

The Effect of Environmental, Social and Governance (ESG) on Capital Cost

- Evidence from Korean Kosdaq Firms -

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Abstract

This paper investigates the effect of environmental, social and governance (ESG) on the cost of capital(WACC) for a sample of Kosdaq firms. It examines if financial markets value continuous investment in ESG movement through higher market capitalization and lower cost of capital. This study hypothesized that ESG movement would affect the cost of capital. This study examined the effect of ESG movement on the cost of capital using a large sample of Korean firms. The measure of ESG movement was used as an ESG(Environment, Social, Governance) index published by Korean Corporate Governance Service (KCGS). The results of this study find that the firms with ESG movement exhibit the negative on the cost of capital. These results are robust across different measures of variables and testing methodologies.

Keywords: Environmental, Social and Governance (ESG), Capital Cost, Kosdaq firms

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<논문 투고일> 2021.9.28 <논문 수정일> 2021.10.18 <게재 확정일> 2021.10.21

I. INTRODUCTION

Considerable attention about the future of the natural environment, prevailing social conditions, and governance of private and public institutions has come firm's environmental, social and governance(ESG) movement. Scholars and investors have published many empirical studies and several review studies on this relation since the beginning of the 1970s. The largest previous review study analyzes just a fraction of existing primary studies, making findings difficult to generalize. Thus, knowledge on the financial effects of ESG movement remains fragmented. To overcome this shortcoming, Friede *et al.*,(2015) extract all provided primary and secondary data of previous academic review studies. Through doing this, they combine the findings of about 2,200 individual studies. Hence, they are by far the most exhaustive overview of academic research on this topic and allows for generalizable statements. The results show that the business case for ESG investing is empirically very well-founded. Roughly 90% of studies find a non-negative of ESG and corporate financial performance (CFP) relation. More importantly, the large majority of studies reports positive findings. We highlight that the positive ESG impact on CFP appears stable over time. Promising results are obtained when differentiating for portfolio and non-portfolio studies, regions, and young asset classes for ESG investing such as emerging markets, corporate bonds, and green real estate.

Recent studies of ESG movement include Amel-Zadeh and Serafeim (2018), Pedersen *et al.*, (2019) and Hoepner *et al.*, (2020). Using survey data from a sample of senior investment professionals from mainstream (i.e. not SRI funds) investment organizations, Amel-Zadeh and Serafeim (2018) provide insights into why and how investors use reported environmental, social and governance (ESG) information. Relevance to investment performance is the most frequent motivation for use of ESG data followed by client demand and product strategy, bringing change in companies, and then ethical considerations. Important impediments to the use of ESG information are the lack of reporting standards and as a result lack of comparability, reliability, quantifiability and timeliness.

Among the different ESG investment styles, negative screening is perceived

as the least investment beneficial while full integration into stock valuation and engagement are considered more beneficial but they are all practiced with equal frequency. Current practices of different ESG styles, especially screening, are driven by product and ethical considerations. In contrast, integration is driven by relevance to investment performance. Future practices of ESG styles are driven by relevance to investment performance, bringing change in companies, and concerns about data reliability.

Hoepner *et al.*,(2020) examine whether engagement on environmental, social and governance (ESG) issues can benefit shareholders by reducing firms' downside risk, measured using the lower partial moment and value at risk. Using a proprietary database, we provide evidence supporting this hypothesis. They further find that the measured risk effects vary across engagement success and engagement themes. Engagement appears most effective in lowering downside risk when addressing environmental topics (primarily climate change). They find corroborating evidence in that successful engagement reduces the firm's exposure to a downside-risk factor.

Berg *et al.*,(2020) investigates the divergence of environmental, social, and governance (ESG) ratings. Based on data from six prominent rating agencies - namely, KLD (MSCI Stats), Sustainalytics, Vigeo Eiris (Moody's), RobecoSAM (SP Global), Asset4 (Refinitiv), and MSCI IVA-, they decompose the divergence into three sources: different scope of categories, different measurement of categories, and different weights of categories. They find that scope and measurement divergence are the main drivers, while weights divergence is less important. In addition, they detect a rater effect where a rater's overall view of a firm influences the assessment of specific categories.

This global trend toward emphasizing on ESG has also affected the business environment for the firms in Korea. An ESG index published by Korean Corporate Governance Service (KCGS) from 2014 to 2018 was used as the measure of ESG movement. This study examined the effect of ESG movement on the cost of capital using a large sample of Korean Kosdaq firms. There are differences from previous research in the following ways. First, we used a KCGS variable as a proxy of ESG movement, while previous studies used managers, foreign and great owner's stocks ratios. Secondly, the results of this study are robust across different measures of variables and testing methodologies.

The remainder of this paper is organized as follows. In the next section, the study describes prior research, presents the theoretical relation between ESG and capital cost, and develops research hypotheses. Section three explains the research design including the sample selection and regression models. The results for this study are presented in section four. A summary of the results and some suggestions for future research will contain in the last section.

II. THEORETICAL FRAMEWORK AND HYPOTHESES

1. Literature Review

The literature review starts by presenting the state of the research on the ESG. Berg *et al.*,(2020) find that scope and measurement divergence are the main drivers, while weights divergence is less important. In addition, we detect a rater effect where a rater's overall view of a firm influences the assessment of specific categories.

The coronavirus pandemic caused a sharp market decline while raising heterogeneous responses across companies related to their employees, supply chain, and repurposing of operations to provide needed products and services(Cheema-Fox et al, 2020). They study whether during the 2020 COVID-19 induced market crash, investors differentiated across companies based on their human capital, supply chain, and products and service response. Using data derived from natural language processing applied to news coverage of corporate responses to the coronavirus crisis for 3,023 companies around the world, they find that more positive sentiment around a company's response is associated with less negative returns. This is especially true for companies with more salient responses and in industries that those responses are more likely to represent a more credible commitment to their stakeholders.

Pedersen et al.,(2019) propose a theory in which each stock's environmental,

social, and governance (ESG) score plays two roles: 1) providing information about firm fundamentals and 2) affecting investor preferences. The solution to the investor's portfolio problem is characterized by an ESG-efficient frontier, showing the highest attainable Sharpe ratio for each ESG level. The corresponding portfolios satisfy four-fund separation. Equilibrium asset prices are determined by an ESG-adjusted capital asset pricing model, showing when ESG increases or lowers the required return. Combining several large data sets, we compute the empirical ESG-efficient frontier and show the costs and benefits of responsible investing. Finally, we test our theory's predictions using commercial ESG measures, governance, sin stocks, and carbon emissions.

In the last decade, companies have come under pressure to be socially conscious and environmentally responsible, with the pressure coming sometimes from politicians, regulators and interest groups, and sometimes from investors. The argument that corporate managers should replace their singular focus on shareholders with a broader vision, where they also serve other stakeholders, including customers, employees and society, has found a receptive audience with corporate CEOs and institutional investors. The pitch that companies should focus on "doing good" is sweetened with the promise that it will also be good for their bottom line and for shareholders. In this paper, Cornell et al.,(2020) build a framework for value that will allow us to examine how being socially responsible can manifest in the tangible ingredients of value and look at the evidence for whether being socially responsible is creating value for companies and for investors.

Park and Kim(2017) examines the empirical association between corporate social responsibility(CSR) and earnings management, using a sample of KOSPI and Kosdaq firms over three-year period (2011-2013). The measure of CSR was used as an ESG(Environment, Social, Governance) index published by Korean Corporate Governance Service (KCGS). The results of this study presented that the firms with high CSR exhibit the decrease of earnings management. Kosdaq firms show the increase than KOSPI firms in the effect of earnings management.

2. Hypotheses

As suggested by previous section, ESG movement makes contributions to reducing conflicts between firms and society. The excessive expense of ESG movement can affect the capital cost of the firms. These impacts of ESG movement on the firms' capital cost are elaborated below and ESG movement can affect the firms' capital cost in the following ways.

Hypothesis : The firms with high ESG movement would be a lower in the cost of capital than those with lower ESG movement.

III. RESEARCH DESIGN

1. Sample Selection

[Table 1] A Number of Sample Firms(Kosdaq)

Industry	KOSDAQ	
	frequency	percentage
manufacturing	258	50%
construction	14	3%
wholesales and retails	31	6%
service	154	30%
others	61	11%
Total	518	100%

[Table 1] presents a number of sample firms tested this study. It is consisted of a sample of 518 on Korean Kosdaq firms which an ESG(Environment, Social, Governance) index published by Korean Corporate Governance Service (KCGS) was used as the measure of ESG movement. The sample firms using this study must satisfy the following criteria: (1) each firm has to be ranked in KCGS index over 5-year period (2014-2018); (2) sufficient financial data is available in KIS-VALUE database to calculate financial performances and other variables.

2. Measurement of Variables

1) ESG index and Capital Cost

ESG variable was measured as SCORE index published by Korean Corporate Governance Service (KCGS). SCORE index is a score based on the evaluation of a firm's ESG system using three components- the Environment, Social, Governance- with different weights. The cost of equity capital is estimated using the Fama and French (1993) three-factor model with the market excess return. As described by Barth et al., 2008, and Kothari et al., 2009, we estimate the cost of equity capital for year t+1 in equation (1) with varying factor loadings for each firm using weekly returns:

$$R_i - R_f = a_i + b_i[R_m - R_f] + s_iSMB + h_iHML + e_i \quad (1)$$

The estimated cost of capital measure is equal to the average risk free rate $\overline{R_f}$ plus the estimated slope coefficients \hat{b} , \hat{s} and \hat{h} multiplied respectively with the yearly average returns of $\overline{R_m - R_f}$, \overline{SMB} and \overline{HML} in t+1.

2) Control Variables

In an attempt to investigate this "correlated omitted variables" problem, we repeat the analysis with the inclusion of firm size (SIZE), systematic risk of common stock(BETA), DEBT(Book Value of Debt/Book Value of Assets). The variables, *SIZE* and *DEBT*, have been shown to affect financial performance(e.g., Easton and Zmijewski (1989) and Collins and Kothari (1989)).

3) Regression Model

As an attempt to investigate whether the firm's ESG movement affects its WACC, we estimate the following regression model:

$$\begin{aligned} WACC_t = & a_0 + a_1ESG_t + a_2SIZE_t + a_3DEBT_t + a_4PPET_t + a_5BETA_t \\ & + a_6ROA_t + a_7OPI_t + a_8ID_t + a_9YD_t + \varepsilon \end{aligned}$$

$$\begin{aligned}
 WACC_{t+1} = & a_0 + a_1ESG + a_2SIZE_t + a_3DEBT_t + a_4PPE_t + a_5BETA_t \\
 & + a_6ROA_t + a_7OPI_t + a_8ID_t + a_9YD_t + \varepsilon
 \end{aligned}
 \tag{1}$$

Where,

WACC : The Cost of Equity Capital

ESG : EGS index of Korea Corporate Governance Service(KCGS)

PPE : Tangible Assets/Total Assets

BETA : Systematic risk of common stock

ROA : Operating Income/Total Assets

DEBT : Book Value of Debt/Book Value of Assets

SIZE : Natural Log of Total Book Value Assets

OPI : Dummy variable which takes a value of 1 if firm belongs to the sample of auditor's unqualified opinion, and 0 otherwise

$\sum ID$: Industry Dummy

$\sum YD$: Year Dummy

ε : Residual Error

IV. Empirical Results

1. Descriptive Statistics

Descriptive statistics for ESG, WACC and control variables are reported in [Table 2]. The mean and median of the ESG are 0.2687 and 0.2585, respectively. The st.dev of WACC presents 2.0354, with mean (median) value of 6.7315(6.9172). Furthermore, mean and median of return on assets (ROA) as measured by financial performance is 0.0212 and 0.0335, respectively. As reported in [Table 2], the control variables used in this study are financial leverage(DEBT), SIZE, BETA, and OPI.

[Table 2] Descriptive Statistics of Variables(Kosdaq)

	KOSDAQ(N=518)				
	mean	median	st.dev	Q1	Q3
ESG	0.2687	0.2585	0.0856	0.1971	0.3368
SIZE	22.7678	22.6935	0.6585	22.2912	23.2073
DEBT	0.3713	0.3541	0.2123	0.1938	0.5335
PPE	0.0856	0.0765	0.1121	0.0121	0.1168
BETA	1.0723	1.0878	0.4186	0.8087	1.3635
ROA	0.0212	0.0335	0.1897	0.0015	0.0846
WACC	6.7315	6.9172	2.0354	5.7646	7.9968
WACCt+1	6.01304	6.1487	1.9765	5.0781	7.1612
OPI	0.6871	1.0000	0.6235	0.0000	1.0000

2. Regression Analysis

[Table 3] Correlations(Kosdaq)

	ESG	SIZE	DEBT	PPE	WACC	WACC t+1	ROA	OPI	BETA
ESG	1	0.259 **	0.656 **	0.234 **	-0.029 **	-0.113 **	0.018 **	0.123 **	-0.285 **
SIZE		1	0.041 **	0.119	0.061 **	-0.038 *	-0.074 *	0.121 **	0.191 **
DEBT			1	0.016	0.071 **	-0.153 *	-0.057 *	-0.057 *	0.263 **
PPE				1	0.215 **	-0.118 **	0.279 **	-0.015 **	0.211 **
WACC					1	-0.189 **	0.587 **	-0.671 **	0.185 **
WACC t+1						1	0.342 *	-0.138	0.197 *
ROA							1	0.116 **	0.163 *
OPI								1	0.085 **
BETA									1

note: ***: Sigificant at $\alpha < 0.01$; **: Sigificant at $\alpha < 0.05$; *: Sigificant at $\alpha < 0.1$

Results in preceding section are descriptive statistics for ESG, the cost of

capital and control variables. [Table 3] explains the Pearson correlation coefficients among selected variables, which present potential effects of other variables on ESG as well as WACC. The rationale for comparing these particular variables is their association with ESG. As expected, ESG has significantly positive correlation with SIZE, DEBT, PPE, ROA and OPI. However, the correlations of ESG with WACC and BETA are significantly negative correlation. Also, there are strong positive correlations among ESG measures.

The purpose of this paper is to examine whether there is any significant shift in the capital cost on ESG. The hypothesis of this study posits that WACC measured by the cost of equity capital is negatively related to ESG and ROA. The regression model is estimated to test the relationships between WACC and ESG as presented in [Table 4]. The regression model relates WACC to ESG and it shows that WACC is negatively related to ESG at the 1% significance level. This implies that an increase in firm's ESG activity results in a decrease in firm's WACC. Additionally, firm's WACC is negatively related to ROA at the 1% significance level which indicates that firm's WACC is also increased when ROA is reduced.

[Table 4] describes the models used by the variables of environment index, social index and governance index of KCGS. This study supports the hypothesis which state that firm's WACC is negatively related to ESG. ESG would play the role of reducing conflicts between firms and society, and it also increase financial transparency and disclosure, thereby lowering firms' WACC.

The residuals of the diagnostic tests represent to be approximately normally distributed and the Durbin-Watson statistic (dw) was close to 2. Outliers were tested by eliminating observations containing value of DEBT and BETA greater in absolute value of the 10 percent. These results were not significantly different from those reported. The Hausman and RESET tests for general mis-specification appeared again to indicate the existence of possible underlying weaknesses in the model. The RESET test presented a coefficient on the proxy variable that was significantly different from zero at the one significance level. In the Hausman test, the relevant F-value of 6.456 on the unrestricted equation exceeded the critical F-value (2.454).

Overall, the results of this study present a direct support to the hypothesis, even after controlling for other factors.

[Table 4] $WACC_t = a_0 + a_1ESG + a_2SIZE_t + a_3DEBT_t + a_4PPE_t + a_5BETA_t + a_6ROA_t + a_7OPI_t + a_8ID_t + a_9YD_t + \epsilon$

Variables	WACC		WACC _{t+1}	
	β	t	β	t
Constant	5.2345	2.0218**	7.4015	2.2312**
ESG	-4.6235	-4.9356***	-4.7253	-4.5018***
SIZE	-0.0023	-0.0056	-0.1678	-0.5201
DEBT	0.7951	2.0269**	0.0315	0.0501
PPE	0.6578	0.8956	0.4456	0.6123
BETA	2.8125	17.5621***	1.6547	7.7123***
ROA	-3.8941	-7.875***	-1.3245	-2.5450**
OPI	0.1365	1.4213	0.0835	1.1059
ΣID	Included		Included	
ΣYD	Included		Included	
D-W	1.723		1.954	
adj.R [^]	0.469		0.179	
N	518		518	

note: ***: Significant at $\alpha < 0.01$; **: Significant at $\alpha < 0.05$; *: Significant at $\alpha < 0.1$.

Where,

WACC : The Cost of Equity Capital

ESG : EGS index of Korea Corporate Governance Service(KCGS)

PPE : Tangible Assets/Total Assets

BETA : Systematic risk of common stock

ROA(Return on Assets) : Operating Income/Total Assets

DEBT : Book Value of Debt/Book Value of Assets

SIZE : Natural Log of Total Book Value Assets

OPI : Dummy variable which takes a value of 1 if firm belongs to

the sample of auditor's unqualified opinion, and 0 otherwise
 $\sum ID$: Industry Dummy
 $\sum YD$: Year Dummy
 ε : Residual Error

IV. Conclusion

The purpose of this study is to examine whether there is any systematic relation between environmental, social and governance (ESG) and the cost of capital on Korean Kosdaq firms. Based on the argument that ESG movement would benefit shareholders by reducing firms' downside risk, measured using the lower partial moment and value at risk, this study hypothesized that ESG movement would affect the cost of capital.

Using this framework, we then derive the hypotheses that firms with higher ESG would have lower WACC and higher firm values than those with lower ESG. These hypotheses were examined using a sample of 518 over five-year period (2014-2018) on Kosdaq firms. An ESG index published by Korean Corporate Governance Service (KCGS) was used as the measure of ESG movement. The results found that the firms with high ESG movement exhibit lower of the capital cost.

Several related issues are left for future research. First, it has not been fully examined whether ESG and WACC have any causal relationship. For example, financially sound firms may be more active in ESG, which in turn would bring even lower of the capital cost. Second, investigation into the effects of these factors such as CEO's management philosophy and degree of foreign exposure on ESG and its relationship with WACC will provide further insights into the relation between ESG and WACC.

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자본비용에 관한 ESG의 영향

- 코스닥기업에 관한 증거 -

김요환*

요약

본 연구는 환경, 사회, 지배구조(ESG)와 자본비용이 유의적인 관계가 있는지를 코스닥기업을 통해 검증한다. 기업의 ESG활동이 기업과 사회의 갈등을 줄이는 역할에 관한 논쟁에 대해 본 연구는 기업의 ESG활동과 자본비용을 사용하여 관계를 검증하였다. ESG 활동을 많이 하는 기업과 자본비용과의 관계를 예측하였다.

이 가설을 검정하기 위해 한국지배구조원에서 발표하는 지수를 참고하여 2014년부터 2018년까지 코스닥기업의 표본을 대상으로 실증분석을 하였다. 연구결과 기업의 ESG를 활동적으로 하는 기업일수록 자본비용과 유의한 결과를 나타냈다. 따라서 기업이 ESG 활동을 할수록 보다 낮은 자본비용이 발생한다는 결론을 제시한다.

핵심 주제어 : 환경, 사회, 지배구조(ESG), 자본비용, 코스닥 기업

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