG subcomponents score: augmented specifications

Dep. Variable: ***Log Spread at issue***	(1)	(2)	(3)	(4)
MSCI - E Score	-0.0763 ** (0.0387)			-0.0437 (0.0379)
MSCI - S Score		-0.2473 * (0.1351)		-0.2077 * (0.1213)
MSCI - G Score			-0.1339 *** (0.0496)	-0.1094 ** (0.0457)
Rating issuer	0.1603 *** (0.0614)	0.1639 *** (0.0609)	0.1520 ** (0.0621)	0.1513 ** (0.0614)
Log Bank size	0.1018 (0.3436)	0.4223 (0.4099)	0.0534 (0.3580)	
ICR	-0.0046 (0.0052)	-0.0016 (0.0055)	-0.0030 (0.0054)	-0.0022 (0.0054)
Log Amount issued	-0.2000 *** (0.0224)	-0.2007 *** (0.0223)	-0.1966 *** (0.0223)	-0.1982 *** (0.0224)
Tenor	-0.0462 *** (0.0088)	-0.0475 *** (0.0089)	-0.0465 *** (0.0088)	-0.0467 *** (0.0089)
Dummies Seniority	Yes	Yes	Yes	Yes
Dummy Exchange Listed	Yes	Yes	Yes	Yes
Dummy ECB Eligible	Yes	Yes	Yes	Yes
Bank fixed effects	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes
Observations	1264	1264	1264	1264
R^2	0.2189	0.2210	0.2208	0.2235

Robust standard errors clustered at bank level in parentheses. p<0.1 ** p<0.05 *** p<0.01.*

Finally, we consider the specifications seen in Table 3 and Table 5 in a subsample consisting of bond issues in the pre-Covid period (2015-2019). We obtain similar results, although the significance of the MSCI ESG rating is slightly weaker, and only the G-component (governance) has a significant relationship with the log spread at issue in the specification with the subcomponents (see Table 6A and 7A in the appendix). The slightly weaker significance observed in the pre-Covid period can be attributed to the fact that the pandemic marked a fundamental shift in the relative importance of the ESG framework. Following a phase of intense turbulence between February and March 2020, during which financial markets were primarily focused on corporate liquidity concerns, sustainability emerged as a critical element in enhancing business resilience and promoting growth in the aftermath of the pandemic shock, the so-called "green wake-up call" (see Albuquerque et al., 2020; Ferriani and Natoli, 2021; Mohommad and Pugacheva, 2022; Ferriani and Pericoli, 2024).

3. Panel event study model

In this paragraph, to investigate deeper whether spreads do respond to ESG rating changes, we turn to a panel event study design, examining the impact of ESG rating changes on banks' bond yields to maturity.

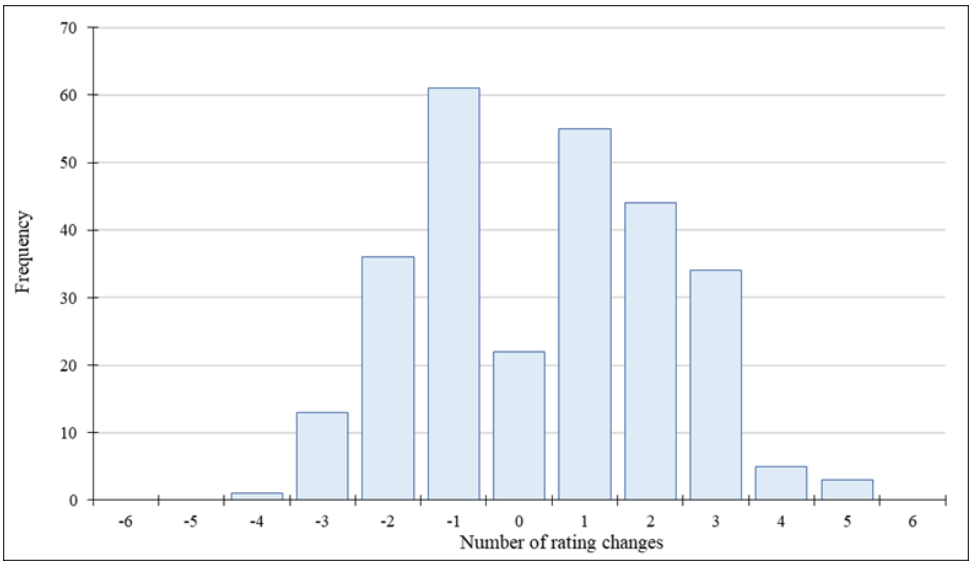
3.1 Data

We consider euro-denominated fixed rate plain vanilla bonds issued between 2015 and 2022 by euro area banks, as we did in the previous analysis. In this case, our dependent variable is the spread to maturity. We first compute the yield to maturity as its daily average by month and then the spread to maturity as the daily average by month of the difference between the yield to maturity and the corresponding yield of the German government bond.[16] We add data on issuances, bank characteristics and credit ratings on issuers, as previously described.[17] Finally, we consider the annual *GDP Forecast Consensus Economics* as macroeconomic control variables.

This analysis is conducted using exclusively the ESG score from MSCI, which represents one of the most influential provider for this data. Concerning the US market, Berg et al. (2023) find that the aggregate holdings of ESG funds react consistently to MSCI ESG rating. This alleviates the concern that disagreement in the measurement of ESG performance may weaken the effect preferences for ESG performance have on bond markets.

In the sample, we observe 456 changes in a bond's EGS rating that occurred between January 2015 and December 2022.[18] Figure 3 displays the number of changes in MSCI ESG score per bond: 141 bonds experience at least one upgrade, 111 bonds at least one downgrade, and 22 bonds show no change in their ESG rating.

Figure 3: MSCI ESG Score changes



[16] As we did in the previous analysis, we use the yield curve of German fixed-rate government bonds as reference rate for the euro area; these yields are obtained from Bloomberg: for each bond in the sample, we interpolate (through cubic interpolation) on the government bond yield curve the residual maturity of the bond. We can then subtract these yields from the ones of the corresponding corporate bonds to calculate the spread to maturity.
[17] Data on banks are as of the end of the previous year, while credit ratings are as of the end of the previous month.
[18] In particular, we detect 280 upgrades and 176 downgrades.

3.2 Methodology and Results

We analyze the effect of ESG rating changes on bond spread to maturity using a panel event study model (Schmidheiny and Siegloch, 2019; Clarke and Tapia-Schythe, 2021; Freyaldenhoven et al., 2021). A panel event study, as a generalized extension of "difference-in-differences" models, allows the estimation of dynamic treatment effects, while also controlling for fixed factors.

By considering the variation in outcomes around the changes of the "event variable" compared with a baseline reference period, both event lags and leads are estimated. This allows us a clear visual representation of the event's causal impact. Lags and leads capture the difference between treated and control observations, compared to the prevailing difference in the omitted base period. These models are widely used in empirical analyses in a range of fields including social sciences, medicine and public health, and additional reviews of their frequency of use in a number of economic journals are provided in Abraham and Sun (2021). Regarding our context, Berg et al. (2023) use these models to examine the impact of ESG ratings on fund holdings, stock returns, and firms' behavior.

There are a number of ways to specify a panel event study model; we adapt a version defined by Freyaldenhoven et al. (2021), estimating the following regression model:

$$
\begin{aligned}
&Log\ Spread\ to\ maturity_{j,i,t} = \\
&\alpha_j + \gamma_t + \sum_{k=-G-L_G}^{M+L_M-1} \delta_k \Delta ESG\ Score_{i,t-k} + \delta_{M+L_M} ESG\ Score_{i,t-M-L_M} + \delta_{-G-L_G-1}(10 - ESG\ Score_{i,t+G+L_G}) \\
&\qquad + \beta_1 Rating\ issuer_{i,t-1} + \beta_2\ Log\ Firm\ size_{i,t-1} + \beta_3 ICR_{i,t-1} + \beta_4 Tenor_{j,i,t} + \beta_5 GDP\ Forecast_t \\
&\qquad + \varepsilon_{j,i,t}
\end{aligned}
$$

where *Log Spread to maturity* is the log spread to maturity of the bond *j* issued by bank *i*, calculated as average of the daily data on month *t*. The term α_j denotes the unit (bond) fixed effect, while γ_t is the time (month) fixed effect. $\Delta ESG\ Score_{i,t-k}$ is the variation in MSCI ESG score for the bank *i* happened *k* months before (or after) month *t*; the terms $ESG\ Score_{i,t-M-L_M}$ and $(10 - ESG\ Score_{i,t+G+L_G})$ are considered "endpoint variables" and they are representatives of changes happened at least $M + L_M$ months before month *t* and more than $G + L_G$ months after month *t*, respectively. Notice that the parameters δ_k can be interpreted as cumulative event effects at different horizons. To investigate the effect of ESG rating changes on spread to maturity we consider a treatment window ranging from $M + L_M - 1 = 4$ months prior to a rating change to $G + L_G = 4$ months after a rating change; setting the post-event treatment window to 4 months allows us to capture at least medium-term effects of ESG rating changes while keeping a large number of observations to our sampling period.[19]

We add to the model some control variables: *Rating issuer*, that is the long-term rating of the issuer in numerical terms such that a higher value indicates a worse credit standing; *Log Bank size* is the total asset of the issuer in log terms, *ICR* is the interest coverage ratio defined as Ebit/Interest

[19] Technically, we first choice $M = 4$ and $G = 0$ (meaning the future values of the ESG score cannot affect the current value of the outcome variable, as the leading cases), and then we set $L_M = 1$, $L_G = M + G$ as suggested by Freyaldenhoven et al. (2021). Setting $L_M = 1$ guarantees that it is possible to test the hypothesis that changes in the ESG rating more than *M* periods in the past do not change the current spread to maturity. Setting $L_G = M + G$ makes the window "symmetric" in the sense that it permits testing for pre-trends over as long of a horizon as the ESG score is thought to affect the current value of the outcome variable.

expenses,[20] *Tenor* is the bond residual maturity in years and *GDP Forecast* is the GDP Forecast Consensus Economics for the year that includes month *t*.

Table 6 shows the results of our panel event study model specifications. Following the standard approach, we omit $\Delta ESG\ Score_{i,t-1}$ (i.e. lead 1) from the regression, which normalizes the remaining lead and lag coefficients to the level of our dependent variable one time period before the event. We can see that ESG rating changes have a significant medium-term effect on spread to maturity, i.e. spread to maturity tends to increase after ESG rating downgrades and tends to decrease after ESG rating upgrades. The significance level keeps at 1% even when we introduce the control variables, while there are no persistently significant effects in the periods preceding the score changes.

Table 6 – Bond spread to maturity and MSCI ESG score

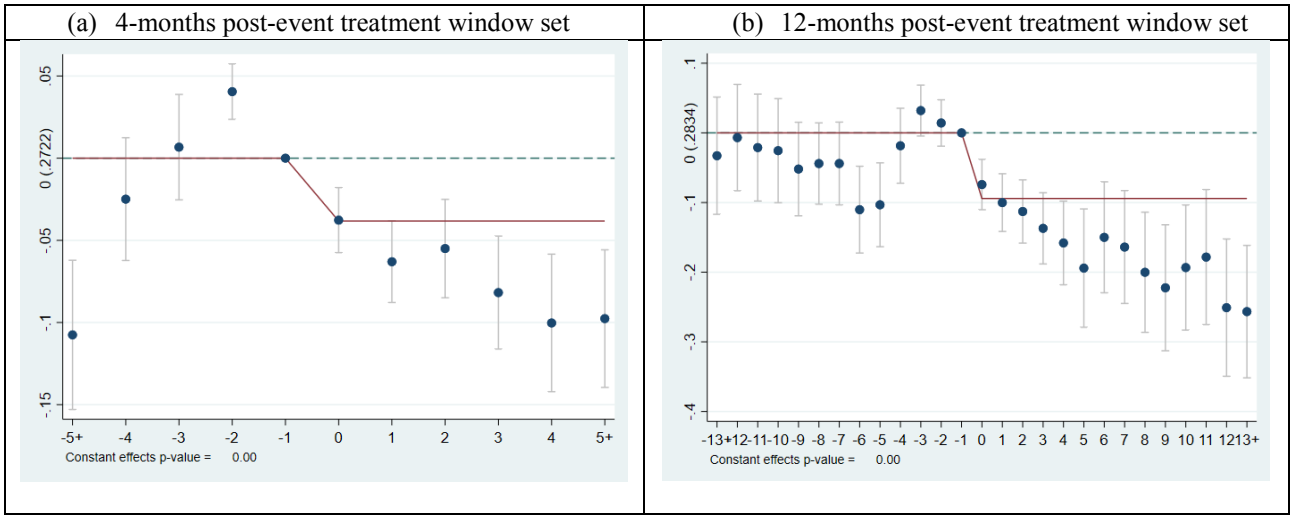
Dep. Variable: ***Log Spread to maturity***	(1)	(2)	(3)
ΔESG Score (lead 4)	-0.0064	-0.0426*	-0.0249
	(0.0207)	(0.0238)	(0.0226)
ΔESG Score (lead 3)	0.0093	-0.0136	0.0067
	(0.0192)	(0.0206)	(0.0194)
ΔESG Score (lead 2)	0.0395***	0.0395***	0.0405***
	(0.0105)	(0.0106)	(0.0102)
ΔESG Score	-0.0522***	-0.0539***	-0.0377***
	(0.0092)	(0.0103)	(0.0120)
ΔESG Score (lag 1)	-0.0711***	-0.0757***	-0.0630***
	(0.0143)	(0.0144)	(0.0150)
ΔESG Score (lag 2)	-0.0594***	-0.0660***	-0.0550***
	(0.0173)	(0.0178)	(0.0181)
ΔESG Score (lag 3)	-0.0867***	-0.0944***	-0.0818***
	(0.0210)	(0.0215)	(0.0208)
ΔESG Score (lag 4)	-0.1085***	-0.1137***	-0.1003***
	(0.0253)	(0.0261)	(0.0253)
Tenor		-0.4305***	-0.3044***
		(0.0598)	(0.0573)
Rating issuer		0.0915*	0.1051**
		(0.0509)	(0.0529)
Log Bank size		-0.7123***	-0.2802*
		(0.1449)	(0.1614)
ICR		0.0209**	0.0025
		(0.0102)	(0.0092)
GDP Consensus Economics			-0.0783***
			(0.0080)
Bond fixed effects	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes
Observations	3540	3054	3054
R^2	0.7850	0.7986	0.8126

*Monthly leads and lags. Robust standard errors clustered at bond level in parentheses. * p<0.1 ** p<0.05 *** p<0.01.*

[20] Bank size and ICR are referring to the previous fiscal year before the month *t*.

Figure 4 (a) depicts the estimated $\hat{\delta}_k$ coefficients together with the 90% confidence intervals, an easy way to see the path of cumulative event effects at different horizons. In panel (b) we represent a model specification as the previous one but with a time window of ±12 months with respect to ESG score changes; we can see that ESG rating changes effects continue beyond the 5-month lag but in a weaker way and with less regularity; on the other side, there are no significant effects even in previous periods respect the 5-month lead.

Figure 4: The reaction of bond spread to maturity to ESG rating changes



The plots depict, on the y-axis, the elements of the estimated event-time path (i.e. coefficients $\hat{\delta}_k$) against event time, k, on the x-axis; the value of $\hat{\delta}_{-1}$ has been normalized to 0. The parenthetical label is the sample mean of log bond spread to maturity one period before ESG score changes. The bars are pointwise 90% confidence intervals for the corresponding coefficients. We overlay estimates from a model that imposes static treatment effects (red line); "constant effects p-value" refers to the Wald test assessing this constraint on the model coefficients.

One way to obtain a graphical summary of the magnitude of the ESG rating changes' effect on bond spread to maturity is by estimating a static version of the model, which includes only the contemporaneous value of the ESG score (i.e., restricting $M = G = 0$). In Figure 4 the red line represents the fit of the static model, and we can observe how the choice of a dynamic model seems more appropriate than the alternative static model. This is further confirmed by the *p-value* from the Wald test, indicating that we can reject the hypothesis that the treatment effect is static. In other words, the current ESG rating changes does not solely affect the current value of the log spread to maturity.

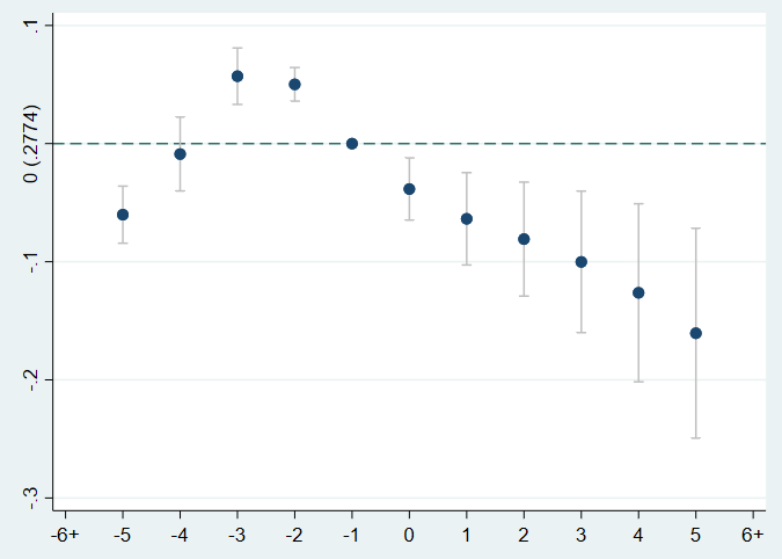
As robustness check of our results, we consider a more complicated model, which adds an unobserved confound that may be correlated with the treatment (i.e., ESG score change). The general formula suggested by Freyaldenhoven et al. (2021) decomposes the confound, $C_{j,t}$, into two components such that

$$C_{j,t} = \lambda'_j F_t + \xi \eta_{j,t}$$

where F_t is a vector of unobserved factors with unknown bond-specific loadings λ_j and $\eta_{j,t}$ is an unobserved scalar with unknown coefficient ξ. We consider the special case where $F_t = 0$ for any month t; we also suppose that $\eta_{j,t}$ is explained by a linear combination of ESG score and by the control variables inserted into the basic model (*Rating issuer*, *Log Bank size, ICR, Tenor, GDP Forecast*). Under these assumptions, it is possible to control for the effect of the latent confound by extrapolation.

As the treatment variable has no causal effect on the log spread to maturity before the treatment (ESG score change), the pre-event trend in the log spread to maturity can be utilized to determine the slope of the trend in $\xi\eta_{j,t}$. Extrapolating this slope into the post-event periods then permits accounting for the latent confound. In Figure 5, the estimated event-time path of the outcome is adjusted for the estimated path of the confound, thus (under the maintained assumptions) revealing the net effect of ESG rating changes on bond spread to maturity. The results confirm and strengthen those illustrated in Figure 4 (b), showing a more persistent estimated medium-term effect of ESG score changes on bond spread to maturity.

Figure 5: The reaction of bond spread to maturity to ESG rating changes, extrapolating confound from pre-event periods



The plot depicts, on the y-axis, the elements of the estimated adjusted event-time path against event time on the x-axis; the estimated adjusted event-time path is the difference between the event-time coefficients of the basic model and ones of the extrapolated linear trend. The parenthetical label is the sample mean of log bond spread to maturity one period before ESG score changes. The bars are pointwise 90% confidence intervals for the corresponding coefficients.

The analysis conducted shows that ESG rating changes have a medium-term impact on bond spread to maturity, but it is also interesting to evaluate whether this impact is due more to upgrades or to downgrades. In Table 7 we report, as alternative event variables, dummy variables signaling the occurrence of ESG rating upgrades (a.1) and downgrades (a.2) for a specific bank on a specific month, and other two variables indicating the intensity of upgrades (b.1) and downgrades (b.2). By these alternative model specifications, we observe that, in the (four) months after an ESG rating change, upgrades are more significant than downgrades to influence the bond spread to maturity; ESG rating downgrades appear to be more important than upgrades only if we consider the same month in which the ESG score change occurs. Therefore, ESG score upgrades have a more significant medium-term effect on bond spread to maturity, i.e. banks' cost of debt is more persistently sensitive to increases in ESG score than to decreases.[21]

[21] As a robustness check, tests on the significance of the differences between the coefficients referring to downgrades and those referring to upgrades confirm that the effects of downgrades and upgrades are not symmetrical.

As robustness check, we also consider a model with bank fixed effects instead of bond fixed effects; in this case we remove the variables concerning bank characteristics and we add the (log) amount of the bond issuance as a size control variable. The results confirm previous evidences (shown in Table 6) but with a lower R-squared (see Table 8A in Appendix). Notice that, in this case, the sign of the bond residual maturity coefficient (*Tenor*) is positive, as expected. Similar results can be obtained by considering issuer country fixed effects instead of bank fixed effects.

Table 7– Bond spread to maturity and MSCI ESG score – other event variable specifications

Dep. Variable: ***Log Spread to maturity***	(a.1) Dummy ESG score upgrade	(a.2) Dummy ESG score downgrade	(b.1) Δ ESG score upgrade	(b.2) |Δ| ESG score downgrade
Lead 4	0.0345	0.0395	-0.0197	0.0584*
	(0.0303)	(0.0340)	(0.0320)	(0.0297)
Lead 3	0.0684***	0.0047	0.0122	0.0118
	(0.0249)	(0.0211)	(0.0272)	(0.0197)
Lead 2	0.0676***	-0.0564***	0.0505***	-0.0357**
	(0.0129)	(0.0141)	(0.0118)	(0.0143)
Lag 0	-0.0179	0.0883***	-0.0298*	0.0530**
	(0.0142)	(0.0305)	(0.0153)	(0.0256)
Lag 1	-0.0784***	0.0565	-0.0853***	0.0247
	(0.0213)	(0.0374)	(0.0210)	(0.0279)
Lag 2	-0.0641**	0.0564	-0.0901***	0.0067
	(0.0252)	(0.0426)	(0.0253)	(0.0308)
Lag 3	-0.0809***	0.0879**	-0.0983***	0.0769**
	(0.0282)	(0.0386)	(0.0308)	(0.0332)
Lag 4	-0.0842**	0.1358***	-0.1001***	0.1269***
	(0.0376)	(0.0419)	(0.0374)	(0.0390)
Tenor	-0.2670***	-0.2456***	-0.2837***	-0.2901***
	(0.0543)	(0.0589)	(0.0579)	(0.0525)
Rating issuer	0.0944*	0.0986*	0.0952*	0.1243**
	(0.0528)	(0.0519)	(0.0537)	(0.0527)
Log Bank size	-0.3462**	-0.4256***	-0.3034*	-0.3795**
	(0.1546)	(0.1577)	(0.1565)	(0.1544)
ICR	-0.0021	0.0091	0.0007	0.0062
	(0.0092)	(0.0099)	(0.0093)	(0.0096)
GDP Consensus Economics	-0.0846***	-0.0810***	-0.0825***	-0.0832***
	(0.0080)	(0.0083)	(0.0083)	(0.0079)
Bond fixed effects	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes
Observations	3054	3054	3054	3054
R^2	0.8080	0.8087	0.8084	0.8096

*Monthly leads and lags. Robust standard errors clustered at bond level in parentheses. * p<0.1 ** p<0.05 *** p<0.01. Δ denotes the first difference operator, | | means absolute value.*

4. Conclusions

This paper examines the link between banks' environmental, social, and governance (ESG) scores and their funding costs in the euro area context, analyzing data across 13 countries from 2015 to 2022. It also provides empirical insights into the question of whether investors take changes in ESG factors into account when making investment decisions.

Our findings show that banks with better ESG ratings have a positive impact on their cost of funding, providing further empirical evidence in favor of stakeholder theory. Decomposing the impact along individual ESG factors (E, S, G), we find that corporate governance contributes the most to cost reduction for bond issuances, with a minor contribution also coming from social performance.

Based on a panel event study model, we also show that bond market investors' reaction to changes in the ESG rating is strong. The impact on banks' yield to maturity is significant over the months following ESG rating changes; spread to maturity tends to increase after ESG rating downgrades and tends to decrease after ESG rating upgrades.

Additionally, our results show that the effects of downgrades and upgrades are not symmetrical. In particular, ESG score upgrades have a more significant medium-term effect on bond spread to maturity; banks' market cost of debt is more persistently sensitive to increases in ESG scores than to decreases. A part of the bond market expresses ESG preferences and consequently adjusts banks' bond exposures to changes in ESG ratings, as reflected by the variations of spreads to maturity.

The findings of this study indicate that bank managers should be aware of the effects that their ESG risks have on the cost of financing. Proper integration of ESG factors into the business model of banks is crucial for sustainable economic growth in the face of existing environmental challenges and can help draw cheaper funds from the fixed income markets. Future extensions of this work should consider banks' emission reduction targets through decarbonization policies in their credit and/or trading portfolios. It would be interesting understand whether the negative correlation observed between the cost of funding and the ESG rating varies between banks that are more committed to the transition and those that are less committed.

At the European level, the disclosure requirements are mostly finalized and involve both financial and non-financial activities (Pillar 3 and non-financial disclosure under the Corporate Sustainability Reporting Directive). ESG data are not only essential for disclosure but are also crucial for effectively managing new risks arising from climate change and financing the transition to a sustainable economy. In the coming years, it will be crucial for banks to proactively implement the new ESG disclosure and enhance ESG-related risk management processes. As it turned out from our analysis, this could also result in benefits for banks in terms of their cost of market financing.

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APPENDIX

Table 1A – Sample composition

	N° SI banks	N° LSI banks
Austria	2	7
Belgium	3	3
Finland	1	5
France	7	24
Germany	10	7
Greece	2	0
Ireland	3	2
Italy	8	15
Luxembourg	3	10
Netherlands	4	6
Portugal	1	2
Slovakia	0	2
Spain	6	1
	50	84

Table 2A – Bond spread at issue and MSCI ESG score: augmented specifications

Dep. Variable: ***Log Spread at issue***	(1)	(2)	(3)	(4)
MSCI ESG Score	-0.1258 ** (0.0488)	-0.1467 *** (0.0481)	-0.1006 * (0.0536)	-0.1135 ** (0.0537)
Rating issuer	0.1581 ** (0.0649)	0.1445 ** (0.0640)	0.1649 ** (0.0667)	0.1756 *** (0.0661)
Log Bank size	-0.2154 (0.3289)	-0.2222 (0.3179)	0.0204 (0.2320)	0.0222 (0.2377)
ICR	-0.0001 (0.0039)	-0.0033 (0.0053)	-0.0013 (0.0058)	-0.0002 (0.0054)
Log Amount issued	-0.1546 *** (0.0192)	-0.1990 *** (0.0222)	-0.1987 *** (0.0221)	-0.1972 *** (0.0218)
Tenor	-0.0308 *** (0.0081)	-0.0467 *** (0.0089)	-0.0499 *** (0.0090)	-0.0492 *** (0.0090)
Euro Short Term Rate			0.3225 (0.2038)	
GDP Consensus Economics t+1				-0.0924 *** (0.0185)
Dummies Seniority	No	Yes	Yes	Yes
Dummy Exchange Listed	No	Yes	Yes	Yes
Dummy ECB Eligible	No	Yes	Yes	Yes
Bank fixed effects	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	No	No
Observations	1264	1264	1264	1264
R^2	0.1931	0.2233	0.2125	0.2176

Robust standard errors clustered at bank level in parentheses. * p<0.1 ** p<0.05 *** p<0.01.*

Table 3A – Bond spread at issue and Morningstar ESG score: augmented specifications

Dep. Variable: ***Log Spread at issue***	(1)	(2)	(3)	(4)
Morningstar ESG Score	-0.0412 *** (0.0124)	-0.0351 *** (0.0126)	-0.0307 ** (0.0123)	-0.0395 *** (0.0117)
Rating issuer	0.0381 (0.0636)	0.0408 (0.0630)	0.1997 *** (0.0594)	0.2151 *** (0.0576)
Log Bank size	1.3151 *** (0.4256)	1.3640 *** (0.4133)	0.3033 (0.2275)	0.3823 * (0.2285)
ICR	0.0075 (0.0047)	0.0041 (0.0061)	0.0023 (0.0057)	0.0029 (0.0053)
Log Amount issued	-0.1475 *** (0.0182)	-0.1829 *** (0.0206)	-0.1745 *** (0.0206)	-0.1770 *** (0.0206)
Tenor	-0.0264 *** (0.0082)	-0.0383 *** (0.0087)	-0.0319 *** (0.0082)	-0.0311 *** (0.0082)
Euro Short Term Rate			0.5480 *** (0.1949)	
GDP Consensus Economics t+1				-0.0937 *** (0.0191)
Dummies Seniority	No	Yes	Yes	Yes
Dummy Exchange Listed	No	Yes	Yes	Yes
Dummy ECB Eligible	No	Yes	Yes	Yes
Bank fixed effects	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	No	No
Observations	1324	1324	1324	1324
R^2	0.2293	0.2519	0.2227	0.2261

Robust standard errors clustered at bank level in parentheses. * p<0.1 ** p<0.05 *** p<0.01.*

Table 4A – Bond spread at issue and Refinitiv ESG score: augmented specifications

Dep. Variable: ***Log Spread at issue***	(1)	(2)	(3)	(4)
Refinitiv ESG Score	0.0028 (0.0059)	0.0032 (0.0060)	-0.0037 (0.0051)	-0.0032 (0.0051)
Rating issuer	0.1537 ** (0.0629)	0.1467 ** (0.0617)	0.2089 *** (0.0535)	0.2174 *** (0.0536)
Log Bank size	0.4901 (0.3556)	0.5561 (0.3471)	0.0592 (0.3015)	0.0346 (0.3019)
ICR	-0.0000 (0.0036)	-0.0041 (0.0046)	-0.0046 (0.0046)	-0.0032 (0.0045)
Log Amount issued	-0.1594 *** (0.0173)	-0.1971 *** (0.0198)	-0.1920 *** (0.0195)	-0.1915 *** (0.0195)
Tenor	-0.0204 *** (0.0072)	-0.0338 *** (0.0075)	-0.0348 *** (0.0076)	-0.0341 *** (0.0075)
Euro Short Term Rate			0.0508 (0.1700)	
GDP Consensus Economics t+1				-0.0421 *** (0.0160)
Dummies Seniority	No	Yes	Yes	Yes
Dummy Exchange Listed	No	Yes	Yes	Yes
Dummy ECB Eligible	No	Yes	Yes	Yes
Bank fixed effects	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	No	No
Observations	1592	1592	1592	1592
R^2	0.2004	0.2252	0.2124	0.2142

Robust standard errors clustered at bank level in parentheses. * p<0.1 ** p<0.05 *** p<0.01.*

Table 5A – Bond spread at issue (difference between the bond yield at issue and the issuer country government bond yield) and ESG score: augmented specifications

Dep. Variable: ***Log Spread at issue***	(1)	(2)	(3)
MSCI ESG Score	-0.1238 ** (0.0564)		
Morningstar ESG Score		-0.0763 *** (0.0150)	
Refinitiv ESG Score			-0.0036 (0.0059)
Rating issuer	0.2437 *** (0.0725)	0.2640 *** (0.0635)	0.2774 *** (0.0625)
Log Bank size	0.2285 (0.2861)	0.6501 ** (0.2791)	0.1729 (0.3371)
ICR	-0.0001 (0.0062)	0.0066 (0.0061)	-0.0034 (0.0052)
Log Amount issued	-0.2057 *** (0.0238)	-0.1864 *** (0.0225)	-0.1997 *** (0.0214)
Tenor	-0.0774 *** (0.0104)	-0.0602 *** (0.0094)	-0.0598 *** (0.0086)
GDP Consensus Economics t+1	-0.0885 *** (0.0222)	-0.1081 *** (0.0240)	-0.0308 (0.0193)
Dummies Seniority	Yes	Yes	Yes
Dummy Exchange Listed	Yes	Yes	Yes
Dummy ECB Eligible	Yes	Yes	Yes
Bank fixed effects	Yes	Yes	Yes
Time fixed effects	No	No	No
Observations	1264	1324	1592
R^2	0.3086	0.3353	0.3202

Robust standard errors clustered at bank level in parentheses. p<0.1 ** p<0.05 *** p<0.01.*

Table 6A – Bond spread at issue and ESG score: augmented specifications (2015-2019)

Dep. Variable: ***Log Spread at issue***	(1)	(2)	(3)
MSCI ESG Score	-0.1702 * (0.0880)		
Morningstar ESG Score		-0.2593 *** (0.0508)	
Refinitiv ESG Score			-0.0066 (0.0083)
Rating issuer	0.1681 * (0.0902)	0.2666 *** (0.0768)	0.2409 *** (0.0784)
Log Bank size	0.2505 (0.5586)	2.9409 *** (0.7335)	1.0415 (0.6402)
ICR	0.0419 *** (0.0161)	0.0729 *** (0.0159)	0.0393 *** (0.0146)
Log Amount issued	-0.2405 *** (0.0280)	-0.2174 *** (0.0267)	-0.2200 *** (0.0263)
Tenor	-0.0714 *** (0.0120)	-0.0530 *** (0.0113)	-0.0526 *** (0.0102)
GDP Consensus Economics t+1	-0.2308 * (0.1303)	-0.2390 * (0.1322)	-0.1083 (0.1300)
Dummies Seniority	Yes	Yes	Yes
Dummy Exchange Listed	Yes	Yes	Yes
Dummy ECB Eligible	Yes	Yes	Yes
Bank fixed effects	Yes	Yes	Yes
Time fixed effects	No	No	No
Observations	930	951	1079
R^2	0.2242	0.2505	0.2213

Robust standard errors clustered at bank level in parentheses. * p<0.1 ** p<0.05 *** p<0.01.*

Table 7A – Bond spread at issue and MSCI ESG subcomponents score: augmented specifications (2015-2019)

Dep. Variable: ***Log Spread at issue***	(1)	(2)	(3)	(4)
MSCI - E Score	-0.0633 (0.0765)			-0.0759 (0.0809)
MSCI - S Score		-0.1764 (0.1841)		-0.1616 (0.1838)
MSCI - G Score			-0.1841 ** (0.0761)	-0.1840 ** (0.0751)
Rating issuer	0.1333 (0.0826)	0.1310 (0.0838)	0.1279 (0.0851)	0.1350 * (0.0811)
Log Bank size	0.5167 (0.6526)	0.5028 (0.6462)	0.4183 (0.6825)	
ICR	0.0066 (0.0232)	0.0082 (0.0240)	0.0108 (0.0238)	0.0107 (0.0235)
Log Amount issued	-0.2416 *** (0.0285)	-0.2415 *** (0.0284)	-0.2408 *** (0.0281)	-0.2419 *** (0.0286)
Tenor	-0.0667 *** (0.0120)	-0.0687 *** (0.0122)	-0.0678 *** (0.0120)	-0.0690 *** (0.0122)
Dummies Seniority	Yes	Yes	Yes	Yes
Dummy Exchange Listed	Yes	Yes	Yes	Yes
Dummy ECB Eligible	Yes	Yes	Yes	Yes
Bank fixed effects	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes
Observations	930	930	930	930
R^2	0.2205	0.2214	0.2231	0.2243

Robust standard errors clustered at bank level in parentheses. * p<0.1 ** p<0.05 *** p<0.01.*

Table 8A – Bond spread to maturity and MSCI ESG score (bank effects)

Dep. Variable: ***Log Spread to maturity***	(1)	(2)	(3)
ΔESG Score (lead 4)	0.0013	-0.0171	-0.0068
	(0.0224)	(0.0245)	(0.0228)
ΔESG Score (lead 3)	0.0179	-0.0027	0.0222
	(0.0215)	(0.0223)	(0.0207)
ΔESG Score (lead 2)	0.0391***	0.0437***	0.0411***
	(0.0112)	(0.0117)	(0.0111)
ΔESG Score	-0.0614***	-0.0602***	-0.0326**
	(0.0113)	(0.0126)	(0.0143)
ΔESG Score (lag 1)	-0.0871***	-0.0815***	-0.0607***
	(0.0152)	(0.0176)	(0.0176)
ΔESG Score (lag 2)	-0.0673***	-0.0760***	-0.0523***
	(0.0174)	(0.0203)	(0.0199)
ΔESG Score (lag 3)	-0.0848***	-0.1062***	-0.0802***
	(0.0195)	(0.0225)	(0.0210)
ΔESG Score (lag 4)	-0.0949***	-0.1244***	-0.0958***
	(0.0249)	(0.0268)	(0.0251)
Log Amount issued		-0.4305***	-0.3044***
		(0.0598)	(0.0573)
Tenor		0.0915*	0.1051**
		(0.0509)	(0.0529)
Rating issuer		0.0209**	0.0025
		(0.0102)	(0.0092)
GDP Consensus Economics			-0.0783***
			(0.0080)
Bond fixed effects	No	No	No
Bank fixed effects	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes
Observations	3538	3130	3130
R^2	0.4109	0.5792	0.6219

*Monthly leads and lags. Robust standard errors clustered at bank level in parentheses. * p<0.1 ** p<0.05 *** p<0.01.*

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