Determinants and Value Implications of Corporate ESG Bond Issuance in Korea*Determinants and Value Implications of Corporate ESG Bond Issuance in Korea†

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Abstract

We examine the determinants of and investor responses to corporate environmental, social, and governance (ESG) bond issuance in Korea. We find that ESG bond issuance is positively associated with firm size and foreign ownership stakes. We also find that firms that establish ESG committees at the board level and those that are subject to carbon emission trading system are more likely to issue ESG bonds. Unlike prior studies that analyze green bond issuance in developed markets and China, we find no significant stock market reaction to ESG bond issuance in Korea, suggesting that the signaling effect of ESG bonds–in which companies credibly signal their commitment to ESG by issuing ESG bonds–does not exist. This paper suggests that enhanced ESG bond standards, post-issuance reporting, and verification procedures are needed in the Korean ESG bond market.

Keywords: ESG bond, corporate social responsibility (CSR), signaling

JEL classification: G30, G32

1. Introduction

The past few decades have seen a marked increase in what is known as environmental, social, and governance (ESG) investing, an investment strategy that incorporates environmental, social and governance factors into the decision-making process. In response to growing investor demand for ESG integration by businesses, firms seek to make investments in environmental, social, or governance aspects of their businesses and increasingly issue ESG bonds as a financing instrument to raise funds for their ESG investments. In Korea, 662 ESG bonds (including social, sustainable, and green bonds) were issued in 2021, a significant increase from the 322 issuances that occurred in 2020. The number of issuers also increased significantly, from 23 in 2020 to 129 in 2021, although most of the issuers are government-owned firms, financial firms, or private firms, with public firms capturing a relatively small proportion of around 20%. Despite this rapid market growth, there is scant research into ESG bonds in Korea. This paper fills this void in the literature by investigating firm-level characteristics that are associated with ESG bond issuance and revealing the implications for corporate value.

Several studies examine ESG bonds in other countries, focusing mostly on green bonds. Corporate green bonds were first issued by Vasakronan, a Swedish property company, in 2013, and since then it has become an increasingly popular instrument that has been the subject of many studies. Some researchers have shown that stock markets react positively to green bond issuance announcements, which is consistent with the signaling hypothesis according to which green bonds signal a company's commitment to the environment (Baulkaran, 2019; Wang, Chen, Li, Yu and Zhong, 2020; Flammer, 2021). Additionally, Flammer (2021) provides evidence that issuing green bonds enhances environmental performance. For instance, environmental ratings are upgraded and carbon emissions fall following the issuance of green bonds. On the other hand, other studies examine the existence of a pricing premium for green bonds, which is often referred to as a 'greenium' (Klassen and McLaughlin, 1996; Krueger, 2015, Zerbib, 2019; Cheong and Choi, 2020). The results are, however, inconclusive; some researchers find that there is a discount on green bonds (Karpf and Mandel, 2017; Zhang, Li and Liu, 2021) while

some find that, to the contrary, there is no noticeable difference between the yields of green and brown bonds (Flammer, 2021; Larcker and Watts, 2020).

An increasing number of Korean firms are now considering issuing ESG bonds. Since the first ESG bond was issued in Korea in 2018, issuance has increased significantly, as mentioned above. Despite this rapid growth, the ESG bond market in Korea remains at the nascent stage. There is as yet no effective mechanism for monitoring issuers following bond issuance. In Korea, ESG bond issuers are required to report ESG bond disclosure documents, which are generally split into the following three categories: preliminary reports contain information on projects to be financed by the proceeds of ESG bond issuances at the beginning or before bond issuance, intermediate progress reports describe the current use of money financed by ESG bonds, and final reports reveal exactly how issuers have used money financed by ESG bonds. According to data provided by Korea Exchange (KRX), as of July 2021 only 15.8 percent of the 120 issuers of ESG bonds so far have disclosed post-issuance use-of-proceeds reports, although all ESG bond issuers commit to preparing progress reports following bond issuance. In addition, ESG bonds have been issued mainly by state-run enterprises (e.g., the Korea Housing Finance Corporation, the Korea SMEs and Startups Agency, the Korea Student Aid Foundation, or the Korea Deposit Insurance Corporation) and private-sector companies account for less than 10% of issuance volume.[1] In light of this market dominance by a few public-sector companies and the lack of an effective mechanism for monitoring issuers after the issuance of ESG bonds, Korean ESG bond markets have not attracted much scholarly attention, and, to the best of our knowledge, 'private' sector companies' ESG bonds have not been explored.

Against this backdrop, this paper aims to explain what drives these companies to issue ESG bonds and to explore the value implications with a primary focus on private-sector companies. Specifically, we address the following two research questions: (1) What firm-level characteristics influence ESG bond issuance decisions? (2) How do stock markets react to ESG bond issuance

[1] In particular, state-run enterprises are responsible for an overwhelmingly large proportion of 'social' bond issuances, almost beyond 80%, and most of these state-run enterprises have received additional ESG certification for their existing bonds (for example, the Korea Housing Finance Corporation received social bond certification for their existing residential mortgage-backed securities).

announcements?

The main results of our analysis of corporate ESG bond issues from 2018 through January 2022 are as follows. First, larger firms, those that establish ESG committees, and those featuring higher foreign ownership shares are prone to issue ESG bonds, confirming that the variables that are known to be closely linked to firms' CSR performance in the previous literature also matter for ESG bond issuance.[2] We also find that firms that participate in an emission trading system (ETS) are more likely to issue ESG bonds. This suggests that an ETS gives companies an incentive to invest in green technologies to reduce emissions, consistent with the Porter hypothesis (Porter, 1991).[3] Second, unlike findings pertaining to Chinese or US green bond markets reported in prior studies, we find no significant response from the Korean stock market to ESG bond issuance announcements. This result suggests that issuing ESG bonds does not credibly signal a commitment to enhancing ESG performance in Korea, presumably because of the lack of a thorough post-issuance assurance mechanism or monitoring of issuers.[4]

Our paper contributes to several strands of literature. To the best of our knowledge, we provide the first empirical analysis of the characteristics of corporate ESG bond issuers and its value implications in Korea, which has a nascent ESG bond market. As mentioned above, previous studies have focused mostly on pricing, the environmental implications, or the economic effects of green bonds in countries where the history of green bond markets is significantly longer than in Korea (Russo, Mariani, Caragnano, 2020). With regards to a green bond premium, several papers find a positive premium for green bonds when compared with conventional bonds (Wang, Chen, Li, Yu, Zhong, 2020; Baker, Bergstresser, Serafeim, and Wurgler, 2018; Zerbib, 2019), while some find a negative premium for green bonds (Larcker and Watts, 2019; Immel, Hachenberg, Kiesel and Schiereck, 2021) and others find no robust or significant yield premium

[2]We review the related literature thoroughly in the hypothesis development section.

[3]The Porter hypothesis proposes that environmental regulations can stimulate innovations, which eventually leads to an increase in productivity or the value of products.

[4]Unfortunately, we cannot conduct analyses to determine whether environmental performance improves after ESG bond issuance. To examine this question, we would need data on ESG performance or greenhouse gas emissions over a longer time horizon, but such data are not yet available because of the relatively short history of ESG bonds in Korea.

or discount for green bonds (Hyun, Park and Tian, 2020). Regarding the environmental implications and economic effects of green bonds, Yeow and Ng (2021) show that green bonds are effective at improving environmental performance but only when they are certified by third parties. Analyzing green bond issuances in G20 countries, Nanayakkara and Colombage (2021) find a significant positive impact of higher compliance with Green Bond Principles (GBPs) on investor demand. Our paper is unique in that we focus on firm-level characteristics that motivate firms to issue ESG bonds.

Our paper is also related to several recent studies that examine stock market reactions to green bond issuance announcements (Baulkaran, 2019; Wang, Chen, Li, Yu and Zhong, 2020; Flammer, 2021). Most of these papers analyze countries with more established ESG bond markets and generally report positive market reactions to such announcements. In contrast, we find no significant stock market response to ESG bond issuance in Korea. Our finding suggests that the signaling effect of ESG bond issuance does not exist in Korea. We conjecture that institutional differences across countries may play an important role in influencing market responses to ESG bond issuance, and more importantly, this may reflect a lack of transparency and comparability in Korean ESG bond markets.

The remainder of this paper proceeds as follows. In Section 2, we develop our main hypotheses. In Section 3 we describe the data and methodology. In Section 4 we present the empirical results. In Section 5 we present investor responses to ESG bond issuance. Section 6, where we offer suggestions for future research, concludes.

2. Hypothesis development

2.1. Firm size

A number of prior studies provide evidence that firm size has a positive influence on corporate social responsibility (CSR) activities (Udayasankar, 2008; Adams and Hardwick, 1998; Cowen, Ferreri, and Parker, 1987). First, given the larger scale of their operations and higher

visibility, larger firms should be subject to greater pressure from outside stakeholders to address ESG issues. For example, Baumann-Pauly, Wickert, Spence, and Scherer (2013) find that larger firms participate more actively in CSR activities. Brown, de Jong, and Levy (2009) find that the larger the company the higher the probability that it publishes a sustainability report in which it applies Global Reporting Initiative (GRI) standards. Second, larger firms can raise more funding for their CSR activities. They have greater access to resources and more stable sources of revenue than smaller firms (Bers and Springer, 1997) and moreover enjoy higher levels of slack resources for discretionary spending on factors such as CSR (Johnson and Greening, 1999). In sum, these two factors, outside pressure and financial slackness, can help explain why larger firms may issue more ESG bonds.

Based on the above arguments, we expect that larger firms are more likely than smaller firms to issue ESG bonds:

H1: Firm size is positively associated with ESG bond issuance.

2.2. ESG committee

Previous studies suggest that the presence of an ESG committee within a board of directors indicates a company's interest in ESG issues. For example, Eccles, Ioannou, and Serafeim (2011) show that companies that have established strong sustainability cultures are more likely to establish sustainability committees within their boards of directors, arguing that the adoption of ESG policies reflects a substantive change in corporate culture. Similarly, Mallin and Michelon (2011) find that the existence of a sustainability committee within a board of directors is positively related to corporate community involvement. In addition, several studies suggest that the presence of an ESG committee is positively linked to ESG disclosure (Fatemi, Glaum and Kaiser, 2018). For example, firms with CSR committees are more likely to disclose greenhouse gas emissions information and practice higher-quality of ESG disclosure (Liao, Luo and Tang, 2015; Peters and Romi, 2014).

Several authors, however, argue that the adoption of ESG policies, such as the use of an ESG

committee, represents either pure greenwashing or a symbolic practice that casts themselves in an environmentally friendly light without making real changes in their operations. For example, Burke, Hoitash, and Hoitash (2019), questioning the effectiveness of ESG committees, find that such committees do not necessarily mitigate sustainability-related risks. In the context of environmental governance, Rodrique, Magnan, and Cho (2013) provide empirical evidence that environmental governance mechanisms at the board level have little impact on companies' environmental performance (in terms of regulatory compliance, pollution prevention, or environmental capital expenditures), suggesting that environmental governance often consists of symbolic rather substantive practices. Therefore, prior results pertaining to the link between ESG committees and ESG outputs are mixed, and ESG committees might be positively or negatively related to ESG performance.

Extending this logic for ESG committees to ESG bond issuance, we cannot clearly determine whether ESG bond issuance represents a symbolic or substantive practice. In line with prior research on ESG committees mentioned above, ESG bond issuance can have heterogeneous impacts on ESG performance. Firms may issue ESG bonds merely to be perceived as eco-friendly without actually using the bond proceeds to support green projects. Hence, the drivers of ESG committees, regardless of whether they are related to greenwashing or managers' intrinsic motivations, are likely to influence other ESG practices, including ESG bond issuance, thereby leading to a positive relationship between establishing ESG committees and ESG bond issuance. As such, we posit the following hypothesis:

H2: Firms that establish ESG committees are more likely to issue ESG bonds.

2.3. Foreign ownership

Prior studies show that foreign investors play an important role in monitoring corporate management, particularly in emerging markets (Ahmed and Iwasaki, 2015). In Korea, where foreign investors come mostly from developed countries with strong shareholder protections and high corporate governance standards, this argument might also be valid. For example, Rowe

and Moon (2012) find that foreign ownership has a positive effect on corporate governance and an increase in a firm's foreign ownership share has a direct effect on corporate governance index scores of Korean firms. Similarly, Choi (2009) provides evidence that a Korean firm with a high ratio of foreign investors achieves superior CSR performance. In addition, foreign investors are known to have positive effects on ESG performance. Dyck, Lins, Roth, and Wagner (2019) examine ESG performance for listed companies from 41 countries and find that the percentage of foreign ownership is positively related to environmental and social performance. In sum, one can expect that firms that feature high foreign ownership shares are more likely to issue ESG bonds to further accelerate ESG activities.

Based on these arguments, we hypothesize that foreign ownership is positively associated with ESG bond issuance:

H3: Firms that feature high foreign ownership shares are more likely to issue ESG bonds.

2.4. Emission trading system

An ETS is a market-based mechanism through which the government places a cap on emissions levels and issues permits to designated business entities, whereby emissions permits can be sold or bought on an emissions-permit exchange.[5] Specifically, emissions permits are allocated by the Korean Emission Trading System (K-ETS), which was launched in 2015, and more recently 630 entities have been subject to caps. The K-ETS is being implemented in three phases: Phase I (2015-17), Phase II (2018-20), and Phase III (2021-25). In Phase I, 100% of the allowances were allocated for free; in Phase II, 97% of the allowances were allocated for free; and in Phase III, 90% or fewer of the allowances have been allocated for free. Allowances are grandfathered in (i.e., based on past emissions), except for in the aviation, cement and oil-refining sectors, which receive allowances based on benchmarks (i.e., based on past activities).

As a market-based mechanism, the K-ETS provides economic incentives to induce companies

[5]The ETS covers direct emissions of six greenhouse gases as well as indirect emissions from electricity consumption. The greenhouse gases covered include carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O), hydrofluorocarbons (HFCS), perfluorocarbon (PFCS), and sulfur hexafluoride (SF6).

to reduce emissions. Firms can sell their emissions permits to other firms and report the proceeds as credits on income statements. When emissions are expected to exceed the caps imposed, firms must either cut their emissions below the permitted volumes or buy permits from other firms. Therefore, one can expect companies that are subject to the ETS to be more likely to make efforts to reduce emissions. For instance, Liu, Zhou, Lu and Hu (2021) find that Chinese listed companies participating in an ETS achieve superior environmental management performance, suggesting that ETS acts as an incentive that induces companies to reduce emissions. As such, we hypothesize that firms participating in the K-ETS will be more willing to issue ESG bonds in an effort to stimulate ESG investing in technologies that help them reduce greenhouse gas emissions.

H4: Firms that are subject to the K-ETS are more likely to issue ESG bonds.

3. Data and variables

We collect ESG bond data from the Korea Exchange (KRX). The KRX data consists of 1,175 ESG bond issuance events during a period that runs from 2018 through January 2022. Among the 1,175 ESG bond issuances, 151 involve green bonds (issued by 65 firms), 794 involve social bonds (issued by 55 firms), and 230 involve sustainable bonds (issued by 57 firms). Most of these ESG bonds are issued by government-owned enterprises, financial firms, or unlisted firms. Only a small portion are issued by listed firms. According to statistics provided by KRX, only 40 listed non-financial firms issued ESG bonds between 2018 and January 2022.[6] We verify ESG bond announcement dates using a news search engine, NAVER, and select the date of the first announcement of plans to issue ESG bonds as the ESG bond event date for the stock-price-response analysis. We merge these ESG bond data with firm-level data that are collected

[6]ESG bonds in Korea fall into three categories: green bonds, social bonds, and sustainability bonds. Green bonds are issued to raise funds to support investments in eco-friendly projects such as renewable energy infrastructure, green buildings, and electric vehicles. Social bonds are issued to raise funds to support invest in businesses that create social value. Lastly, the sustainability bonds are issued to raise funds to invest in environmentally friendly and socially valued businesses. Since ESG bond was first issued in 2018 in Korea, ESG bond issuance has increased consistently; 160 in 2019, 322 in 2020 and 662 bonds were issued in 2021.

from multiple sources. We obtain stock market and accounting data from the FnGuide and the TS-2000 database. We obtain ESG scores from the Korea Corporate Governance Service (KCGS) and hand-collected ESG committee data using corporate annual reports which are disclosed on Data Analysis, Retrieval and Transfer System (DART).[7] Firm-level emissions data are obtained from the National Greenhouse-gas Management System (NGMS). We exclude financial firms and firms with missing values needed for the analysis. Our final sample consists of 40 ESG bonds issued by non-financial listed firms (59 ESG bonds when including financial firms) from 2018 through January 2022. To avoid double-counting, we treat separate green, social, or sustainability bonds issued by the same entity as a single ESG bond. All continuous variables are winsorized by 1% at the tail.

The dependent variable is an indicator ($ESGBOND$) that equals one if a firm issues ESG bonds and zero otherwise. Independent variables consist of firm size, ESG committee, foreign ownership, and ETS firms, which are defined as follows. Firm size ($SIZE$) is the natural logarithm of total assets. ESG committee (CMT) is a dummy variable that equals one if a firm maintains an ESG committee and zero otherwise. Foreign ownership ($FORSHARES$) is foreign shares divided by the sum of common stock shares and preferred shares (Kim, Jung, and Chun, 2009). Emission Trading System (ETS) is a dummy variable that equals one if a firm is subject to the Korea Emission Trading System and zero otherwise.

We follow Lee (2021), Mohamed, Masih and Bacha (2015), Dang (2013), Buferna (2005), and Rajan and Zingales (1995) in including firm-level characteristics as control variables. Leverage (LEV) is total debt divided by total assets. Tobin's Q (Q) is the sum of the market value of equity and total liabilities divided by total assets. Cash holdings ($CASH$) is the sum of cash and cash equivalents divided by total assets. Cash flow (CF) is operating income before depreciation divided by lagged total assets. Research and development expenditure ($R\&D$) is R&D expenditures divided by total assets. Advertising expenditures (AD) is advertising expenditures divided by total assets. Capital expenditures ($CAPEX$) is the sum of changes in

[7] DART is a comprehensive corporate disclosure system that allows listed corporations to submit disclosure documents online, and users, such as investors, can immediately inquire through the Internet upon submission.

tangibles and intangibles plus depreciation of tangibles and intangibles divided by total assets. If the value is negative, we replace it with zero. Sales growth (SG) is sales divided by total assets.

In Table I we report the descriptive statistics for the main variables. The reported figures indicate that about 5% of KOSPI firms issued ESG bonds at least once between 2018 and January 2022. The correlation between ESG bond issuance ($ESGBOND$) and the independent variables are all positive and significant: ESG committee dummy (r=0.40, p<.01), foreign ownership (r=0.20, p<.01), firm size (r=0.44, p<.01), and ETS firms dummy (r=0.23, p<.01). Among the control variables, Tobin's Q (Q), cash holdings ($CASH$) and advertising expenditures (AD) are negatively correlated with ESG bond issuance, while the other control variables–financial leverage (LEV), cash flow (CF), capital expenditures ($CAPEX$), sales growth (SG) and R&D expenditures($R\&D$)–are positively correlated with ESG bond issuance. Detailed variable definitions are presented in the appendix.

Table I About Here

4. Results

In this section, we test which firm-level characteristics are associated with ESG bond issuance and we analyze how investors in the stock market react to ESG bond issuance announcements.

4.1. ESG bond issuers' characteristics

To test which firm-level characteristics are associated with ESG bond issuance, we run the following logistic regression:

$$\Pr(ESGBOND = 1|I, X) = \frac{\exp(\beta_0 + \beta_1 I + \beta_2 X + FE)}{1 + \exp(\beta_0 + \beta_1 I + \beta_2 X + FE)} \tag{1}$$

$ESGBOND$ is an indicator variable for ESG bond issuance. I is an independent variable—firm size, an ESG committee dummy, foreign ownership, or an ETS firm dummy. If our hypotheses hold in the data, the coefficient β_1 should be positive and statistically significant. X are control variables consisting of leverage, Tobin's Q, cash holdings, cash flow, R&D expenditure, advertising expenditures, capital expenditures, and sales growth. FE is fixed effects. We cluster standard errors at the industry level.

Table II presents the results of the analysis of the effects of firm size on ESG bond issuance. In column (1), based on a regression without control variables or industry fixed effects, the coefficient on $SIZE$ is positive and statistically significant at the 1% level. The coefficients on $SIZE$ shown in columns (2)–(4) suggest that the results are robust to the inclusion of control variables and industry fixed effects. For instance, the estimate for column (4) implies that a one-standard-deviation increase in firm size results in a 2.1 increase in the logarithm of the odds ratio for issuing ESG bonds. The results are consistent with the argument that larger firms are subject to higher visibility and heavier social pressures to embrace ESG practices than small firms are, as a result of which large firms are more likely to issue ESG bonds. As such, the results shown in this table support Hypothesis I.

Table II About Here

Table III shows the results for the effects of the ESG committee dummy (CMT) on ESG bond issuance. In column (1), the coefficient on CMT is positive and statistically significant at the 1% level. For columns (2), (3), and (4), we add control variables and industry fixed effects and the coefficients on CMT are positive and statistically significant at the 1% level. For instance, the estimate for column (4) implies that the logarithm of the odds ratio for issuing ESG bond by a firm with an ESG committee is 3.6 times higher than that for a firm that maintains no ESG committee. As such, firms that maintain ESG committees at the board level more actively participate in ESG bond issuance, which is consistent with the view that maintaining an ESG committee and issuing ESG bonds might originate from managers' interest

in CSR. As such, these results support Hypothesis II.

Table III About Here

Table IV shows the results of the analysis of the effects of foreign ownership on ESG bond issuance. The coefficient on $FORSHARES$ is positive and statistically significant at the 1% level in columns (1)–(4). For instance, the estimate for column (4) implies that a one-standard-deviation increase in foreign ownership results in a 0.8 increase in the logarithm of the odds ratio for issuing ESG bonds. As such, these results support Hypothesis III.

Table IV About Here

Table V shows the results of the analysis of the effects of ETS participation on ESG bond issuance. In columns (1)–(4) the coefficients on ETS are positive and statistically significant at the 1% level, whether the analyses account for control variables or industry fixed effects. For instance, the estimate for column (4) implies that the logarithm of ESG bond issuance by a firm that is subject to the ETS is 2.4 times higher than that for a firm that does not participate in the ETS. This result is consistent with the view that firms that are subject to the ETS may be under heavier pressure to reduce their carbon footprints and thus may seek to raise capital for environmental projects by issuing ESG bonds. As such, the results are consistent with Hypothesis IV.

Table V About Here

4.2. Investor responses

In this section, we examine stock price responses to ESG bond issuance announcements. As explained above, we hand-collect announcement dates using a news search engine to find the first day the market learned about a given issuance. We compute daily abnormal returns (AR)

as the stock return on a firm minus the market return on a specific date. We then compute cumulative abnormal returns (CAR) over the [-1,+1], [-2, +2], [-3, +3], and [-5, +5] windows, following Wang, Chen, Li, Yu, and Zhong (2020). In Table VI we report the univariate analysis results for ARs and CARs around ESG bond issuance announcements. Neither AR nor CAR is statistically significantly different from zero for all event windows. This result stands in contrast to those reported in prior studies that analyze green bond issues in the US, China and European countries. Analyzing global data on green bonds, Flammmer (2020) shows that the average CAR in the [-5, +10] event window is significant at the 5% level. A study using a Chinese sample also finds a similar result, indicating that, in the [-3, +3] and [-10, +10] event windows, the average CAR are both significant at the 1% level(Wang, Chen, Li, Yu, and Zhong, 2020).

These results suggest that the signaling hypothesis proposed in Flammer (2021)–which states that, by issuing green bonds, companies credibly signal their commitment to the environmen– does not hold in Korea. It seems likely that a lack of regulations on post-issuance reporting in Korean ESG bond markets might explain this result, as least in part. KRX requires all ESG bond issuers to submit post-issuance reports once a year; otherwise, their ESG bond registrations might be cancelled. That is, according to Segment Operation Guidelines for Socially Responsible Investment Bonds filed at KRX, firms issuing ESG bonds must submit post-issuance reports once a year to inform investors in transparent fashion where or how they used the financed money, and firms that fail to submit post-issuance reports once a year could see their registration of corresponding bonds cancelled. These rules are not mandatory, though, and there have been no confirmed cases in which ESG bonds were cancelled for violating these rules. In addition, the lack of certification and post-issuance reporting requirements may contribute to an erosion of investor trust regarding the ultimate use of an ESG bond's proceeds.

Table VI About Here

5. Conclusion

ESG bond markets in Korea are relatively nascent, yet they have undergone rapid recent growth, attracting the attention of firms that seek to make CSR investments. While many studies have been conducted on the existence of a green bond premium and other consequences of green bonds, little is known about what influences firms' decisions to issue ESG bonds in the first place. In particular, studies of ESG bond markets in emerging markets like Korea are very rare. We advance the literature on ESG bonds, and more broadly on CSR, by investigating the determinants of ESG bond issuance and the associated value implications in Korea.

We find that large firms, those that maintain ESG committees, those that feature high foreign ownership shares, and those that participate in the K-ETS are prone to issue ESG bonds. These results confirm that important variables in the CSR literature (e.g., resource availability, internal and external governance mechanisms, regulations) also matter when explaining corporate ESG bond issuance behaviors.

In addition, we examine investor responses to ESG bond issuance announcements, finding that stock prices do not change significantly around announcement dates. We conjecture that this result mostly reflects the lack of transparency and comparability in Korean ESG bond markets, eroding investor trust and confidence in ESG bonds. Overall, our findings suggest that the signaling effect of ESG bond issuance is not significant in Korea, highlighting the importance of transparency and disclosure in the ESG bond market. Given that the Korean ESG bond market remains at a nascent stage, we encourage future researchers to test the real effects of ESG bonds on environmental and financial performance as the market matures.

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Appendix A: Variable Definitions

Variables	Name	Definition
ESGBOND	ESG Bond Issuance	Takes the value of 1 if a firm had previously issued ESG bonds and 0 otherwise.
CMT	ESG Committee	Takes the value of 1 if a firm had established an ESG committee by 2021 and 0 otherwise.
SIZE	Size	Log of asset.
Q	Tobin's Q	(Market value+book value of debt)/total assets.
LEV	Financial Leverage	Total debt/total assets.
CASH	Cashholdings	Cash+short-term investments/total assets.
CF	Cashflow	Operating income before depreciation/lagged total assets.
R&D	R&D Expenses	R&D expenses/lagged total assets.
AD	Advertising Expenses	Advertising expenses/lagged total assets.
FORSHARES	Foreign Shares	Foreign Shares/(common shares+preferred shares).
CAPEX	CAPEX Expenditures	(Change in tangibles+change in intangibles+depreciation of tangibles+depreciation of intangibles)/lagged total assets; replace capex=0 if capex<0.
SG	Sales Growth	Sales/lagged sales.
ROA	Return on Asset	Net income/total asset.
ETS	ETS Firm Dummy	Takes the value of 1 if a firm participated in the K-ETS and 0 otherwise.

Table I **Summary Statistics**

This table reports summary statistics for the main variables in our regression models. Continuous variables are all winsorized at their 1st and 99th percentiles. *ESGBOND* takes the value of 1 if a firm had previously issued ESG bonds and 0 otherwise. *CMT* takes the value of 1 of a firm had established an ESG committee by the end of 2021 and 0 otherwise. *Forshares* is the percentage of foreign shares. *SIZE* is the log of the book value of assets. *ETS* takes the value of 1 if a firm participates in the K-ETS and 0 otherwise. *LEV* is financial leverage. *Q* is firm value. *CASH* is cash holdings. *CF* is cash flow. *CAPEX* is capital expenditures. *SG* is sales growth. *R&D* is R&D expenditures. *AD* is advertising expenditures. All variables are defined in the appendix.

Variable	MEAN	Std.Dev	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
ESGBOND	0.05	0.22	1.00												
CMT	0.14	0.35	0.40***	1.00											
FORSHARES	0.10	0.12	0.20***	0.26***	1.00										
SIZE	20.12	1.44	0.44***	0.53***	0.47***	1.00									
ETS	0.24	0.43	0.23***	0.20***	0.13***	0.38***	1.00								
LEV	0.40	0.21	0.11***	0.05	-0.12***	0.12***	0.12***	1.00							
Q	1.35	1.18	-0.04	0.01	0.12***	-0.07*	-0.06	-0.01	1.00						
CASH	0.12	0.12	-0.08**	-0.08**	0.04	-0.20***	-0.12***	-0.27***	0.10**	1.00					
CF	0.03	0.07	0.05	0.14***	0.21***	0.23***	-0.02	-0.19***	0.11***	0.02	1.00				
CAPEX	0.03	0.05	0.15***	0.05	0.02	0.08**	0.10***	0.22***	0.08**	-0.14***	0.11***	1.00			
SG	0.98	0.35	0.01	0.00	0.02	-0.02	-0.10***	-0.13***	0.10***	0.01	0.32***	-0.00	1.00		
R&D	0.01	0.02	0.02	-0.02	0.13***	0.03	-0.01	-0.02	0.39***	0.04	0.09**	0.11***	0.10***	1.00	
AD	0.00	0.01	-0.05	0.02	0.14***	0.06	-0.09**	-0.06*	0.16***	-0.03	0.20***	0.11***	0.01	0.27***	1.00

Table II **The relationship between ESG bond issuance and firm size**

This table reports the results of logistic regressions relating ESG bond issuance to firm size. Continuous variables are all winsorized at the 1st and 99th percentiles. $ESGBOND$ takes the value of 1 if a firm had previously issued ESG bonds and 0 otherwise. $SIZE$ is the log of assets. Q is firm value. LEV is financial leverage. $CASH$ is cash holdings. CF is cash flow. $CAPEX$ is capex expenditures. SG is sales growth. $R\&D$ is R&D expenditures. AD is advertising expenditures. T-statistics are reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	$ESGBOND$			
	(1)	(2)	(3)	(4)
$SIZE$	1.332***	1.389***	1.387***	1.477***
	(0.138)	(0.145)	(0.156)	(0.153)
Q		-0.249		-0.268
		(0.399)		(0.407)
LEV		1.107		1.493
		(0.892)		(1.132)
$CASH$		0.208		1.561
		(3.432)		(3.586)
CF		-0.501		2.988
		(4.071)		(4.595)
$CAPEX$		8.930***		9.268**
		(2.947)		(4.091)
SG		0.937***		0.965**
		(0.361)		(0.445)
$R\&D$		-3.793		-12.703
		(19.487)		(21.535)
AD		-83.392		-72.408*
		(50.985)		(37.679)
$IndustryFE$	NO	NO	YES	YES
N	719	719	697	697
$Pseudo\ R^2$	0.412	0.473	0.440	0.493

Table III **The relationship between ESG bond issuance and an ESG committee**

This table reports the results of logistic regressions relating ESG bond issuance to establishing an ESG committee. Continuous variables are all winsorized at the 1st and 99th percentiles. $ESGBOND$ takes the value of 1 if a firm had previously issued ESG bonds and 0 otherwise. CMT takes the value of 1 of a firm had established an ESG committee by the end of 2021 and 0 otherwise. Q is firm value. LEV is financial leverage. CASH is cash holdings. CF is cash flow. CAPEX is capital expenditures. SG is sales growth. $R\&D$ is R&D expenditures. AD is advertising expenditures. T-statistics are reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	$ESGBOND$			
	(1)	(2)	(3)	(4)
CMT	3.115***	3.278***	3.430***	3.586***
	(0.391)	(0.461)	(0.452)	(0.516)
Q		-0.341		-0.249
		(0.501)		(0.346)
LEV		1.972**		1.818*
		(0.843)		(1.011)
$CASH$		-2.212		-1.783
		(2.670)		(2.605)
CF		1.309		2.755
		(3.747)		(3.498)
$CAPEX$		8.668***		8.565***
		(2.517)		(2.380)
SG		0.280		0.688
		(0.603)		(0.505)
$R\&D$		21.199*		16.442
		(12.090)		(11.143)
AD		-91.374**		-88.493**
		(46.267)		(40.985)
$IndustryFE$	NO	NO	YES	YES
N	719	719	697	697
$Pseudo\ R^2$	0.249	0.342	0.307	0.381

Table IV **The relationship between ESG bond issuance and foreign ownership**

This table reports the results of logistic regressions relating ESG bond issuance to foreign ownership. Continuous variables are all winsorized at the 1st and 99th percentiles. $ESGBOND$ takes the value of 1 if a firm had previously issued ESG bonds and 0 otherwise. $Forshares$ is the percentage of foreign shares. Q is firm value. LEV is financial leverage. $CASH$ is cash holdings. CF is cash flow. $CAPEX$ is capital expenditures. SG is sales growth. $R\&D$ is R&D expenditures. AD is advertising expenditures. T-statistics are reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	$ESGBOND$			
	(1)	(2)	(3)	(4)
$FORSHARES$	4.430***	5.963***	4.916***	6.507***
	(0.803)	(1.116)	(0.860)	(1.188)
Q		-0.846		-0.759
		(0.786)		(0.775)
LEV		2.761***		2.844***
		(0.908)		(1.020)
$CASH$		-3.777		-3.451
		(3.070)		(2.962)
CF		4.496		5.674*
		(2.931)		(3.057)
$CAPEX$		6.639***		6.567***
		(2.442)		(2.476)
SG		0.235		0.403
		(0.398)		(0.441)
$R\&D$		18.599		17.229
		(15.503)		(16.455)
AD		-74.239*		-59.069*
		(39.473)		(30.758)
$IndustryFE$	NO	NO	YES	YES
N	717	717	695	695
$Pseudo\ R^2$	0.066	0.200	0.109	0.223

Table V **The relationship between ESG bond issuance and ETS firms**

This table reports the result of logistic regressions relating ESG bond issuance to ETS firms. Continuous variables are all winsorized at the 1st and 99th percentiles. $ESGBOND$ takes the value of 1 if a firm had previously issued ESG bonds and 0 otherwise. ETS takes the value of 1 if a firm participated in the K-ETS and 0 otherwise. Q is firm value. LEV is financial leverage. $CASH$ is cash holdings. CF is cash flow. $CAPEX$ is capex expenditures. SG is sales growth. $R\&D$ is R&D expenditures. AD is advertising expenditures. T-statistics are reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	$ESGBOND$			
	(1)	(2)	(3)	(4)
ETS	1.991***	1.869***	2.440***	2.410***
	(0.363)	(0.377)	(0.511)	(0.530)
Q		-0.549		-0.484
		(0.594)		(0.532)
LEV		2.218***		1.549*
		(0.861)		(0.917)
$CASH$		-2.123		-2.037
		(2.564)		(2.304)
CF		6.280**		6.161**
		(2.717)		(2.520)
$CAPEX$		5.840**		5.569**
		(2.321)		(2.422)
SG		0.511		0.794**
		(0.343)		(0.403)
$R\&D$		18.743		25.014*
		(14.084)		(14.515)
AD		-49.453*		-44.318
		(27.073)		(28.833)
$IndustryFE$	NO	NO	YES	YES
N	719	719	697	697
$Pseudo\ R^2$	0.112	0.196	0.157	0.230

Table VI **Univariate analysis of stock market reactions around ESG bond issuance announcements**

The date on which it is first reported that a firm will issue ESG bonds is considered the event date. *AR* is abnormal returns, defined as the stock return on a firm on a specific date minus the market return on that day. Cumulative abnormal returns is defined as total daily abnormal returns over the [-1,+1], [-2, +2], [-3, +3], and [-5, +5] windows.

ESG Bond Issue				
	N	MEAN	STD	t-test
AR(-5)	59	-0.08	1.71	-0.37
AR(-4)	59	-0.28	1.58	-1.35
AR(-3)	59	0.09	2.02	0.33
AR(-2)	59	-0.27	1.72	-1.18
AR(-1)	59	0.12	1.91	0.47
AR(0)	59	0.41	3.11	1.03
AR(1)	59	0.11	1.49	0.57
AR(2)	59	0.41	2.05	1.55
AR(3)	59	-0.11	1.60	-0.55
AR(4)	59	0.29	1.90	1.16
AR(5)	59	0.04	2.11	0.13
CAR[-1,+1]	59	0.64	3.77	1.31
CAR[-2,+2]	59	0.79	5.62	1.08
CAR[-3,+3]	59	0.76	6.53	0.90
CAR[-5,+5]	59	0.73	6.65	0.84