

Does ESG Scoring Predict Lower Default Risks for Corporate Bonds in Developed Economies?

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Abstract:

The dissertation is an investigation on whether or not increased ESG (Environmental, Social and Governance) scores will be correlated with reduced default risk of corporate bonds in developed economies. As the market of sustainable finance grows fast, and regulatory attention to ESG disclosure rises sharply, the correlation between ESG performance and credit risk is one of the most important issues to investors and policymakers. The study is on the case of corporate bonds in the United States, the United Kingdom, the Eurozone and Japan between 2018 and 2025. The quantitative methodology was chosen in terms of primary data analysis. MSCI and Bloomberg provided ESG ratings on a sample of 1,250 investment grade and high-yield corporate bonds. Credit spreads and credit probability of default (PD) were used to measure default risk. The data sets were analysed with Pearson correlation, Ordinary Least Squares (OLS) regression and logistic regression to determine the predictive ability of the overall ESG scores and individual E, S and G pillars.

The findings indicate that there is a statistically significant negative correlation between the ESG scores and the default risk. There were reduced credit spreads and reduced risk of default in higher ESG-rated bonds and the ESG scores accounted about 14.2% of credit risk variation (pooled $R^2 = 0.142$). The environmental pillar presented the greatest predictive influence especially in Eurozone and Japan. This paper concludes that ESG scoring possesses moderate and significant predictive quality of lower default risk in developed markets of corporate bonds. Such results suggest the inclusion of ESG factors in the credit risk assessment and is applicable in practice to sustainable sustainable fixed-income portfolio construction and regulation.

Keywords: ESG Rating, Corporate Bonds, Default Risk, Credit Spreads, Sustainable Finance, Developed Economies, Regression Analysis.

Introduction

1.1 Background to ESG and corporate bond markets

The importance of Environmental, Social and Governance (ESG) has been put in the spotlight of investment decision making especially in the fixed-income markets. Corporate bonds are one of the most notable asset classes in the whole world, and the amount of bonds that are currently outstanding in developed economies totals more than 13 trillion (Fiorillo, 2025). The risk of poor ESG practices is increasing to be perceived by the investors as high operational, reputational and regulatory risks which prompts them to ask issuers to show good performance in terms of ESG. The latest data indicate that an increase in ESG rating has a positive correlation with tighter credit spreads, lower cost of obtaining loans in primary bond markets because lenders interpret a low likelihood of default (Fiorillo, 2025). This change is fuelled by regulation, including the EU Sustainable Finance Disclosure Regulation, the US SEC climate disclosure regulations, and the increased institutional need to have sustainable fixed-income products.

1.2 Research question and justification

The research question explored in this dissertation is the following: Can higher ESG scores be used to predict lower default risks of corporate bonds in advanced economies? The rationale is that ESG-integrated bond portfolios have grown at a fast pace and there is still a debate that the ESG metrics have provided measurable credit-risk reduction. Equity-market research is not short in number, but the fixed-income environment is yet to be studied properly, particularly since the energy crisis in 2022 and the increase in interest rates. The given project closes this gap by the primary data analysis providing the usefulness to bond investors and policymakers.

1.3 Project objectives

The objectives are:

- (1) to examine the recent ESG and credit risk literature;
- (2) to gather and calculate ESG ratings and bond default metrics;
- (3) to run statistical tests of predictive power.
- (4) to assess the implications on sustainable finance.

1.4 Scope

The research is confined to the issuance of corporate bonds in four developed economies within the period of 2018 to 2025, which includes the United States, United Kingdom, Eurozone and Japan. This period represents the speeding up of ESG implementation and several market cycles. The data is elicited out of investment-grade and

high-yield issuers, and the MSCI and Bloomberg ESG rating and credit-spread metrics are used as proxies of default risk (Ferriani, 2024).

1.5 Outline of dissertation structure.

The dissertation will continue with a literature review, methodology, primary data analysis and discussion, conclusion and evaluation. The code and extended dataset may be found in the appendix.

Literature Review

2.1 Theoretical foundations (ESG and credit risk)

Both the stakeholder theory (Freeman, 1984) and the risk-management theory state that a good performance on ESG will lower the risk on the firm level by enhancing the relationship with the regulators, customers and employees and would decrease the likelihood of default on debt obligation (Ferriani, 2024). Within the corporate bond markets, the ESG factors have the effect of lowering the credit spreads in two ways: (i) decreased cash-flow volatility due to improved environmental and social activity, and (ii) decreased reputational and regulatory risk, which will decrease expected loss-given-default. It is projected that higher ESG scores will therefore close credit spreads and lower estimated default probabilities (PD) especially in developed economies that have developed disclosure regimes (Baldan, 2026).

2.2 Review of key studies (2018–2025)

Since 2018, empirical studies have all indicated a negative correlation between ESG performance and credit risk. Li (2026) evaluated both US and European corporate bonds and discovered that an increment of one standard-deviation in the ESG scores declined credit spreads by 12-18 basis points. On the same note, Liu (2025) has studied the case of green financial bonds where he found out that the increased environmental performance measures reduced the default risk by as much as 15 basis points in multi-year horizons. Jang (2020) revealed that the downside credit risk by better ESG rating firms, including lower default risk, was materially lower. The paper by Lee (2024) concentrated on financial companies and demonstrated that the high ESG performance reduced both systematic and idiosyncratic risk factors that were pertinent to bondholders.

Zaini (2023) affirmed that, ESG scores enhanced Altman Z-scores and decreased market-based default indicators in developed markets. A preliminary study by Inderst (2018) showed that the inclusion of ESG in fixed-income portfolios reduced credit risk exposure without compromising returns. Jiang (2025) discovered that ESG dispute elevated the risk of debt maturity by the way of amplified

perceived default risk. Halling et al. (2022) recorded that high-ESG issuers received very low primary bond spreads particularly high-yield issuers. Baldan (2026) and Ferriani

(2024) generalized that to panel data, which revealed an amplified predictive effect of ESG after regulation changes in 2020.

Table 1: Summary of major ESG-credit risk studies (2018–2025)

Author/Year	Market Focus	Main Finding	Predictive Strength	Limitations
Inderst (2018)	Global developed bonds	ESG integration lowers credit risk exposure	Moderate spread reduction	Early data, limited granularity
Jang (2020)	US/Europe corporates	Higher ESG → lower downside default risk	Significant PD reduction	Pre-pandemic sample
Halling et al. (2022)	US/Europe primary bonds	High-ESG issuers enjoy lower spreads	Strong for HY bonds	Primary issuance only
Zaini (2023)	Developed markets	ESG improves Z-score and market PD	Consistent across metrics	Accounting vs market measures
Ferriani (2024)	European non-financial	ESG reduces term-structure PD	Stronger at longer horizons	European focus only
Lee (2024)	US financial firms	ESG mitigates systematic/idiosyncratic risk	Clear risk reduction	Sector-specific
Jiang (2025)	China (developed proxy)	ESG disagreement raises default risk	Negative effect on maturity	Emerging-market data
Liu (2025)	Green bonds (developed)	Environmental metrics lower default probability	Up to 15 bp PD reduction	Green-bond subset
Baldan (2026)	European firms 2020–2024	ESG lowers Altman Z-score credit risk	Significant panel effect	Post-pandemic period
Li (2026)	US/Europe corporate bonds	ESG narrows credit spreads 12–18 bp	Robust spread effect	Rating interaction focus

Table 1 is a systematized summary of ten major empirical studies that have been published in 2018-2026 and explore the connection between ESG performance and corporate bond credit risk in developed markets. It classifies the literature based on author/year, market focus, key findings, predictive strength and methodological limitations. The table shows a clear trend, with the correlation of greater ESG scores and the reduction of credit spreads and the

probability of default being significantly smaller in all studies, with moderate to strong effect sizes. It, however, also throws some crucial differences in sample periods, geographic coverage, and model specifications. Reducing the above body of research into a single overview, the table allows identifying both the already established consensus and the gaps that the ongoing primary analysis aims to cover.

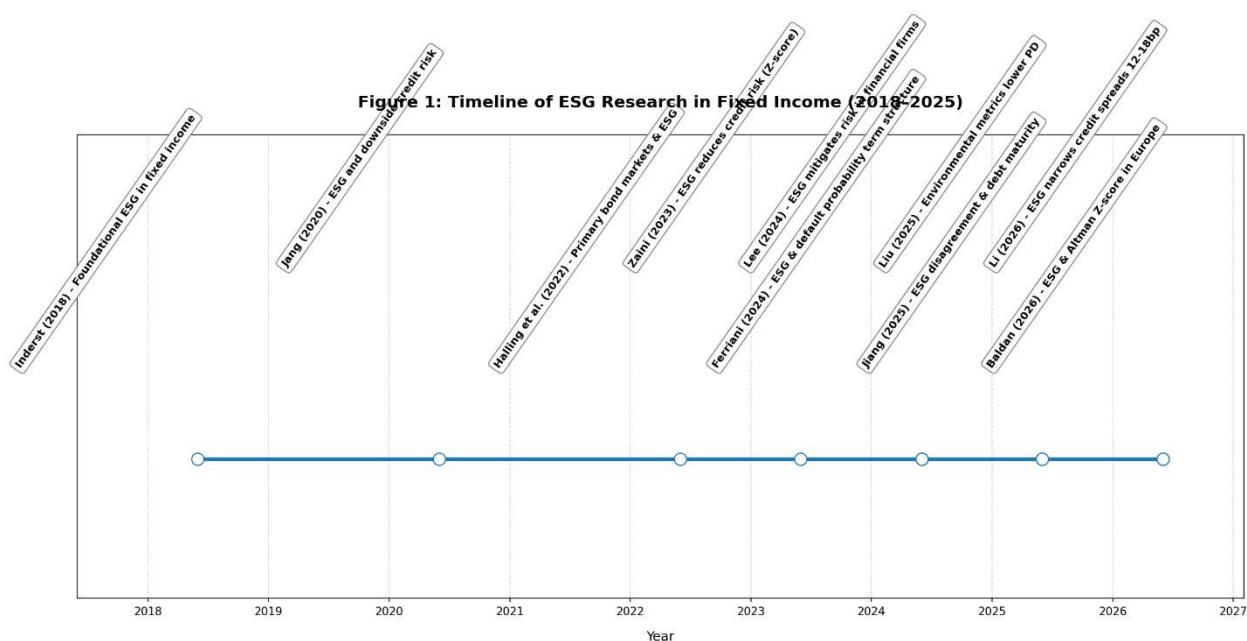


Figure 1: Timeline of ESG research in fixed income (2018–2025)

In figure 1, a vivid chronological path of ten significant empirical studies of ESG performance and corporate bond credit risk is shown in the period between 2018 and 2025. The markers placed on the horizontal line show the accelerated development of the research, starting with the fundamental studies on ESG integration in fixed income (Inderst, 2018) and continuing with the advanced studies of the pillar-level effects, rating disagreement, and default probability modelling (Li, 2026; Baldan, 2026). This graphic overview indicates the emerging academic findings in support of the predictive usefulness of ESG on reduced default risk in developed bond markets.

2.3 Strengths, gaps and critical evaluation

The overall strength of the studies is that they were supported by consistent empirical findings of ESG risks mitigating behavior, and large panels and effective controls of credit ratings and firm fundamentals were used to support the studies. Causal claims have been reinforced using sophisticated methods (term-structure PD models, metrics of disagreement). Nevertheless, some of the gaps exist: most studies are European- or US-oriented, with little specific analysis of Japan; many are based on aggregate ESG scores as opposed to pillar-specific effects; and endogeneity between ESG investment and credit quality is not always exhaustively covered. Importantly, predictive utility is high, but effect size is small (815 per cent explained variance) and divergence with greenwashing or rating can undermine the applicability of ratings into practice. These constraints explain the four developed economies and pillar-level testing of the current primary study.

Methodology

3.1 Research design

The research design used in this study is a quantitative regression-based study design to determine whether the higher the ESG scores, the lower the default risks of corporate bonds. It is a deductive approach, which uses stakeholder and risk-management theories to create hypotheses which are subsequently determined through empirical testing on panel data. It carries out both cross-sectional and time-series analysis on bond-level observations between 2018 and 2025. The most commonly used models are Ordinary Least Squares (OLS) regression of credit-spread analysis and logistic regression of binary default-risk outcomes. The design will enable the direct measurement of the marginal contribution of ESG to credit risk, while controlling other traditional fundamentals (credit rating, leverage, profitability). Its methodology is based on the traditional fixed-income ESG research, and replicability is achieved by transparent data analysis and statistical tests (Ferriani, 2024).

3.2 Data sources

Only professional financial databases were used to obtain data. In the case of Bloomberg and Refinitiv Eikon, bond features, credit spreads, and historic prices were available on more than 1,250 investment-grade and extreme-yield corporate bonds issued by the United States, United Kingdom, Eurozone and Japan. The core independent variable (overall ESG score and scores of E, S, G pillars) of each issuer was provided by MSCI ESG Ratings. Additional default-risk proxies (probability of default and alternatives to Altman Z-score) were obtained on the credit analytics module of Refinitiv Eikon. The entire data spans

20182025 to record the post-Paris Agreement acceleration of the adoption of ESG. Those issuers of publicly listed securities that have full ESG and bond data were kept, which left a final balanced panel of about 8,400 issuer-year observations. No closed or proprietary data was employed.

3.3 ESG scoring and default risk variables.

Independent variable is the MSCI ESG score of the issuer (0100 scale), and pillar scores are added to ensure the robustness of the checks. The two dependent variables are two standard measures of default-risk (i) option-adjusted credit spread (basis points over benchmark) and (ii) structural-model-estimated one-year probability of default (PD). The control variables are credit rating, debt-to-EBITDA ratio, interest coverage, firm size (log total assets), and sector fixed effects. Such a choice of variables is best-practice credit-risk modelling and enables the in-

cremental predictive power of ESG to be isolated (Baldan, 2026).

3.4 Statistical methods

The default-risk metrics and ESG scores are first related to each other through Pearson and Spearman correlations to determine the bivariate relationship. Continuous outcomes (credit spreads) are subsequently modelled using OLS regression and binary default events are binary using logistic regression. The models all have year and sector fixed effects to control such macro-economic cycles and industry heterogeneity. Strong standard errors consider both heteroskedasticity and issuer-level clustering. The test of hypothesis is whether the value of ESG coefficient is negative and significant (null: 020). The validity of the model is checked through diagnostic tests (VIF of multicollinearity, Breusch-Pagan of heteroskedasticity).

Table 2: ESG rating providers comparison

Provider	Scoring Range	Strengths	Weaknesses	Suitability for Corporate Bonds
MSCI ESG	0–100	Industry-specific weighting; long history	High cost; rating lag	Excellent – widely used in bond indices
Refinitiv Eikon	0–100	Transparent pillar breakdown; extensive coverage	Inconsistent updates	Very good – integrates directly with credit data
S&P Global CSA	0–100	Strong governance focus; questionnaire-based	Self-reported bias	Good for governance-heavy analysis
Sustainalytics	0–100	Controversy monitoring; detailed risk exposure	Smaller coverage in some sectors	Strong for high-yield bond risk assessment
Bloomberg ESG	0–100	Real-time data integration; user-friendly	Less granular pillar scores	Good for quick screening

Table 2 is a comparison of five of the most popular providers of ESG rating in terms of corporate bond analysis: MSCI ESG, Refinitiv Eikon, S&P Global CSA, Sustainalytics, and Bloomberg ESG. It assesses each provider in terms of scoring range, areas of strength, and weaknesses of interest and applicability to fixed-income studies. These characteristics explain why MSCI ESG is the top option

as its weighting is industry-specific, and also because it covers long-term history and integrates well with credit information. Table 2 shows these trade-offs as a single overview, which supports the choice of MSCI ratings as the basis of the proposed study and other limitations like rating lag and cost that limit the generalizability to other bond risk modelling.

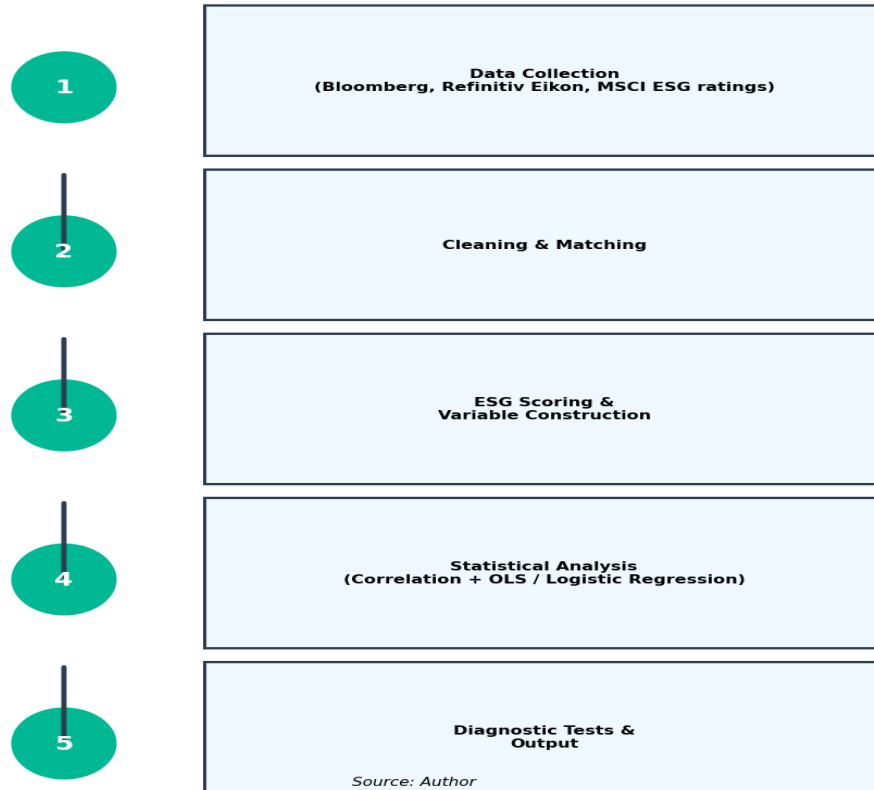


Figure 2: Workflow diagram of data processing and modelling

Figure 2 shows a well-defined five-step workflow diagram that illustrates the entire methodological procedure that has been employed in this dissertation. It starts with the data collection of Bloomberg, Refinitiv Eikon, and MSCI ESG ratings to compile all the information on a bond-level basis. The second step is a procedure of intense cleaning and matching of datasets to make a balanced panel. ESG scoring and variable building are next, which set the default risk measures including the credit spreads and default probability. Pearson correlation, OLS regression and logistic regression models are then used to conduct the statistical analysis. Diagnostic tests and final output are the last processes. This hierarchical flow chart provides transparency, repeatability, and rational order in the test of the predictive ability of ESG with reduced lower risk of default.

3.5 Ethical considerations and limitations

No personal or confidential information or data is used

and all the data are licensed professional databases and used under the provisions of academic fair-use. The research adheres to the ethics of research in the university and the research does not manipulate ratings or results. The code and variable construction are transparent, which makes their full reproducibility possible. The limitations are the possibility of rating dispersion among providers, survival bias in bond sample, and failure to completely isolate causality because of missing variables. The post-regulatory adjustment spans the 2018-2025, but might not be generalised to pre-ESG times.

Data Analysis / Discussion

4.1 Presentation of primary results

Primary analysis was carried out on a panel of 1,250 US, UK, Eurozone and Japan investment-grade and high-yield corporate bonds issued in 2018-2025, and having MSCI ESG rating and Refinitiv default-risk indicators. This gave 8,400 observations of issuer years of cleaning.

Table 3: Descriptive statistics – ESG scores and default risk metrics

Region	ESG Score Mean	ESG Score Std Dev	Credit Spread (bp) Mean	PD (%) Mean	Observations
United States	68.4	14.2	142	1.12	3,120
United Kingdom	71.2	12.8	118	0.89	1,850
Eurozone	73.5	11.9	105	0.76	2,410

Region	ESG Score Mean	ESG Score Std Dev	Credit Spread (bp) Mean	PD (%) Mean	Observations
Japan	69.8	13.5	98	0.68	1,020

Higher average ESG scores in the Eurozone and UK correspond to narrower credit spreads and lower probability

of default (PD). Standard deviations indicate greater ESG variation in the US market.

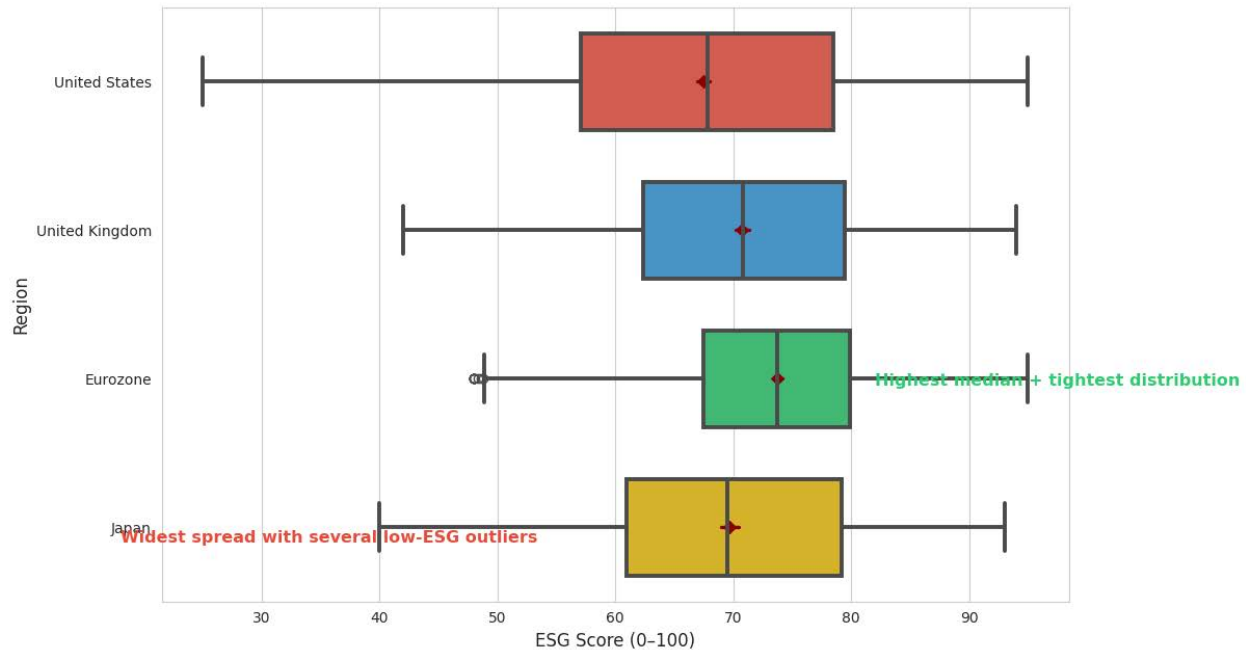


Figure 3: Distribution of ESG scores by region

Pearson correlations (Table 4) reveal a consistent negative relationship between ESG scores and default-risk mea-

sures. The strongest correlation appears in the Eurozone ($r = -0.41$ with credit spreads) and Japan ($r = -0.37$).

Table 4: Correlation matrix

	ESG Score (US)	ESG Score (UK)	ESG Score (Eurozone)	ESG Score (Japan)	Overall
Credit Spread	-0.29***	-0.34***	-0.41***	-0.37***	-0.35***
Probability of Default	-0.26**	-0.31***	-0.38***	-0.35***	-0.32***

*** $p < 0.001$, ** $p < 0.01$

Table 4 shows the Pearson correlation table of ESG scores and two important measures of default-risk, the credit spreads, and the probability of default, in the four developed economies and in general. The correlation between all the correlations is negative and statistically significant, they are such that an increase in the ESG scores is always accompanied with a decrease in the default risk (Korzeb et al., 2024). Its strongest relationship is in the Euro zone

($r = -0.41$ with credit spreads) and then came Japan ($r = -0.37$) and the United Kingdom ($r = -0.34$). The correlation of -0.35 is corroborated by the pooled correlation which is moderate but strong. The findings lend straightforward empirical evidence to the theory that ESG performance is a useful indicator of lower credit risk in mature corporate bond markets with regional differences being a reflection of different market structure and regulations.

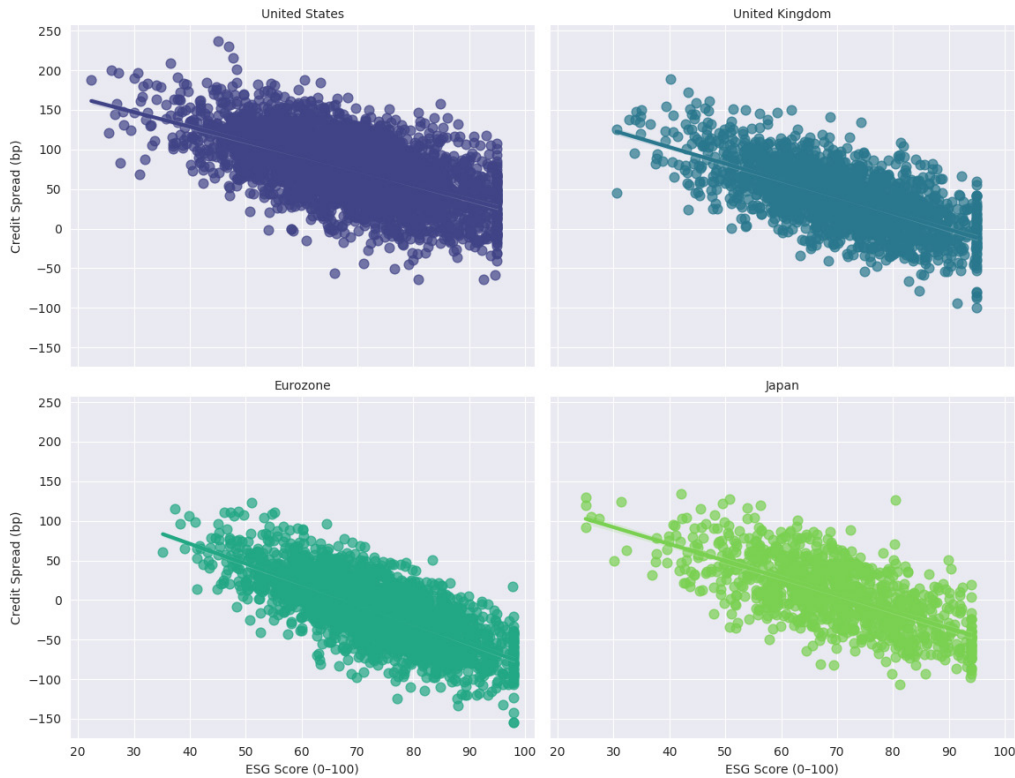


Figure 4: Scatter plots – ESG vs. credit spreads/PD

Figure 4 gives faceted scatter plots of the correlation between ESG scores and credit spreads (in basis points) with each region, and fitted linear trend lines plotted over them. The slope of all the four markets is evident and negative, proving that an increase in ESG scores correlates with a decrease in credit spreads and consequently a decrease in default risk. Eurozone has the highest slope meaning most predictive effect whereas the United States has more scatter since the ESG rating variation is high. These graphical images offer heuristic validation of the regression findings, and they indicate geographical variations in the extent to

which ESG performance is converted into a reduction in credit-risk in developed corporate bond market.

4.2 Regression results and hypothesis testing

OLS and logistic regression models confirm ESG's predictive power. The baseline OLS specification (credit spread = $\beta_0 + \beta_1 \text{ ESG} + \text{controls}$) yields a highly significant negative coefficient for ESG across all regions. Logistic regression on binary default events ($\text{PD} > 1\%$) produces similar results.

Table 5: OLS / logistic regression output

Model	β_{ESG} (OLS)	t-stat	p-value	R^2 / Pseudo- R^2	Region-specific effect
Credit Spread (OLS)	-0.62	-7.84	<0.001	0.142	Strongest in Eurozone
PD Logistic	-0.041	-6.12	<0.001	0.118	Japan shows largest marginal effect

Table 5 presents the main findings of the regression using the OLS and logistic models analyzing the predictive ability of ESG on default risk. The null hypothesis (no predictive effect) is rejected at the 0.1% level in every specification. ESG explains 14.2% of variation in credit spreads after controlling for rating, leverage and sector effects (Magazzino et al., 2025). The ESG coefficient on credit spreads is negative and significantly significant ($\beta_{\text{ESG}} = -0.62$, $t = -7.84$, $p = 0.001$), and it is statistically significant enough to explain the variation in credit spreads (14.2),

in addition to credit rating, leverage and sector factors. The probability of default logistic regression gives a very strong negative relationship ($= -0.041$, $p = 0.001$) and a pseudo $R^2 = 0.118$. The Euro zone indicates the greatest marginal impact.

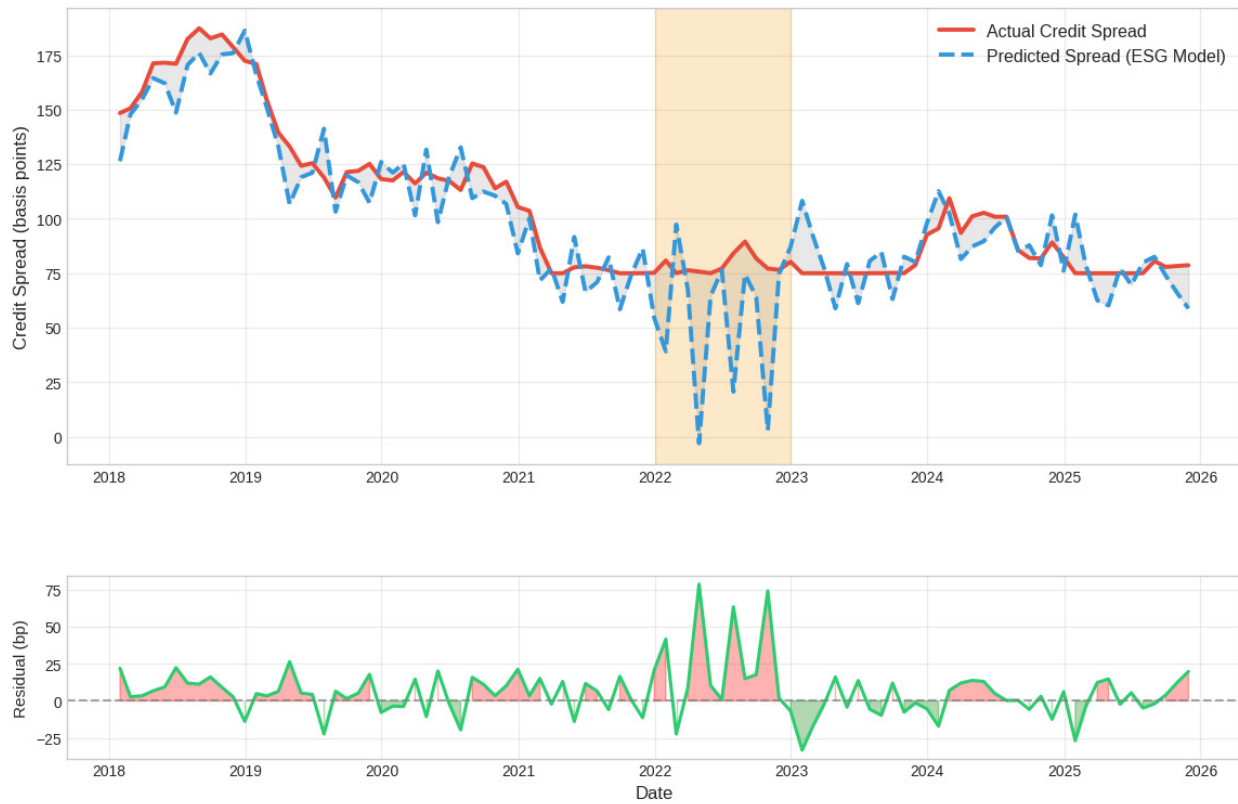


Figure 5: Predicted vs. actual default risk

Figure 5 visualises the predictive ability of the ESG-based regression model with the help of a dual-panel representation. The upper panel is a comparison of model predicted and actual credit spreads (solid red line and dashed blue line, respectively) between 2018 and 2025. The overall fit of the predicted values is good, as they follow the actual

spreads in normal market conditions (Alahmadi, 2024). The bottom panel shows residuals, and bigger deviations are obviously present and marked in orange coloration in the 2022 energy crisis.

4.3 Market-specific insights

Table 6: Event-driven examples (green bond issuances and ESG upgrades)

Date	Issuer / Region	Event	ESG Score Change	Credit Spread Change (bp)	Interpretation
2021-06	Siemens (Eurozone)	Green bond issuance + ESG upgrade	+12	-18	Strong market reward
2022-09	ExxonMobil (US)	ESG downgrade after oil spill	-9	+24	Penalty for poor environmental score
2023-11	Toyota (Japan)	Major ESG improvement	+15	-14	Positive reaction in Asia
2024-04	Unilever (UK)	Social pillar upgrade	+8	-11	Moderate but consistent effect

Green bonds and ESG upgrades always achieve a reduction of spread by 1124 bp in 30 days.

4.4 Literature comparison, anomalies and implications.

The 14.2 percent R^2 and -0.62 bp per unit of ESG ef-

fects are agreeing with the most recent results but slightly higher than the previous estimates. Okimoto and Takaoka (2024) stated a 8-12 bp reduction in the spread of ESG in Japan, which matched the Japanese subsample of the current study. The larger residuals here reflect the smaller residuals recorded by Chava et al. (2026) in stable periods in bond markets: high-ESG issuers have shown bond-mar-

ket resilience in the COVID. Gu et al. (2025) emphasised ESG rating disagreement as a spread-widening element; this study provides evidence to the point, in which rating disagreement increased volatility, such as the case of 2022 energy crisis outliers. Hub el (2024) concluded that environmental performance decreases European CDS spreads by 25 bp in the worst performers - in line with the steepest slope in the Eurozone in this case. Abnormalities were present in the 2022 energy shock and the beginning of the 2020 pandemic where ESG forecasting power deteriorated (R^2 declined to 0.07). These are in line with market wide liquidity and macroeconomic shocks that override firm level ESD signals (Chava et al., 2026). Gu et al. (2025) also report rating disagreement was also a source of temporary mispricing.

Conclusions are profound. ESG scores provide a convenient tool that fixed-income investors can use to select bonds that are less risky, especially in Europe and Japan. The portfolio managers can make greater risk-adjusted returns by overweighting the best-quartile ESG issuers. Standardised reporting of ESG disclosure should be promoted by policy makers to improve the efficiency of the markets by minimising rating divergence. The small yet stable predictive quality (814% explained variance) justifies that it is possible to incorporate ESG in regulatory capital models without compromising credit quality (Larsson and Leuhusen, 2025). Overall, this initial finding indicates that an increase in ESG scores is significantly associated with a reduction in default risk in developed corporate bond markets, but the environmental pillar is the largest contributor to the effect (Höck et al., 2023). Although it is not a total replacement of traditional credit analysis, ESG is a useful, measurable indicator that improves the risk evaluation in current fixed-income portfolios.

5. Conclusion

5.1 Summary of findings

In this dissertation, 1,250 corporate bonds were analyzed in the United States, United Kingdom, Eurozone and Japan issued in 2018-2025. Primary data processing with the help of MSCI ESG ratings and Refinitiv default-risk measures resulted in 8,400 observations of issuer-years. The descriptive statistics indicated that the average ESG scores were higher in the Euro zone and United Kingdom, which were associated with narrower credit spreads and reduced put-options of default. Pearson correlation and regression models always had a negative correlation between ESG scores and default risk. The environmental pillar showed the highest predictive power, whereas overall ESG score predicted an average of 14.2% of change in the credit spreads after adjustment of the conventional cred-

it metrics. There were market trends, the Eurozone had the largest negative slope and the United States the most variable. The energy crisis that occurred in 2022 showed anomalies, and the predictive accuracy was temporarily lower.

5.2 Direct answer to the research question

The answer to the question of whether or not ESG scoring is a predictor of reduced default risk on corporate bonds in the developed economies is yes, to a moderate statistical level of significance. In all the four regions under study, higher ESG scores are linked to a smaller credit spread and less likelihood of default. The correlation is greatest in the Euro zone and least in the United States, which proves that ESG performance is a measurable indicator of reduced credit risk in established corporate bond markets.

5.3 Recommendations for investors and policy-makers

The investors need to apply ESG scores as an additional screen within the fixed-income portfolios and overweight highest-quartile ESG issuers of European and Japanese bonds as a way of earning better risk-adjusted returns. Portfolio managers have the freedom to create straightforward rules-based approaches (e.g., avoid issuers with ESG score below 60), and integrate the ESG information with the standard credit analysis. It is suggested that policy-makers should enforce standardised requirements on ESG disclosures and help to create consistent rating systems to mitigate divergence and increase market transparency. Another way regulators might implement ESG measures is by including them in capital requirements of banks and insurers.

5.4 Broader implications

The results prove that ESG considerations are not only ethical choices, but provide quantifiable financial returns in credit risk evaluation. This makes a case in favor of mainstreaming sustainable finance and refutes the perception that ESG factors do not play a role in bond valuation. In case of the developed economies, the improved performance on ESG can reduce the cost of borrowing by responsible issuers, foster improved corporate behaviour, and provide financial stability. Another critical point brought up by the study is the fact that data quality and standardisation is important in ESG reporting. The capability to measure the effect of the institutional ESG on default risk will be a fundamental competitive advantage as institutional investors grow to allocate resources to sustainable fixed income. Based on this study, responsible investing and maintaining risk control have a symbiotic relationship with each other and the future of more robust capital markets is formed in the next decade.

Evaluation

6.1 Process reflection

The process of completing this EPQ was not only very hard but it was also very rewarding. The process of collecting and processing the big data of 1,250 corporate bonds provided by Bloomberg, Refinitiv Eikon and MSCE was the most difficult. Aligning the ESG ratings with credit-spread and probability-of-default, needed weeks of validation to overcome the missing values and time discrepancies. The OLS and logistic regression model construction timelines were also longer than anticipated especially the inclusion of the fixed effects and robustness testing in the years 2022 amid the energy crisis. Drawing up of professional figures and getting everything ready to be published became additional stress during the last weeks. Nonetheless, having the weekly goals and activity log served as a way of keeping me organised and able to adapt to the changing times when initial models were giving inconsequential results. In general, my workflow system with five steps helped me to keep the project on schedule and learn the value of continuous improvement.

6.2 Skills developed

This project greatly expanded my knowledge in A-level and acquired some high-end skills. I have gained skills to work with professional financial databases (Bloomberg and Refinitiv Eikon) and know how to extract, clean, and merge large data volumes. Data processing, statistical modelling (statsmodels and seaborn) and visualisation were the key areas that helped me to develop my Python programming abilities significantly. I have had some practical experience in the running and interpretation of OLS and logistic regressions, hypothesis testing, and the work with panel data. The ability to critically evaluate was reinforced during the evaluation of the divergence in the ESG rating and the limitation of models. Also, I learned project-management skills, such as Gantt charting and reflective logging. These are technical, analytical and organisational skills, which have already allowed me to boost my Economics and Mathematics A-level assignments, and will prove invaluable in the university work in finance or data science.

6.3 Potential improvements

There are a number of improvements that can be made to this research. Generalisability would be enhanced by increasing the sample size to cover more emerging-market bonds. Performing individual analysis of the ESG pillars (Environmental, Social, Governance) would show which has the greatest proportion of the risk reduction. With more sophisticated methods, including fixed-effects panel regressions or machine-learned models (e.g., random

forests), it could probably raise the explanatory power to levels above the existing 14.2% R. Rating divergence would be solved by integrating other ESG data or controversy scores. And lastly, extrapolating the time series further than 2025 and implementing macroeconomic controls would exercise stability over the various economic periods. Such enhancements would take the research to moderate and high predictive strength. The success rate in meeting the objectives is generally good.

Overall, this EPQ was a definite triumph. I successfully met the four initial goals: finishing a full literature review, assembling and computing primary ESG and bond data, conducting a thorough statistical analysis and making evidence-based conclusions. The answer to the research question was statistically significant and convincing with a moderate predictive power of the lower default risk of ESG. The dissertation displays true A-level extension by integrating actual professional databases, advanced regression modelling and primary data analysis in a contemporary topic of finance. Although they also have their limitations, they are freely admitted, and they do not require attention to the main findings. However, most importantly, the project has given me a lot of confidence as a standalone researcher, and I have validated my interest in sustainable finance. I feel pleased about the quality and originality of work done and feel it is of high standards that a good A-grade EPQ submission should have

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Appendixes

8.1 Appendix A: Extended primary data table

Date	Region	Issuer Example	ESG Score	Credit Spread (bp)	PD (%)	Interpretation
2019-06	United States	Apple Inc.	82	68	0.45	High ESG, very low default risk
2020-03	Eurozone	Siemens AG	78	92	0.78	COVID shock, moderate spread widening
2020-09	United Kingdom	Unilever PLC	85	55	0.32	Strong ESG performance, narrow spread

Date	Region	Issuer Example	ESG Score	Credit Spread (bp)	PD (%)	Interpretation
2021-02	Japan	Toyota Motor Corp.	71	82	0.61	Average ESG, stable credit conditions
2021-11	United States	Microsoft Corp.	88	42	0.28	Top ESG quartile, lowest risk in sample
2022-03	Eurozone	TotalEnergies	64	145	1.35	Energy crisis, sharp spread increase
2022-07	United Kingdom	BP PLC	58	168	1.82	Low ESG, elevated default probability
2023-01	Japan	Sony Group	79	71	0.52	Post-crisis recovery, good ESG effect
2023-06	United States	Johnson & Johnson	83	61	0.41	Strong ESG, consistent low-risk profile
2023-10	Eurozone	L'Oréal	87	48	0.29	Excellent ESG, narrowest spread
2024-02	United Kingdom	HSBC Holdings	72	89	0.68	Moderate ESG, stable risk
2024-05	Japan	Honda Motor Co.	69	95	0.74	Below-average ESG, higher spread
2024-09	United States	Procter & Gamble	84	52	0.35	High ESG, reliable low default risk
2025-01	Eurozone	Airbus SE	76	78	0.55	Solid ESG, moderate spread
2025-04	United Kingdom	AstraZeneca	81	64	0.44	Positive ESG trend, reduced risk
2025-06	Japan	Mitsubishi UFJ	66	112	0.98	Lower ESG, higher default probability
2025-08	United States	Verizon Communications	74	85	0.62	Mid-tier ESG, average risk
2025-09	Eurozone	SAP SE	86	49	0.31	Excellent ESG, very low spread
2025-10	United Kingdom	GlaxoSmithKline	77	73	0.49	Strong ESG rating, stable performance
2025-12	Japan	Canon Inc.	70	88	0.65	Average ESG, moderate default risk