ESG Scores and the Credit Market

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Abstract

This study analyzes the relationship between Environmental, Social and Governance (ESG) scores and bond returns using the corporate bond data in Korea during the period of 2010 to 2015. We find that ESG scores include valuable information about the downside risk of firms. This effect is particularly salient for the firms with high information asymmetry such as small firms. Interestingly, of the three ESG criteria, only environmental scores show a significant impact on bond returns when interacted with the firm size, suggesting that high environmental scores lower the cost of debt financing for small firms. Finally, ESG is complementary to credit ratings in assessing credit quality as credit ratings cannot explain away ESG effects in predicting future bond returns. This result suggests that credit rating agencies should either integrate ESG scores into their current rating process or produce separate ESG scores which bond investors integrate with the existing credit ratings by themselves.

Keywords: bond; credit rating; ESG; fixed income; funding cost; information asymmetry

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1. Introduction

Research on Environmental, Social and Governance (ESG) has developed significantly over the last few years. The existing literature tends to focus on the beneficial role of ESG integration in generating excess returns [25,34,35]. However, this literature largely overlooks how the total returns of corporate bonds vary as ESG scores vary. This is a crucial gap in literature because the total return is the most important performance measure from the perspectives of both buyers (bond investors) and sellers (bond issuers). This paper fills this gap by investigating the relationship between ESG and bond returns. Furthermore, we undertake rigorous qualitative case studies to identify the factors that drive our results. Such results also produce policy implications for credit rating agencies and policy makers as well as managerial implications for bond investors and issuers.

In addition to the choice of methods that differentiates our study from the previous ones, we also contribute to existing literature as follows; first, our empirical results suggest that the higher ESG scores lower the cost of debt financing [22,25] particularly for small firm issuers. The first case study supports this by showing how the demand pressure from large investors encourages the development of ESG criteria in corporations. With weaker balance sheets, small firms are inevitably more reliant on external funding. Second, our regression analysis finds that ESG is not fully reflected in credit ratings. The second case study supports this by exemplifying the insufficient and conflicting approaches among rating agencies over ESG evaluation. Third, we find that ESG provides bond investors with extra downward protection by mitigating the credit risks of small firms. Due to the lack of available data and transparency, the credit risk of the small firms is harder to evaluate. This issue can be partially resolved if the firms have high ESG scores as shown in our empirical result. Simply put, capable small firms overcome such an informational disadvantage by signaling their

advanced ESG performance. Overall, our empirical results are in line with the risk-management view.

In extending prior literature about the risk-management view in relation to ESG [11,17,20,30], we highlight bonds rather than equities as the subject of this research because bond issuers and investors pay significantly more attention to the downside risks than the upside potential when compared to stock investors [25]. In addition, bond issuers are subject to frequent refinancing needs compared to equity issuers [22], thereby increasing their need to meet with social demands to avoid paying higher financing costs. Note, that since the upside potential of bonds is limited (i.e., no default), downside risks primarily determine bond pricing. We analyze whether ESG scores affect bond returns in a way to reflect the downside risk of a firm and whether the results conform to the risk-management view.

Our paper proceeds as follows. Section 2 discusses previous literature on this topic. Section 3 explains how to gather data and which methods to employ in conducting empirical tests. Section 4 outlines and interprets the empirical results. Section 5 introduces the case studies and Section 6 discusses implications. Section 7 concludes the paper.

2. Literature review

Corporate Social Responsibility (CSR) is one way to enhance ESG. There is a lot of debate over the link between CSR and Corporate Financial Performance (CFP) [19]. The outcomes of the empirical tests to find the link between CSR and economic returns are subject to controversy due to the underspecified theoretical background or dispersed measures for CSR [11]; on the other hand, the research on the CSR effect with the risk management perspective is supported with more converging outcomes as that the effects are seen through the increased “moral capital” or intangible assets. In fact, literature with the risk management view asserts that CSR (more generally ESG) activities strengthen firms’

intangible assets such as reputation capital [9,17,20,30], which in turn creates shareholder wealth in the long run [11,12]. Such an insurance-like property of CSR activities provides firms with an extra cushion amid the occurrence of negative events [11,12,30]. Put differently, Godfrey *et al.* [12] assert that "CSR-based moral capital creates value if it helps stakeholders attribute the negative event to managerial maladroitness rather than malevolence and temper their reactions accordingly." We extend this risk management view by analyzing bonds, whose returns are highly sensitive to the downside risks due to their very nature of fixed-income contracting.

In addition, Godfrey *et al.* find that the CSR effect, namely the insurance-like effect, amid negative events is greater for larger firms, which contradicts our finding. We find that the impact of ESG is greater for smaller firms. We attribute such a difference to the following factors. First, while sharing most properties of CSR, ESG is more a comprehensive concept that includes most factors within the environmental, social and governance aspects. This can lead to variations in the outcomes as important factors for consideration in the tests differ. For instance, Godfrey *et al.*'s tests are based on the data collected from the Socrates that reports the outcomes of 41 binary items measuring the firm's CSR engagement; on the other hand, the ESG data we use contain estimates and answers for 275 quantitative and qualitative items altogether.

Second, while we highlight the financial aspects with regard to ESG, Godfrey *et al.*'s argument is more based on the moral concerns. This is evident in their statement that CSR activities "create moral capital as the activities signal the firms' intention to engage stakeholders in an 'other-regarding' manner." On the contrary, we find that ESG activities are linked to the increased financial benefits especially in terms of lower funding costs for the firms that issue bonds. Meanwhile, Godfrey *et al.* argue that CSR activities send "information about the firm to other social actors" thereby reducing the search and evaluation costs [12].

This is similar to our argument that ESG activities signal the firm's dedication towards doing good for others while increasing the transparency of the firms even by paying the high costs, thereby decreasing the cost of financing with the decreased perceived default risks by the investors. This signaling effect should be more salient for small firms that are subject to more information asymmetry, meaning that the ESG effect should also be larger in the small firms.

To summarize, if the risk management view holds, the higher the ESG scores, the lower the downside risks are, including the default risk. The default risk determines the credit quality of a bond, which in turn determines the price and return of the bond. In conclusion, the risk-management view implies that the bonds issued by the firms with high ESG scores should be more expensive than those issued by the firms with low ESG scores. This provides a solid basis for our empirical results. Indeed, our findings suggest that the higher the ESG scores, the lower the cost of debt financing for bond issuers. This result also implies that ESG compensates for the lack of information in evaluating credit qualities from the perspective of bond investors, which in turn increases the premium in bond prices. Such an effect is most pronounced for smaller firms that are informationally disadvantaged, dependent on external funding and thus more vulnerable to negative events [28]. This result well conforms to the risk management view on ESG.

In addition, our study finds that each criteria of ESG has a different impact on bond returns. According to English [5], environmental issues such as climate change or water pollution are more diffuse and long-term than social and governance risks that are mostly contained internally. The similar implication is obtained from the study involving Korean listed companies [13]. Han *et al.* (2016) found a significant, negative relationship between environmental scores and firms' Financial Performances (FPs) while finding no relationship between social scores and FP. Similarly, we find no meaningful relationship between governance or social scores and bond returns while environmental scores clearly signal the

risks that are not reflected in bond prices when interacting with the firm size. Such similar findings from both advanced and developing countries like the U.S. and Korea provide assurance that the implications from our study can be generalized in a broader setting despite minor variations due to certain geographical issues [38].

Finally, to a certain degree, our study resembles the work of Polbennikov *et al.* [25] that examined the impact of ESG on corporate bond returns; however, there are significant differences between the two studies. First, they use the spreads embedded in yield-to-maturity (YTM) while we use total returns in measuring bond returns. By using the total returns instead of the spreads, we are able to analyze the actual returns generated during the specified period; on the other hand, the spreads only represent a part of the bond returns. Although they are useful tools in understanding the idiosyncratic risks of the firms, the spreads are, in fact, also affected by the benchmark rates, so it is an incomplete measure of the performance of the bonds. For such reasons, we believe that the total return approach provides a more informative and accurate way to assess the impact of ESG on bond pricing. Second, our study differs from the study of Polbennikov *et al.* in that we further investigate whether the impact of ESG varies depending on the firm characteristics such as credit rating or size. Our empirical findings indeed show that the impact actually differs significantly among the firms with different sizes. This is crucial because the issuers with different funding needs or resources can have different perspectives and approaches in ESG integration in the real world, which shall be reflected in the bond returns as well. Third, our study takes the perspectives of both the fixed income buyers (i.e., investors) and sellers (i.e., issuers) and stresses the impact of ESG on the funding cost as well as risk management while the study of Polbennikov *et al.* focuses on the ESG effect and its implications for bond investors. Fourth, we undertake qualitative case studies to identify what the internal dynamics that actually drive the empirical results are, which simple regression analysis cannot identify. The combination of

the quantitative and qualitative approaches will extend and complement the existing results and offer richer insights into ESG and the risk management view.

3. Data and Method

Our sample period is from August 2010 to July 2015. We collect data on corporate bond prices, accrued interests and coupon rates from Korea Asset Pricing. Monthly total returns are calculated as the sum of the bond prices, accrued interests and coupon payment at the current period divided by the sum of the bond prices and accrued interests in the previous period minus one. A firm can issue multiple tranches of bonds, so we calculate the average returns aggregated at an issuer level. The formula to compute monthly bond returns is expressed as below:

$$R_{i,t+1} = ((P_{i,t+1} + A_{i,t+1}) + PI_{i,t+1} - (P_{i,t} + A_{i,t}))/(P_{i,t} + A_{i,t}) \quad (1)$$

$P_{i,t}$ is quoted price at month t. $A_{i,t}$ is the accrued interest of the bonds at month t. $PI_{i,t}$ is the coupon payment at month t.

We gather ESG scores from Korea Corporate Governance Service (KCGS). ESG scores are used as a sum (*ESG*) and individually as Environmental (*ENV*), Social (*SOC*) and Governance (*GOV*) scores. Finally, the independent variable for the empirical tests is the lagged ESG score that is released once a year in August. For example, the ESG score released in August 2014, which reflects the assessment on the company's ESG activities from August 2013 to July 2014, is used to match the monthly returns for the bond from August 2014 to July 2015.

Furthermore, we collect data on market capitalization (*size*) and industry classification from FnGuide. Credit ratings (*rating*) are obtained from Korea Ratings. Both log of market capitalization (*log_size*) and *rating* are used as key control variables in the test. *Rating* is calculated as the arithmetic average of the ratings of the bonds issued by the same issuer. The

higher *rating* is, the better the credit quality of the issuer is. For example, AAA is assigned with 27 and D with 1. Lastly, we create an industry dummy variable following FnGuide industry classification and exclude banks and insurance companies from the sample.

4. Empirical results

4.1 Sample characteristics

Panel A of Table 1 reports the summary statistics of all firm-month observations. The number of observations is 6,832. The mean and median value of monthly buy-and-hold returns are 0.4% and 0.5%, respectively, reflecting the balanced distribution of the returns. *SOC* and *ESG* both show some positive skewness with the mean of 136 and 134 and median of 122 and 129, respectively. On the other hand, *ENV* shows negative skewness with the mean of 146 and median of 156, implying that the firms generally have relatively low *ENV* scores. *GOV* displays a relatively balanced distribution with the mean of 124 and median of 122. For the firm size, we take a log value of the firm's market capitalization, which results in a balanced distribution with the mean and median of 14. *Rating* also shows a balanced distribution with the mean and median of 22.

Panel B of Table 1 shows the correlation matrix among all variables. The correlation coefficients among *ESG* and *ENV*, *SOC*, and *GOV* are relatively high as can be reasonably assumed. *Log_size* is highly correlated with *rating* (0.696) as rating agencies allocate a significant weight to the firm size when evaluating the credit quality of firms. The correlation coefficients among *rating* and *ESG* (0.355), *ENV* (0.173) and *SOC* (0.377) are relatively low, suggesting that credit ratings do not effectively reflect the aspects of ESG. *GOV*, whose impact has been vastly examined in the literature in the context of corporate governance, shows the highest correlation with *rating* (0.461) amongst others.

###Insert Table 1 about here###

4.2 Impact of ESG on bond pricing

Table 2 reports the panel regression results of the impact of ESG on monthly bond returns from August 2010 to July 2015. The dependent variable is the monthly bond returns from t to t + 1. Independent variables are the information observable at t. Throughout all specifications, the effect from the firm size and credit quality are controlled for along with the industry fixed effect. All estimates are reported along with the standard errors that are double-clustered by firm and date, following the method of Petersen (2009) [23].

###Insert Table 2 about here###

Except in column (1), the coefficients of ESG are negative and statistically significant across all models. When the interaction term between *size* and ESG, denoted by *size_ESG*, is introduced in column (2), however, the coefficient of the variable is 0.035 and statistically significant at the 1% level. Specifically, one unit increase in *size_ESG* results in 0.035% increase in the bond return. This suggests that higher ESG scores of smaller firms are related to lower bond returns. Furthermore, lower bond returns imply that the bonds are priced higher at issuance, ergo lower funding costs. We discuss the implications in detail in Section VI.

In column (3) where the interaction term, *rating_ESG*, is introduced, the estimated coefficient of the variable is 0.001 and statistically significant at the 10% level. However, when all variables are used simultaneously, *rating_ESG* loses its statistical significance and *size_ESG* remains statistically significant at the 5% level with the coefficient of 0.029. Thus,

the implication remains consistent. The higher the ESG scores and the smaller the issuer, the lower the bond returns. Another interesting finding is that the effect of ESG clearly exists separate from *rating*, meaning that ESG provides complementary information to credit ratings in assessing credit risks of corporate bonds. Therefore, the overall results in Table 2 are summarized as that ESG scores affect the debt financing cost for especially the small firms as well as signals credit risks not addressed by credit ratings.

Table 3 reports panel regression results using *ENV*, *SOC* and *GOV* scores as the main independent variables and monthly bond returns as the dependent variable during the sample period. The formula is the same as the one used in Table 2, except for the main variables.

###Insert Table 3 about here###

In column (1), it shows that one point increase in the environmental score leads to 0.081% decrease in bond returns, suggesting that bonds with higher environmental scores experience lower returns. Contrary to this, bond returns are increased by 0.119% for a point increase in the governance score. This conforms to the view that bond investors react negatively to the management's effort in strengthening corporate governance which mostly benefits equity holders [16].

In the following specifications, only *ENV* shows significant impact on bond pricing when considering the impact of each criterion in conjunction with the issuer size. Specifically, one unit increase in the interaction term of *size_ENV* results in 0.012% increase in bond returns. When each criterion is interacted with credit quality, no variable shows a statistically significant coefficient. Thus, depending on the firm size, environmental scores affect bond returns, or in other words, the cost of funding for issuers. This confirms and specifies the results in Table 2.

The following may provide a rationale for such results. From the entrepreneur's perspective, ESG is costly and difficult to implement. Firms should commit a considerable amount of investment to secure relevant resources including ESG data and specialists before implementing ESG firm-wide. For this reason, large companies can endure related costs while small companies struggle. Therefore, if small firms actively implement ESG measures, it signals their dedication towards preserving the long-term value of the firms even by paying ESG taxes, thereby the lower returns or lower cost of debt financing for the issuers.

Table 4 reports panel regression results for robustness of the findings in Table 3. The dependent variable is the same while independent variables such as *ENV_GOV*, *ENV_SOV*, *SOC_GOV* and *ENV_SOC_GOV* are newly introduced. The purpose of this test is to confirm whether the previously examined relationship between *ENV*, *SOC* or *GOV* and bond returns holds even after controlling for the additional interaction terms that may alter the relationship by their own interacting effects.

###Insert Table 4 about here###

While the results confirm that the effect of *ENV* remains the same, it yields another interesting finding that has not been addressed in previous literature. As the positive coefficients imply, *ENV* and *SOC* substitute each other and so do *SOC* and *GOV* whereas *ENV* and *GOV* do not. However, when interacted altogether, *ENV*, *SOC* and *GOV* become complementary to one another, thereby making it beneficial for bond issuers to promote all three ESG aspects simultaneously. Alternatively, if a firm decides to promote only two of the three aspects of ESG, the pre-existing effect on bond returns is nulled while promoting all three aspects of ESG contributes to lowering its debt financing cost.

###Insert Table 5 about here###

Additionally, we check the existence of meaningful differences across the sample that are divided into two groups based on size. Table 5 reports the differences in the mean values of *rating*, *ESG* and each of *ENV*, *SOV*, and *GOV* between small and big firms. The results indicate that there are meaningful differences in the mean values of all test variables except for returns between small and big firms, confirming that large firms have significantly higher ESG scores and *rating*. Lastly, Table 6 reports robustness in using the double sorting based on size and ESG. The sample is divided into high and low scores of each criterion of ESG or ESG as a whole and also divided into small and big based on size. The test results confirm that the firms with low environmental scores show a statistically significant difference in returns (t-value of 1.71) between small and big firms. Such a result confirms our previous findings that environmental scores is an important determinant in bond returns especially for small size firms. In other words, smaller firms can effectively lower the debt financing cost by emphasizing the environmental aspect in firm-wide ESG implementation. While other return differences are statistically insignificant, the signs are all consistent with our regression results and conjecture.

###Insert Table 6 about here###

5. Case studies

We undertake case studies to identify what drives our regression results. The case studies suggest that the current approaches to ESG integration vary, but the demand pressure from the large investors including government pension funds accelerates the movement towards

more meticulous ESG integration in companies and ESG evaluation in the credit rating agencies (CRAs).

5.1 The case with the largest owners or government pension funds

To understand what drives firms to take ESG seriously today, one should understand the dynamics in the investment community. We start with the global examples. BlackRock and StateStreet, two of the biggest investors in the U.S. financial market, recently announced their commitment to the firm-wide ESG integration [3,31] and pledge to the United Nations-supported Principles for Responsible Investment (PRI) [3]. It followed the criticism that it has not done enough to adjust their portfolios in consideration of ESG [2], which is important because their actions to decrease ESG risks in their portfolios will ultimately encourage the companies to strengthen ESG aspects especially if they raise capital primarily from the market. The behavior of such large investors would affect the behavior of small firms in particular because the bond prices of the smaller firms are more sensitive to the demand flow due to the lack of liquidity [28]. In addition, the lack of publicly available information to assess the small firms increases the need to signal their ESG activities to seek better funding terms.

Such a dynamic works the same with the government pension funds that manage trillions of dollars in assets. The mounting demand pressure from the government pension funds in the market can explain why ESG lowers the cost of debt financing. For example, Norway Government Pension Fund Global (GPFG), the largest government pension fund in the world, excluded five Korean companies from their investable universe due to serious environmental concerns [36]. It banned investment in POSCO and Daewoo International because POSCO owned 60% of Daewoo International that developed the palm oil plantation in India. To avoid

losing such large funding sources and to prevent the hikes of their financing costs, companies would likely be encouraged to strengthen the ESG aspects and minimize any risks thereof.

As an example from Korea, National Pension Services (NPS) reportedly increased its ESG investment sixty-seven-fold from 2007 to 2018 [7] while the amount of ESG investment increased from 338 million USD to 22.5 billion USD [24]. Out of 2,111 listed companies in Korea, NPS owns more than 5% of 290 companies and more than 10% of 90 companies as of March 2018. As NPS plans to expand the ESG integration into all assets including stocks, bonds and alternative assets along with other pension funds, their movement would likely impact the market as to encourage ESG integration in all other companies [21] for the same reasons mentioned above. In fact, it is consistent with our empirical results that show the relationship between ESG scores and bond returns. The results suggest that higher ESG scores are related to lower debt financing costs of small firms in particular that are highly sensitive to the demand flows from large institutional investors. Now, doing good brings not only the reputational benefits, but also the benefit of lowering the financing cost for the issuers.

5.2 The case with Credit Rating Agencies (CRAs)

Moody's, S&P and Fitch are the most reputable CRAs in the world today. As the demand for more fine-tuned ESG integration rose, it became their urgent assignment to develop measures to assess ESG aspects of firms. While they argue that some aspects of ESG have already been reflected in their evaluation, the ESG they mention in this context is far less sophisticated than the ESG we talk about today. For example, when rating companies, CRAs mostly refer to the companies' financial matrix, which do not reflect any of the environmental concerns that are hardly predictable at the time. Some aspects of governance may be addressed through the companies' financial policy or regulatory environment, but the

scope is limited. For such reasons, CRAs do not fully reflect firms' ESG aspects in the ratings yet. Even if there are some aspects of ESG in the rating, a credit rating should reflect all the risks related to the ESG matters in order to provide a complete picture of the default probability of a firm, which is not the case today.

Such incomplete evaluation supports our empirical finding that ESG scores are significantly related to bond returns even after controlling for the credit rating throughout all specifications. In addition, the positive impact of ESG on bond returns becomes distinct for smaller firms because they are in general at disadvantage in attaining the best possible rating from the CRAs for two reasons: high costs related to the rating evaluation services and limited resources to offer to CRAs for full evaluation of all aspects of the firms. In reality, large companies can afford to pay different CRAs to evaluate their firms and choose the best ratings to use when issuing bonds while small firms cannot. The cost of maintaining the ratings is also high, which is another burden for the small firms.

On the other hand, the conflicting approaches in the CRAs also result in the current status of insufficient ESG evaluation. For example, KIS rating (KIS), NICE rating (NICE) and Korea Ratings (KR), the three largest rating agencies in Korea, are reportedly taking steps to develop the ESG assessment process of their own. However, the approaches vary from an agency to another [27]. For example, NICE insists that ESG assessment be done separately from the existing credit evaluation since ESG aspects are reflected in credit ratings indirectly by their impact on earnings. NICE is considering providing ESG certification services rather than integrating ESG in its existing rating process. On the contrary, KR is considering integrating ESG throughout their existing rating process, similar to the U.S. agencies.

In summary, the incomplete measures and conflicting approaches towards ESG evaluation in the CRAs results in the existence of the ESG impact on bond returns separate

from that of the credit ratings. Currently, we find that Korean CRAs make two approaches regarding ESG evaluation. They either attempt to integrate ESG into their existing rating process to provide the complete picture of the credit quality of the issuer, or they report separate ESG scores and let bond investors combine the ESG evaluation of their own with the existing ratings given by the CRAs. Our empirical findings overall can help fill the gap in literature and support the movement by the large institutions and CRAs towards utilizing ESG scores in investment and rating corporate bonds.

6. Discussion of the results

The case studies in the previous section help us to identify what drives our empirical results. First, it shows that the strengthening of ESG integration in large investors can encourage corporations to develop ESG aspects in order to secure funding and to lower the cost of funding. This effect should be particularly salient for smaller firms, which supports our finding that the higher ESG scores of the smaller firms is related to the lower funding cost and highlights our contribution to the previous literature. Information asymmetry may explain why smaller firms are more affected by ESG scores. There is a great deal of public information and tools other than ESG scores that bond investors can utilize in evaluating the credit risk of large firms. On the contrary, investors are left with scarce resources to evaluate the small firms, which can explain the widening information asymmetry and thus the increasing importance of ESG scores for small firm issuers and investors. For the small firm issuers, therefore, higher ESG scores can help them reduce the funding cost in bond issuance; ESG is potentially a useful signaling strategy for the small firms. We find such an implication from the empirical studies by introducing interaction variables to examine whether the impact of ESG on bond returns varies depending on the size or credit quality of a firm.

Second, ESG aspects are not completely reflected in credit ratings. In the second case study, the CRAs' insufficient and conflicting approaches to ESG scoring helps to explain why ESG scores are not fully reflected in the current bond ratings. In our test, we include rating in addition to ESG or E, S and G. The results show that the effect of rating on bond coexists with that of ESG variables. Clearly, the correlation between ESG scores and credit ratings may be high [8], but not high enough to substitute each other. In addition, it has a particularly strong impact on small firm issuers because ESG scores would compensate for the lack of resources and transparency for both the issuers and buyers of the corporate bonds issued by the small firms, highlighting our contribution to the literature.

By analyzing and discussing the global examples involving the main players in ESG integration, other than bond issuers and investors, such as the internationally renowned CRAs like Moody's and S&P and largest investors in the global market like BlackRock and NGPFG, we focus on finding the underlying driver of our empirical results that also helps us to generalize our findings in a broader setting. The underlying assumption is that if the case studies and implications thereof are generalizable, the empirical findings supported by them are also generalizable. Since the implications from the global cases in addition to those of NPS and Korean credit rating agencies strongly confirm that the same kind of effect exists in other countries or markets outside Korea, we believe that our results are well generalized in a broader context.

7. Conclusion

In this study, we find the existence of the relationship between ESG scores and bond pricing and make the following contributions. First, we find that ESG can help lower the cost of funding for the bond issuers of relatively small firms. We show this with the empirical findings that indicate that bond returns are lower for small firms with higher ESG scores as

well as with the real-life examples involving large investors that help accelerate ESG integration especially among the small firms with higher information asymmetry and external funding needs. Second, we show that ESG is complementary to credit ratings in assessing credit quality, as credit ratings cannot explain away ESG effects in predicting future bond returns. Throughout all specifications in our empirical tests, the effect of ESG or E, S and G coexists with that of credit rating, indicating that ESG scores are not fully reflected in the current bond ratings. Third, we show that ESG provides bond investors with extra downward protection by mitigating the credit risks of the small firms. This is crucial since ESG integration could be better understood as a risk-management tool [11,17,20,30] than a return generating tool [26], conforming to the risk management view of CSR. We add that ESG can be used as an effective signaling strategy for small firm issuers. Lastly, we combine the implications from the qualitative case studies and empirical results, which highlights the key contribution of our study in literature. The first case study shows that the mounting pressure from the largest investors encourages ESG integration especially among the small firms, while the second case study shows that the scattered efforts of the CRAs result in the lack of converging outcomes of ESG scores today. The implications from the case studies provide a strong, supporting ground for our empirical findings.

In addition to the contributions mentioned above, our study differs from previous studies on the same subject in that we use the total return approach instead of the spreads to better gauge the financial impact of ESG on corporate bond returns. While the spreads are useful in understanding the idiosyncratic risks of firms, the total return calculates the actual returns generated during the specified period, and thus is considered the most important performance measure from the perspectives of both buyers (bond investors) and sellers (bond issuers). Additionally, we use Environmental, Social and Governance criterion separately to each other, and in addition to ESG and examine the effect of each criterion in conjunction with the

size and credit quality. In other words, we examine how the relationship between ESG or Environmental, Social and Governance and bond returns varies depending on firm characteristics such as the size or credit quality. This is particularly important because the issuers' different funding needs or resources result in different approaches to ESG integration, which shall be reflected in the bond returns.

Based on the implications that we extract from both the quantitative tests and qualitative case studies, we make the following arguments for the decision makers such as the credit rating agencies and policy makers that have not been addressed yet. First, we believe that the CRAs should either integrate ESG scores into their current rating process with clear guidelines or produce separate ESG scores which bond investors can integrate with the existing credit ratings by themselves. It is crucial since the current state of the conflicting approaches to or incomplete measure of ESG evaluation has limitations in guiding both bond issuers and investors to yield the complete picture of the credit quality of firms. Second, leveraging our results, we believe that policy makers can design better whom and how to support when bond issuers face (re)financing difficulties in the market for various reasons like COVID-19. For example, when the government considers bailing out companies that are in financial trouble due to the temporary breakout like COVID-19, they can base their decisions or terms of lending on the companies' ESG scores in addition to other considerations.

Lastly, there are several limitations to our research that may be resolved in the future research. First, we focus on the Korean market, so the future studies can extend the empirical research to a global setting. For example, we may have an opportunity to examine whether the relationship between ESG and bond returns we have found in this study changes depending on the market typology or country-specific factors in the future research. The implications from the examples of BlackRock and the Norway Government Pension Fund

Global confirm that the same kind of effect exists in other countries or markets, supporting our finding that the relationship between ESG scores and bond returns holds true in other countries as well. However, the degree of the effect may differ depending on country-specific factors such as the legal regime [38]. Liang and Renneboog (2017) assert that the effect of CSR differs depending on the country's legal regime (i.e., whether the country follows the civil or common law) [18]. Second, one can undertake deeper case studies regarding the organizational process and stakeholder interactions in ESG bond investment and issuance. With the increasing attention towards ESG integration worldwide, any effort to provide a clear guidance on the quantitative impact of ESG shall be appreciated.

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Table 1. Descriptive Statistics and Correlations

Panel A reports the summary statistics for firm-month observations. Panel B reports the correlation matrix of all variables used in the empirical tests. *returns* is monthly buy-and-hold returns of the bonds, which are calculated as the sum of capital gains, accrued interest and coupon income divided by the sum of the bond prices and accrued interests in the previous period minus one. *rating* is the mean value of the ratings of the maximum three bonds of the same issuer. *ENV* is the environment score; *SOC* is the social score; *GOV* is the governance score; and, finally, *ESG* is the sum of *ENV*, *SOC* and *GOV*. *log_size* is the logarithm of the market capitalization. All estimates are reported as arithmetic averages.

Panel A. Descriptive Statistics

	N	Mean	St. Dev.	Min	Pctl(25)	Median	Pctl(75)	Max
return	6,832	0.004	0.007	-0.241	0.001	0.005	0.007	0.037
rating	6,832	21.813	2.200	12.479	20.175	21.883	23.236	27.000
ESG	6,832	133.974	44.436	45.700	100.200	129.400	168.900	238.900
ENV	6,832	146.160	74.107	0.000	82.300	155.500	206.325	277.700
SOC	6,832	135.557	61.996	12.000	88.000	122.000	186.000	274.000
GOV	6,832	123.860	26.910	39.000	104.000	122.000	138.000	232.000
log_size	6,832	13.976	1.506	10.293	12.778	13.970	15.048	17.992

Panel B. Correlations

	return	rating	SOC	ENV	GOV	ESG	log_size
return	1						
rating	-0.015	1					
SOC	-0.026	0.377	1				
ENV	-0.034	0.173	0.777	1			
GOV	0.018	0.461	0.560	0.387	1		
ESG	-0.023	0.355	0.935	0.908	0.668	1	
log_size	-0.012	0.696	0.585	0.472	0.558	0.613	1

Table 2. The Effect of ESG scores on Bond Returns

This table reports the regression results from the panel regressions. The dependent variable is the monthly bond return from t to t+1. *ESG* means the aggregate ESG score; *log_size* is the logarithm of the market capitalization; *rating* is the weighted average of the ratings for all bonds of the same issuer; *size_ESG* is the interaction variable of *log_size* and *ESG*; *rating_ESG* is the interaction variable of *rating* and *ESG*; and industry dummy is created based on the FnGuide industry classification. All estimates are reported as arithmetic averages. The standard errors are double-clustered by firm and date, following Petersen (2009).

	Dependent variable:			
	(1)	(2)	(3)	(4)
ESG	-0.100	-0.596**	-0.186**	-0.543**
	(0.062)	(0.244)	(0.094)	(0.234)
log_size	0.375**	-0.066	0.395***	0.010
	(0.149)	(0.138)	(0.151)	(0.084)
rating	-0.007**	-0.008**	-0.019***	-0.011*
	(0.003)	(0.003)	(0.007)	(0.007)
size_ESG		0.035***		0.029**
		(0.013)		(0.013)
rating_ESG			0.001*	0.0003
			(0.0005)	(0.001)
Constant	-0.00001	0.006***	0.001	0.005***
	(0.001)	(0.002)	(0.001)	(0.002)
Note:				*p<0.1; **p<0.05; ***p<0.01

Table 3. The Effect of Environmental, Social and Governance Scores on Bond Returns

This table reports regression results from the panel regressions. The dependent variable is the monthly bond return from t to t+1. *ENV* is the environment score; *SOC* is the social score; *GOV* is the governance score; *log_size* is the logarithm of the market capitalization; *rating* is the weighted average of the ratings for all bonds of the same issuer; [first variable]_[second variable] is the interaction variable of the two variables in brackets. For example, *size_ENV* is the interaction variable of *log_size* and *ENV and rating_ENV* is the interaction variable of *rating* and *ENV*. Industry dummy is created based on the FnGuide industry classification. All estimates are reported as arithmetic averages. The standard errors are double-clustered by firm and date, following Petersen (2009).

	Dependent variable:			
	(1)	(2)	(3)	(4)
ENV	-0.081**	-0.258***	-0.322**	-0.319**
	(0.037)	(0.085)	(0.150)	(0.154)
SOC	-0.009	-0.023	0.052	0.002
	(0.038)	(0.041)	(0.163)	(0.231)
GOV	0.119**	0.110**	0.110**	0.311
	(0.048)	(0.045)	(0.045)	(0.338)
log_size	0.295**	0.150***	0.185***	0.315
	(0.122)	(0.024)	(0.059)	(0.201)
rating	-0.008**	-0.012**	-0.015**	-0.015***
	(0.003)	(0.006)	(0.006)	(0.005)
size_ENV		0.012***	0.019*	0.019*
		(0.004)	(0.010)	(0.011)
rating_ENV		0.0002	-0.0002	-0.0002
		(0.0003)	(0.0005)	(0.0005)
size_SOC			-0.010	-0.007
			(0.013)	(0.017)
rating_SOC			0.001	0.001
			(0.001)	(0.001)
size_GOV				-0.014
				(0.023)
rating_GOV				0.00001
				(0.001)
Constant	-0.0003	0.002***	0.002***	0.0001
	(0.002)	(0.001)	(0.001)	(0.002)
Note:				*p<0.1; **p<0.05; ***p<0.01

Table 4. The Effect of Environmental, Social and Governance Scores on Bond Returns – Robustness

This table reports regression results from the panel regressions for robustness. The dependent variable is the monthly bond return from t to t+1. *ENV* is the environment score; *SOC* is the social score; *GOV* is the governance score; *log_size* is the logarithm of the market capitalization; *rating* is the weighted average of the ratings for all bonds of the same issuer; [first variable]_[second variable] is the interaction variable of the two variables in brackets. For example, *size_ENV* is the interaction variable of *log_size* and *ENV and rating_ENV* is the interaction variable of *rating* and *ENV*. The Industry dummy is created based on the FnGuide industry classification. All estimates are reported as arithmetic averages. The standard errors are double-clustered by firm and date, following Petersen (2009).

	Dependent variable:			
	(1)	(2)	(3)	(4)
ENV	-0.325**	-0.312**	-0.319**	-0.465**
	(0.152)	(0.150)	(0.152)	(0.213)
SOC	0.061	0.018	-0.029	-0.239
	(0.228)	(0.231)	(0.269)	(0.275)
GOV	0.252	0.241	0.370	-0.385
	(0.342)	(0.402)	(0.412)	(0.614)
log_size	0.374*	0.181	0.460	0.107
	(0.199)	(0.366)	(0.402)	(0.454)
rating	-0.016***	-0.014**	-0.016***	-0.011
	(0.005)	(0.006)	(0.005)	(0.007)
size_ENV	0.018	0.021*	0.019*	0.027***
	(0.011)	(0.012)	(0.010)	(0.006)
rating_ENV	-0.0003	-0.0002	-0.0002	-0.0003
	(0.0005)	(0.0005)	(0.0005)	(0.0004)
size_SOC	-0.014	-0.008	-0.009	-0.032**
	(0.016)	(0.017)	(0.015)	(0.013)
rating_SOC	0.001	0.001	0.001	0.001*
	(0.001)	(0.001)	(0.001)	(0.001)
size_GOV	-0.010	-0.004	-0.023	0.022
	(0.023)	(0.033)	(0.035)	(0.045)
rating_GOV	-0.00004	-0.0001	0.0001	-0.001
	(0.0005)	(0.001)	(0.0005)	(0.001)
ENV_SOC	2.604			21.267**
	(2.363)			(9.564)
ENV_GOV		-3.093		0.672
		(4.224)		(11.927)
SOC_GOV			4.424	39.815***

			(6.865)	(11.667)
ENV_SOC_GOV				-1,345.238**
				(636.582)
Constant	-0.0002	0.001	-0.001	0.006
	(0.002)	(0.004)	(0.004)	(0.006)
Note:				*p<0.1; **p<0.05; ***p<0.01

Table 5. Mean Differences between Small and Big Firms – Robustness

This table reports differences in mean values of the variables between big and small firms: *returns* is bond returns during the sample period; *rating* is the weighted average of the ratings for all bonds of the same issuer; *ESG* is the ESG score; *ENV* is the environment score; *SOC* is the social score; *GOV* is the governance score. All estimates are reported as arithmetic averages.

	Small	Big	Big - Small	t stats
return	0.004	0.004	0	-0.601
rating	20.591	23.027	2.436	127.583
ESG	110.132	156.233	46.101	63.996
ENV	115.565	173.509	57.944	26.014
SOC	103.726	165.064	61.338	61.258
GOV	110.947	136.946	25.999	97.398

Table 6. Difference-in-Difference Estimates (DiD) – Robustness

This table reports difference-in-difference estimates measuring returns of the bonds issued by firms with different ESG scores and sizes. The sample is divided into high or low scores of *ESG*, *ENV*, *SOC* and *GOV* and into small and big based on firm size. *ESG* is the ESG score; *ENV* is the environment score; *SOC* is the social score; *GOV* is the governance score. All estimates are reported as arithmetic averages.

	Small	Big	Small - Big	t stats
ESG High	0.0040	0.0039	0.0000	0.0889
ESG Low	0.0041	0.0038	0.0002	1.3124
High - Low	-0.0001	0.0001	-0.0002	0.0000
t stats	-0.3116	0.6492	0.0000	0.0000
ENV High	0.0039	0.0039	-0.0000	-0.1429
ENV Low	0.0042	0.0039	0.0003	1.7056
High - Low	-0.0003	0.0001	-0.0003	0.0000
t stats	-0.9293	0.3455	0.0000	0.0000
SOC High	0.0040	0.0039	0.0001	0.3229
SOC Low	0.0040	0.0038	0.0002	0.7219
High - Low	-0.0000	0.0001	-0.0001	0.0000
t stats	-0.0819	0.3993	0.0000	0.0000
GOV High	0.0039	0.0039	-0.0000	0.0076
GOV Low	0.0041	0.0039	0.0003	1.0791
High - Low	-0.0002	0.0001	-0.0003	0.0000
t stats	-0.6260	0.3830	0.0000	0.0000