**Master's Thesis of Business Administration**

# Agency Problems of Environmental and Social Stocks:
## An analysis of the Covid-19 Market Crash in Korea

## 환경·사회책임 우수기업의 대리인 문제:
## Covid-19 한국 주식시장 급락을 중심으로

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## Abstract

# Agency Problems of Environmental and Social Stocks:
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In this paper, I revisit the question of whether ESG activities are value-maximizing or agent-driven in the Korean stock market using the Covid-19 panic period. I document a unique and negative association between ESG scores and stock returns during the first quarter of 2020. I find that ESG score is a function of selling, general and administrative (SG&A) costs and that high-ESG firms increased their overall costs, SG&A, and free cash flows relative to low-ESG firms before the onset of Covid-19 pandemic. I argue that overinvestment before the first quarter of 2020 significantly accounts for the worse stock performance of socially responsible firms.

**Keyword :** ESG, Covid-19 stock market crash, Stock performance, Agent-driven ESG, Value-enhancing ESG
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# 1. Introduction

Firms' involvement with Environmental, Social and Governance (ESG) activities has long been a hotly debated issue among economists, lawmakers, and practitioners. The classical economic theory suggests that firms should not internalize negative externalities on non-shareholding stakeholders (see, e.g. Pigou, 1920). Nevertheless, the society demands individual and corporate social responsibilities to mitigate some market failures that inevitably occur in reality.

Much of recent research on ESG have been devoted to examining whether and how ESG activities relate to firm performance, and the findings from these studies support either of two different perspectives on ESG. First, the predominant view on ESG is often described as "doing well by doing good": firms' engaging with broader environmental and social goals can be consistent with enhancing shareholder value. Several researchers argue that high ESG firms have lower systematic risk due to their loyal customer bases and less price-elastic demand (Albuquerque, Koskinen, and Zhang, 2018) and their resilience during the crisis period (Lins, Servaes, and Tamayo, 2017), while other researchers provide evidence that ESG activities are associated with lower downside risks (Ilhan, Sautner, Vilkov, 2019; Hoepner, Oikonomou, Sautner, Starks, and Zhou, 2019). In short, this line of thought implies that managers invest in ESG activities because those projects have positive net present value (NPV).

In contrast, the alternative view on ESG is well represented by Milton Friedman's argument that "the only responsibility of firms is to maximize the value of shareholders" (New York Times Magazine, 1970, p.122). Krüger (2015) provides evidence that stock returns negatively react to some forms of positive

news on corporate social responsibilities, and Hong Kubik, and Scheinkman (2012) show that some omitted variables such as financial constraints explain the correlation between ESG and firm performance. Furthermore, Cheng, Hong, and Shue (2013) and Masulis and Reza (2015) argue that ESG investment may simply be the outcome of agency problem by showing that ESG activities decrease as CEO shareholding increases, using dividend tax cut in 2003 as a natural experiment. Under this alternative perspective, ESG activities are more likely to be induced by managers or board members at the expense of other shareholders' wealth. Overall, the question of whether ESG investment is value-enhancing or manager-driven remains unsolved.

In this paper, I revisit the debate over two competing perspectives on ESG by testing both arguments. I first examine whether investment in corporate social responsibilities causes stock outperformance in the Korean financial market during the Covid-19 market crash. While the majority of previous studies reports a positive effect of ESG on firm performance during the crisis period, I find a significantly negative association between KCGS ESG ratings[1] and stock returns, and this negative association is unique to the Covid-19 panic period. Inconsistent with the value-maximizing ESG investment, this evidence lend more support to the agency perspective of ESG.

Empirical challenge with studying the correlation between ESG and performance lies in identifying the direction of causality (i.e., firms do good because they do well). To address this empirical difficulty, I use the Covid-19 market crash event as an unexpected shock to output and market confidence. For instance, some previous literature employs an exogenous shock such as the 2008-

[1] The Korea Corporate Governance Service (KCGS)

2009 financial crisis and the Covid-19 pandemic as a natural experiment. Lins, Servaes, and Tamayo (2017) find the positive association between ESG scores and firm performance during the financial crisis, and Albuquerque, Koskinen, Yang, and Zhang (2020), and Ding, Levine, Lin, and Xie (2021) report a positive association between firms' ESG scores and performance in the Covid-19 pandemic period. These studies support the value-enhancing ESG perspective by showing that firms with higher ESG scores suffer less relative to firms with lower ESG scores during the period when revenue unexpectedly stops. Yet, Buchanan, Cao, and Chen (2018) document a significantly negative correlation between firms' ES ratings and their firm value measured by Tobin's q during the financial crisis. Using the triple difference analysis, Buchanan et al. (2018) interpret this result to suggest that significant decline in asset price magnified firms' agency problems when firms were insufficiently monitored by institutional shareholders.

The second part of this paper discusses potential explanations for the findings based on agency theory. One possible explanation for the negative correlation between ES and covid panic returns is overinvestment among socially responsible firms. The imperfect control models of Dow, Gorton, and Krishnamurthy (2005) predicts that firms are more likely to overinvest during booms and that this overinvestment problem will be more associated with large firms. Consistent with this prediction, Hong, Kubik, and Sheinkman (2012) finds that firms which are overvalued due to IT bubble temporarily increased ESG spending before the bubble busted. These findings of previous agency literature raise following hypothesis: If socially responsible firms overly invested in ESG projects before 2020, the unexpected outbreak of the pandemic may have

negatively affected the earnings outlook of these firms, thereby further decreasing stock returns during the first quarter of 2020.

To test this hypothesis, I first examine whether ES is a function of firm's expenditure by analyzing the determinants of ES scores, and find that ES is an increasing function of firms' selling, general and administrative (SG&A) costs. Next, I test whether high-ES firms spent more relative to low-ES firms before the market crash in the first quarter of 2020 by analyzing the change of firms' expenditure surrounding the panic period. I find that ES score has a significant and positive association with several cost measures before the onset of Covid-19 pandemic and the positive relationship becomes insignificant during the Covid-19 market crash. These findings are consistent with the prediction of overinvestment hypothesis.

This paper is organized as follows. Section 2 introduces the data and sample used in the analysis. Section 3 presents the baseline cross-sectional regression of panic-period returns and difference-in-difference regressions surrounding the panic period. In Section 4, I discuss alternative explanations and testing hypotheses based on agency theory. Section 5 concludes with a summary.

# 2. Data

## 2.1. ES measure

In this paper, I use data from two main sources. Information on ESG ratings is from the Korea Corporate Governance Service (KCGS, hereafter) database. Stock returns and accounting data are from DataGuide database. This paper analyzes firms with all information available in both KCGS and DataGuide databases.

The KCGS has announced environmental, social, and governance ratings of large publicly traded companies since 2011. The KCGS database contains annual ratings on about 900 Korean companies, all firms listed on the KOSPI market and some selected firms listed on the KOSDAQ market.[2] The rating data has been used for constructing ESG-themed indices of the Korea Exchange (KRX), such as KRX ESG Leaders 150, KRX Governance Leaders 100, and KRX Eco Leaders 100.

The KCGS evaluates performance of the selected companies in the three categories: environment, society, and governance. First, the environment category is further broken down into internal environmental organization, environmental audit and accounting, carbon emission, and sustainability reporting. Second, the society category includes firm's relationship with its employees, partners, consumers, and local communities. Finally, the governance category comprises firm's devices to protect shareholders, board independence, investor relations, and

[2] The Korea Exchange (KRX) operates four markets: Main Board (often referred as the Korea Composite Stock Price Index (KOSPI) market), the Korean Securities Dealers Automated Quotations (KOSDAQ) market, the Korea New Exchange (KONEX) market, and the derivatives market. The KOSPI market contains larger domestic and international stocks, whereas the KOSDAQ market largely contains small and medium-sized stocks.

dividend policy. In October each year, the KCGS reports ratings for each of the three categories and overall ESG of the previous year, and the ratings take on the form of seven letter grades: S, A+, A, B+, B, C, and D.

To construct the main explanatory variable, I first convert the letter-graded rating scale of each of the three categories and overall ESG into the numeric scale, following the previous literature (Lee and Park, 2019). For instance, the highest rating of S has a numeric score of 7, the next highest rating of A+ has a numeric score of 6, and so forth. The lowest rating of D has a numeric score of 1. Then, I compute the average of environment and social scores to focus on environment and social categories in the ESG activities as in the previous studies (Lins, Servaes, and Tamayo, 2017; Albuquerque, Koskinen, Yang, and Zhang, 2020). The main explanatory variable, *ES*, ranges from 1 to 7.

## 2.2. Event period

I define the Panic period as the period from January 2020 to March 2020. Figure 1 provides the basis for the choice of the event period. Figure 1 plots daily KOSPI performance during 2020 with three dates highlighted: January 24, February 19, and March 24, 2020. These dates represent the dates when exogenous covid shock which affected the Korean stock market took place. After the first case of the Covid-19 was identified in December 2019 in China, the first domestic case was publicly reported on January 24, 2020 in Korea. On the first trading day after the report, the Korean stock market immediately declined by 3.1 percent, but the market managed to recover by mid-February. However, the stock market sharply dropped again after the 31st domestic case on February 19. The patient's contact tracing data raised the possibility of large-scale infection and many of those who

contacted the 31st patient confirmed infection. The downtrend in the Korean stock market continued until the market rebound on March 20, the day when US government announced the second Coronavirus Emergency Aid Package (CEAP) and Commercial Paper Funding Facility (CPFF) to mitigate the strain in the real and financial market, and the news led the Korean investors expect comparable measures from the Korean government. On March 24, the Korean government finally announced coronavirus rescue package of 100 trillion won ($80 billion) and the market rebounded. The KOSPI reached the pre-covid-shock level of 2,220 in July 2020, and continued to increase afterwards. On the final trading day of 2020, the KOSPI set a record high by closing at 2,873.47.

[Insert Figure 1]

## 2.3. Return and control variables

I obtain monthly stock returns from DataGuide from 2015 to 2020. The monthly abnormal return is estimated as the difference between the monthly raw stock returns and the expected returns based on market model:

$$AR_{it} = R_{it} - \alpha_i - \beta_i R_{mt} \quad (1)$$

where $\alpha_i$ and $\beta_i$ are market model parameter estimates obtained by regressing monthly returns for the security *i* on the value-weighted market returns over 60-month estimation period ending in December 2019.[3] Similarly, *Panic Raw Return* is firm's buy-and-hold raw return during January 2020 through March 2020, and *Panic Abnormal Return* is the difference between the buy-and-hold raw return and the buy-and-hold expected returns, based on market model estimated over 60-

[3] Results are similar when using abnormal returns based on the CAPM instead.

month period.

I obtain annual accounting data for 2018 from DataGuide and compute the following firm characteristics: *Cash Holdings* (cash divided by assets), *Short-Term Debt* (short-term debt divided by assets), *Long-Term Debt* (long-term debt divided by assets), and *Profitability* (operating income divided by assets).

I gather monthly market data for 2019 from DataGuide and computed following additional control variables: *Size* (the log of a firm's year-end equity market capitalization), *Book-to-Market* (book value of equity divided by market value of equity), *Negative Book-to-Market* (dummy variable set to one when the book-to-market ratio is negative and zero otherwise), *Momentum* (the firm's raw return over the period January to December 2019).

In addition, I control for firm's *Idiosyncratic Risk* and *factor loadings* using monthly return data during 2015 through 2019 from the DataGuide database. I measure *Idiosyncratic Risk* as the residual variance from the market model estimated over 60-month period ending in December 2019. I estimate firm's factor loadings over 60-months prior to the onset of the covid-19 outbreak, based on Fama-French three-factor model plus Carhart momentum factor. Firms with available data fewer than 12 months are excluded from the analyses to estimate idiosyncratic risk and factor loadings.

As in the previous studies, I remove financial and microcap stocks from the analysis. Microcap stocks is defined as a stock with market capitalization below the median year-end market capitalization in the KOSPI market in the previous year, following the definition by Ha and Ko (2017). After integrating firms on the DataGuide database and firms on the KCGS database, I obtain a sample of 391 nonfinancial and non-microcap stocks for which all control variables are available

during the panic period.

## 2.4. Summary statistics

Panel A of the Table 1 reports summary statistics for the main variables during the first quarter 2020. The most noticeable point is the negative correlation between *ES* and two stock return variables in Panel B. The previous literature document the positive association between US firms' ESG ratings and the stock performance during the Covid-19 market crash (Albquerque et al. 2020) and during the financial crisis (Lins et al. 2017). These findings are in line with the view that a firms' engagement with ESG activities enhances firm stock performance. On the contrary, the negative relationship between *ES* and stock return variables detected in the Korean stock market during the Covid-19 market crash indicates that the dominant perspective on ESG may not apply to the Korean market. Furthermore, this negative correlation implies that stocks with higher ES scores in Korea may suffer more severely relative to other stocks with lower ES scores during the period of low trust.

To better understand the negative relationship between stock returns and the main explanatory variable, *ES*, I divided firms in the sample into terciles by firms' ES scores. Panel C presents the detailed summary statistics among ES terciles. The mean raw returns of the lowest ES tercile, second ES tercile, and the top ES tercile are –0.16, –0.24, and –0.28, respectively, indicating that stock prices of firms with higher ES ratings declined more severely than stock prices of firms with lower ES ratings. The mean abnormal returns of the lowest ES tercile, second ES tercile, and the top ES tercile are 0.04, –0.06, and –0.09, indicating that the abnormal returns of stocks with higher ES ratings also performed worse than the

abnormal returns of stocks with lower ES ratings. The difference in mean returns between the top and bottom terciles are statistically significant at the 1% level.

[Insert Table 1]

# 3. Covid-19 panic period experiment

## 3.1. Empirical Design

In this subsection, I summarize two sets of regression models to study the effect of a firm's *ES* on its stock performance in the Korean stock market. First, I investigate whether a firm's investment in environment and social responsibilities pays off during the period of low trust in the Korean market. To test this hypothesis, I estimate the following cross-sectional regression:

$$Return_i = b_0 + b_1 ES_i + b_2{}' \mathbf{X}_i + Industry\ FE + e_i \quad (2)$$

where $Return_i$ is 3-month raw or abnormal return of firm $i$ during the first quarter 2020, $ES_i$ is the average of environment and social scores of firm $i$ in 2018 and $\mathbf{X}_i$ is a vector of control variables based on annual accounting data in 2018 and monthly market data that are publicly available as of year-end 2019.[4] The control variable includes firm characteristics and firms' factor loadings based on Fama-French three-factor plus Carhart momentum factor. The proxies for firms' financial characteristics are *Cash holdings, Long-Term Debt, Short-Term Debt, Proftiability, Size, Book-to-Market, Negative B/M dummy, Momentum*, and *Idiosyncratic Risk*. Definitions of control variables used in the analysis are introduced in the section 2.3. In all models, I include industry fixed effects and controls for firms' factor

[4] Results are similar if I use accounting data for fiscal year 2019, instead.

loadings. Standard errors are robust to heteroscedasticity. The coefficient on the ES ($b_1$) captures the direction of the impact of ES on quarterly stock returns during the panic period when the stock market continually dropped due to mounting worries about soaring infection cases.

Second, I test whether the positive or negative association between *ES* and stock returns observed in the Korean stock market is unique to the panic period. The rejection of the null hypothesis indicates that some omitted variables which is correlated with *ES* may explain the association between *ES* and stock returns observed in most time periods. To test the null hypothesis, I estimate the following difference-in-difference model with continuous treatment:

$$Return_{i,t} = b_0 + b_1 ES_{i,2018} \times Panic_t + b_2 ES_{i,2018} \times PostPanic_t + b_3{}' \mathbf{X}_{i,t-1} + Month\ FE + Industry\ FE + e_{i,t} \quad (3)$$

where $Return_{i,t}$ is firm *i*'s monthly raw return or abnormal return starting in January 2019, prior to the onset of the panic period, and ending in December 2020, $ES_{i,2018}$ is firm *i*'s ES score in 2018, $Panic_t$ is a dummy variable that equals one from January 2020 to March 2020 and zero before and after this period, $PostPanic_t$ is a dummy variable that equals one from April 2020 to December 2020 and zero before this period, and $\mathbf{X}_{i,t-1}$ is a vector of lagged control variables. For this panel regression model, financial characteristics based on accounting data are updated three months after each fiscal year-end, and other control variables based on market data (momentum, size, book-to-market, idiosyncratic risk, and factor loadings) are updated monthly. Firm's idiosyncratic risks and factor loadings are re-estimated each month based on the previous 60 months' data. I included industry and month fixed effects. All standard errors are clustered at the firm level. As in the cross-sectional regression, I remove financial stocks and microcap stocks as of year-end

2019 from the analysis.

To see the negative impact of ES on monthly stock returns is unique to the panic period, I analyze the differential effects between panic and post-panic periods in equation (3). The coefficient on the first interaction term ($b_1$) captures the differential impact of ES on monthly stock returns during the first quarter of 2020, after controlling for factor loadings and firm characteristics and after eliminating firm and time fixed effects. If the negative effect of ES is unique to the panic period, the coefficient on the first interaction term would be negative and significant and the coefficient on the second interaction term would be non-negative or insignificant.

## 3.2. Empirical Results

3.2.1. *Panic-period cross-sectional regression*

The results for raw and market-model abnormal returns are presented in Panel A of Table 2. In column (1) and (2), I use the primary explanatory variable *ES* and factor loadings as independent variables. Standard errors are robust to heteroscedasticity. The negative effect of ES scores on stock returns are significant at the 1% level. The magnitude of coefficient indicates that one standard deviation increase in ES (1.1) is associated with 3.30 percentage point decrease in raw returns and 2.97 percentage point decrease in abnormal return during the first quarter of 2020 in the Korean stock market.

In column (3) and (4) of Panel A of Table 2, I add firm characteristics as independent variables to prevent the effect of unobservable variables on stock returns. After controlling for the additional variables, the results again suggest that

firms with higher ES ratings had lower stock returns during the first quarter of 2020 in the Korean stock market: one standard deviation increase in ES (1.1) is associated with lower raw returns of 3.41 percentage points and lower abnormal returns of 2.75 percentage points. In addition, the results indicate that firms with higher cash holdings and lower book-to-market had higher stock return during the panic period. Based on the model in column (3), a one standard deviation increase in cash holdings (0.069), and book-to-market (0.908) is associated with a change of raw returns of 2.83 and –4.54 percentage points, respectively.

In Panel B of Table 2, I divide firms into ES terciles. Instead of using the linear score measure, I include dummy variables for the highest and the middle ES terciles, where the intercept captures the effect of the lowest ES tercile, *ES1*. *ES3* includes firms with highest ES scores in 2018, while *ES2* contains firms with the next highest ES scores in 2018. The results again show that firms with higher ES scores are more likely to have lower stock returns. In column (1), the difference in raw returns between the lowest and the highest terciles, captured by the coefficient on *ES3*, is –8.5 percentage points, while the difference in raw returns between the lowest and the middle ES terciles, captured by the coefficient on *ES2*, is –5.1 percentage points. Furthermore, the results in all four models show that the negative effect of ES on stock returns is monotonic. In column (4), for instance, abnormal returns decrease about 5.8 percentage points when moving from the lowest to the middle ES tercile, while a movement from the lowest to the highest ES tercile is associated with a larger decrease in abnormal returns of 7.1 percentage points. The results imply that during the covid market crash the Korean investors perceived riskier the socially responsible firms which had actively invested in ESG activities before the market crash, on the contrary to the prevailing ESG

perspective that firms' investment in ESG activities enhances firm performance.

On the other hand, some previous studies indicate that firm's governance affects stock performance. Gompers, Ishii, and Metrick (2003) document that the investment strategy of buying firms with stronger shareholder rights and selling firms with weaker shareholder rights earns positive abnormal return. Baek, Kang, and Park (2004) show that during the Korean financial crisis in 1997, firms with higher ownership by foreign investors experienced smaller decrease in stock price while firms with higher ownership by controlling family shareholder experienced a larger decline in share value. Likewise, Lins, Volpin, and Wagner (2013) document that family-controlled firms largely underperformed relative to other firms during the 2008-2009 financial crisis. In contrast, Lee and Lee (2020) provide mixed evidence in the Korean stock market and show that the KCGS governance has a negative correlation with stock return in the short-term period, but the relation turns into positive three years after the governance rating evaluation.

To address the concern that firm's governance characteristics is significantly correlated with the ES measure, resulting in omitted variable biases, I control for several governance measures to the previous model in Panel A. I first use the governance category scores obtained by assigning numeric scores for the KCGS governance ratings the same way as I compute the environment and social scores. I also include dividend payout ratio obtained from Dataguide database as governance control. In addition, I hand-collect data on *Board Size*, *Board Independence* (the fraction of outside directors on the board), *CEO-Chairman Duality*, and *Board Ownership* (the fraction of outstanding shares owned by board members) as of year-end 2018 from the annual reports. I also include a dummy variable that equals one if the annual report does not provide information on the

CEO-Chairman duality.

In Panel C of Table 2, the negative effect of ES measure on stock returns persists after controlling for all governance measures. Columns (1) and (2) show that the KCGS governance scores have an insignificant correlation with raw and abnormal returns and that the negative impact of ES measures largely the same in comparison with the result in Panel A, controlling for other firm characteristics. In columns (3) and (4), board ownership is significant for both raw and abnormal returns. The results suggest that firms with higher ownership by board members suffered less during the panic period.

In sum, the results in Table 2 displays that high ES-rated firms underperformed in the Korean stock market during the Covid-19 market crash, and that this negative impact of ES on stock performance cannot be explained by firm's financial characteristics. These findings undermine the dominant ESG perspective that ESG activities enhance firm value and performances.

[Insert Table 2]

### 3.2.2. *Difference-in-differences regression*

I next investigate whether the negative correlation observed in the cross-section is unique to the panic period or common across most time periods. Table 3 presents the differential impacts of ES on stock return during and after panic period. For this test, I use panel data of monthly returns starting from January 2019, before the outbreak of the pandemic, and ending in December 2020.

For both raw and abnormal returns, the results suggest that ES and stock returns have a strongly significant and negative correlation during the panic period, but the correlation between ES and returns in the post-panic period turns into

insignificant when controlling for firm characteristics. The coefficient of –0.012 on the *ES x Panic* interaction term means that one standard deviation increase in 2018 ES rating (1.1) is associated with a 1.31-percentage-point lower abnormal return during the panic period on a monthly basis. On the other hand, the insignificant estimates on the *ES x Post-panic* interaction term suggests that high ES-rated stocks do not quickly recover after the market crash in comparison with other similar stocks but with lower ES scores. In sum, these results in Table 3 indicate that underperformance of socially responsible stocks is limited to the panic period.

[Insert Table 3]

Yet, the difference-in-differences regression do not rule out an alternative explanation for the unique impact of ES score during the panic period. Recent increase in global investors' attention on the ESG topic has led to investing in socially responsible stocks and ESG-themed mutual funds. In August 2019, the National Pension Service (NPS), the largest institutional investor in Korea with asset under management of KRW 892 trillion won as of May 2021, announced that it would introduce ESG criteria for its investment. The change in the investor preference for ESG stocks began to appear in the Korean stock market around the end of the first quarter of 2020, and the growth of ESG fund market has been rapid.[5] The large capital inflows to the socially responsible stocks after the panic period may induce temporary overvaluation of those stocks and offset the negative effect on returns.

Overall, the cross-sectional and the difference-in-differences analyses

[5] According to FnGuide, the total net asset value of the Korean ESG funds stands at approximately KRW 350 billion as of May, 2020. The ESG funds attracted about KRW 15.3 billion in net inflows between February to May, 2020, while the non-ESG equity funds and mutual funds lost KRW 1.4 trillion and KRW 3.1 trillion in the same period respectively.

show the negative effect of ES scores on stock return, and these results are inconsistent with the view that engaging with ESG goals improves firm value. To explore the source of underperformance of socially responsible firms during the Covid-19 market crash, I introduce an overinvestment hypothesis in the agency perspective and test this hypothesis in the next section.

## 4. Overinvestment

In this section, I discuss a potential explanation for the findings in the section 3. The rejection of value-maximizing ESG hypothesis in the Korean market lend support to the perspective that ESG activities are evidence of agency conflicts over investment decisions. Consequently, I explore two hypotheses based on agency theory.

The possible explanation is related to overinvestment concerns. Several agency studies argue that overinvestment suggests a potential agency conflict. When the level of firms' investment is significantly high, mangers can spend more resources to low quality projects which shareholders dislike. Gompers, Ishii, and Metrick (2003) show that firms with lower governance ratings have higher capital expenditure relative to firms with higher governance ratings. Bae, Kang, and Wang (2011) also show that firms with significant free cash flows but with less investment opportunities may invest beyond the optimal level. In addition, the imperfect control model of Dow et al. (2005) predicts that firms are more likely to overinvest during booms and that this overinvestment problem will be more associated with large firms. Accordingly, Hong, Kubik, and Sheinkman (2012) finds that firms which are overvalued due to IT bubble temporarily increased ESG

spending before the bubble busted.

These findings raise a question of whether high ES firms in Korea spent excessively on ESG activities before 2020. Overinvestment hypothesis suggests that the sudden outbreak of Covid-19 pandemic would have decreased payoffs on the ESG expenditure, and thus decreased the firm value during the first quarter of 2020. To test this hypothesis, I first investigate whether ES is a function of investment and expenditure by studying the determinants of ES scores in the subsection 4.1. Then, I test whether spending of socially responsible firms significantly changes over the panic period by exploiting a difference-in-differences regression model in the subsection 4.2.

### 4.1. Determinants of ES

Before I test overinvestment of socially responsible firms before the onset of the Covid-19 pandemic, I investigate whether ES scores can be represented as a function of firms' spending on ESG activities. I run the following regression model:

$$ES_{i,t} = b_0 + b_1{}'SG\&A_{i,t-1} + b_2 Agency_{i,t-1} + b_3{}'\mathbf{X_{i,t-1}} + Year\ FE + Industry\ FE + e_{i,t} \quad (4)$$

where $ES_{i,t}$ is the average of firm *i*'s annual environment and social scores on year *t*, $SG\&A_{i,t-1}$ is a proxy for firm *i*'s ESG expenditure, $Agency_{i,t-1}$ is proxy for firm *i*'s agency problems, and $\mathbf{X}_{i,t-1}$ is a vector of lagged control variables. I include year and industry fixed effects and cluster standard error by firm level.

The variable of interest is $SG\&A_{i,t-1}$, defined as firms' selling, general and administrative (SG&A) expenses scaled by asset. SG&A costs include firm's expenditure to engage with its key stakeholders (e.g., advertising costs, employee

payrolls and training costs). Consequently, the sign and significance of the coefficient estimate on this variable is one of main interests in the modeling of determinants of ES.

In the choice of control variables, I consider the argument of Jensen (1986) that firms with significant free cash flows but with limited investment opportunities are more likely to have agency problems. Accordingly, I include the following four variables as controls in the model: (i) firm size, measured as log of asset; (ii) profitability, measured as operating income divided by asset; (iii) investment opportunities, measured by Tobin's q; and (iv) financial slack, measured by current ratio.

In addition, I follow Ferrel, Liang, and Renneboog (2015) and utilize their five agency proxies with additional measure: (i) cash holdings; (ii) free cash flows; (iii) capital expenditure; (iv) lack of efficiency, measured as sales minus income from continuing operations plus depreciation divided by sales; (v) dividend payout ratio scaled by net income; (vi) leverage, measured as total debt over total equity. Higher values for the estimates on the first four variables suggest higher agency conflicts, whereas lower values for the estimates on the last two variables can be an indication of agency conflicts because dividend and debt can serve as a mechanism that constrains agency problems.

According to Ferrell et al. (2015), adding an agency proxy in the model allows testing of two competing views on ESG by examining whether signs of estimates on each of agency proxies are consistent with the predictions of the two views in a collective manner. However, Ferrell et al. (2015) emphasize that signs of all agency proxies should be consistent with the prediction because a separate agency proxy can represent different aspects of firm's financial policy. The agency

view predicts positive coefficients on the first four agency proxies (cash holdings, free cash flows, capital expenditure, and efficiency) and negative coefficients on monitoring mechanisms (leverage and dividend payout ratio), while the value-enhancing view predicts the opposite.

The dataset used to analyze the determinants of ES spans from 2015 to 2019. After removing stocks with insufficient information and financial and microcap stocks, the final sample has 2,036 observations from 586 firms.

Panel A of Table 4 provides descriptive statistics of the dataset used in the analysis, while Panel B presents comparisons between firms with lower ES scores and firms with higher ES scores from 2015 to 2019. The results in Panel B show that firms with higher ES scores are more likely to have larger assets, more employees, larger board, and higher board independence, comprise greater proportion in the total industry sales (i.e., greater market power), and spend less proportion of sales on advertising and overall SG&A costs. The results in Panel B also provide mixed evidence regarding two competing views on ESG. Consistent with the value-maximizing ESG perspective, socially responsible firms tend to have lower cash holdings and financial slack (measured by current ratio), and higher leverage, dividend-to-net-income, and financial constraints (measured by interest coverage). In contrast, firms with higher ES scores have less investment opportunities (measured by Tobin's q) but higher free cash flows. These facts indicate a possibility that socially responsible firms in the Korean market invest beyond their optimal level (Bae, Kang, and Wang, 2011). Furthermore, dividend payout ratio scaled by sales monotonically decreases when moving from lower ES tercile to higher ES terciles. Moreover, lack of cost efficiency increases when moving from the middle ES tercile to the highest ES tercile. Such high level of

total cost among the highest ES tercile indicates potential agency conflicts or bad management decisions that can decrease firm value.

[Insert Table 4]

Panel A of Table 5 presents the estimates of regression. In all models, coefficient estimates on the log of asset and *SGA-to-Asset* are positive and significant. These results indicate that firm size and firm's ESG expenditures have positive effect on the firm's ES score in the following year. In terms of economic significance, the results in column (2) indicate that a standard deviation increase in *SGA-to-Asset* (0.173) is associated with 0.08-point increase in ES score (0.173 x 0.416) in the following year, a standard deviation increase in firm size (1.519) with 0.68-point increase in ES score (1.519 x 0.448) in the following year, and a standard deviation increase in free cash flow (0.097) with 0.04-point increase in ES score (0.097 x 0.375) in the following year.

In Panel B of Table 5, I include the lagged ES scores as a control variable. The strongly positive coefficients on the *lagged ES* reflect the sticky nature of ES ratings. It is worth noting that the coefficients on *SGA-to-Asset* and log of assets remain positive and significant in all models after controlling for lagged ES scores. These results confirm that ES score is an increasing function of the firm size and firm's ESG expenditure in the previous year.

Yet, the results in Table 5 provide mixed evidence on supporting either of the two competing ESG perspectives. The positive and significant coefficients on free cash flows and dividend payout ratio in Panel A cannot support neither value-enhancing view nor agency view on ESG. The positive effect of dividend payout ratio on the next year's ES score is consistent with the value-enhancing view,

whereas the positive impact of free cash flow on the next year's ES score is in accordance with the agency view. Furthermore, the other agency proxies (cash holdings, capital expenditure, efficiency, and leverage) have insignificant associations with the next year's ES score. Consequently, the estimates on the six agency proxies are inconsistent with the prediction of either view in a collective way. Likewise, the results in Panel B explain neither of two views. The significantly positive coefficient on dividend payout ratio and the significantly negative coefficient on cash holdings are separately in line with the prediction of the value-maximizing view. However, the evidence is insufficient to support value-enhancing view because the other four agency proxies do not explain the next year ES score in the next year when controlling for the lagged ES score.

Overall, I find that ES score is an increasing function of firm size, SG&A expenditure, and dividend payout ratio in the previous year. This result suggests a possibility of excessive investment in ESG activities among socially responsible firms in Korea.

[Insert Table 5]

## 4.2. Firms' Expenditure surrounding the panic period

In this subsection, I analyze the change of firms' spending surrounding the panic period to explore the source of negative association between ES scores and stock returns during the panic period in the perspective of agency theory. To test whether socially responsible firms excessively spent before the market crash in the first quarter of 2020, I estimate a difference-in-differences models with continuous

treatment. Using quarterly data, I run the following models over the period between the second quarter of 2015 and the fourth quarter of 2020 for different cost measures:

$$Expenditure_{i,t} = b_0 + b_1 ES_{i,2018} \times PrePanic_t + b_2 ES_{i,2018} \times Panic_t + b_3{}' \mathbf{X}_{i,t-1} + Quarter\ FE + Firm\ FE + e_{i,t} \quad (5)$$

where $Expenditure_{i,t}$ is the quarterly cost measures for firm $i$, $ES_{i,2018}$ is firm $i$'s ES score as of year-end 2018, $Prepanic_t$ is a dummy variable that equals one before the first quarter of 2020 and zero otherwise, and zero otherwise, and $\mathbf{X}_{i,t-1}$ is a vector of control variables lagged by one quarter. I remove firm's average return throughout the estimation period and time-series patterns in overall stock returns by including firm and quarter fixed effects. Standard errors are clustered at the firm level.

Based on the earlier discussion of the previous agency literature of Jensen (1986) and Dow et al. (2003), agency conflicts are significantly associated with firm's investment. Consequently, I utilize the following cost and agency measures as dependent variables: the quarterly changes in (i) capital expenditure; (ii) free cash flows; (iii) SG&A cost, scaled by assets; (iv) advertising costs, scaled by assets; and (v) total cost, measured as sales minus income from continuing operations plus depreciation divided by sales. In addition, several studies find that firm's investment is largely related with investment opportunities, financial constraints (Bae et al. 2011; Hong et al. 2012). Therefore, I control for the following variables that can affect firm's investment: firm size, Tobin's q, profitability, current ratio, debt ratio and interest coverage. In the regression models of expenditure, I include firm and time fixed effects. Standard errors are clustered by firm level.

Table 6 presents the results. The first expenditure measure is the total cost relative to sales. The results in column (1) report a weakly positive coefficient on the interaction between ES and the pre-panic dummy, indicating that socially responsible firms spent more on the overall operation relative to other firms before the panic period. Increasing ES by one-standard deviation (1.1) increases total cost scaled by sales by 1.76 percentage points in the pre-panic period. This finding is largely consistent with the prediction of overinvestment hypothesis. In the panic period, however, the effect of ES on total cost becomes insignificant. The disappearance of the effect of ES may be associated with cost reduction of high ES-rated firms during the panic period or with stronger sales revenues of high ES rated firms relative to other companies.

The next measure is SG&A costs relative to sales. The overinvestment hypothesis predicts positive association between ES and SG&A costs in the pre-panic period because SG&A is one of the significant determinants of ES measure. Consistent with this prediction, the interaction between ES and the pre-panic dummy is positive and significant at 90% level. In terms of economic significance, one standard deviation of ES score is associated with 9.35-percentage-point increase in SG&A costs, scaled by sales. Again, the positive impact of ES on SG&A costs turns into insignificant during the panic period. Such change suggests that firms with high 2018 ratings considerably reduce their SG&A expenditure during the panic period or that firms with low ES ratings in 2018 increase their ESG investment in step with the increased attention to ESG topic.

The results in column (3) and (4) show no significant effects of ES scores on firm’s advertising costs and changes in capital expenditure surrounding the panic period.

The final measure is changes in free cash flows. The interaction between ES and the pre-panic dummy is again positive and weakly significant, indicating that firms with high 2018 ES ratings have more free cash flows in comparison with other companies before the covid market crash. These findings indicate that those socially responsible firms are more likely to invest beyond their optimal level. Again, the effect of ES becomes insignificant during the panic period. Such change is understandable because firms are more likely to increase cash holdings in order to wear the liquidity crisis such as the Covid-19 recession.

Overall, the results reported in this section suggest that high-ES-rated firms increased their overall costs, SG&A costs, and free cash flows relative to low-ES-rated firms before the onset of Covid-19 pandemic. The positive and significant effect of ES on firm's expenditure is limited to the pre-panic period, These findings lend support to the overinvestment hypothesis.

[Insert Table 6]

## 5. Conclusion

This paper provides an empirical evidence that socially responsible firms with high ES ratings underperformed relative to firms with low ES ratings during the first quarter of 2020 in the Korean stock market. I also find that this negative association between ES scores and stock return is unique to the Covid-19 panic period. These results are contrary to the previous studies of Lins et al. (2017) and Albuquerque et al. (2020), which find the positive association between ES and panic period returns in the US stock market.

To explore the source of negative association between ES and panic period stock returns, I examine the determinants of ES score and investigate whether socially responsible firms excessively invested in ESG activities before the onset of Covid pandemic. I find that ESG score is a function of selling, general and administrative (SG&A) costs and that high-ESG firms increased their overall costs, SG&A, and free cash flows relative to low-ESG firms before the onset of Covid-19 pandemic. These findings are largely consistent with the prediction of overinvestment hypothesis.

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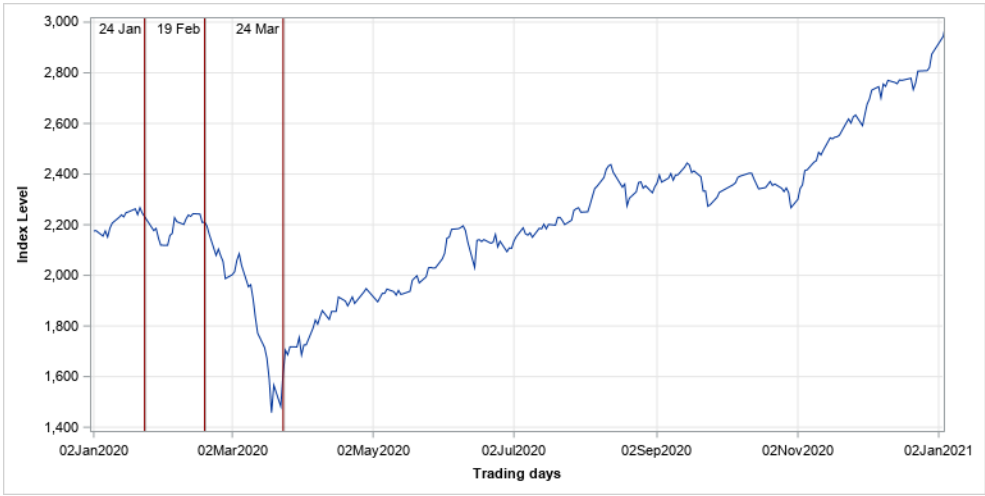
Figure 1 **2020 Daily KOSPI**

This figure plots the daily stock market path of KOSPI during 2020. The vertical line represent three event dates. January 14 is the date when the first domestic case was publicly reported in Korea. February 19 is the date when the 31st domestic case was confirmed whose contract tracing data raised the possibility of large-scale infection. March 24 is the date when the Korean government finally announced coronavirus rescue package of 100 trillion won ($80billion).



## Table 1 **Summary statistics: panic period returns and ES**

The sample consists of 421 firms with ESG data available from the KCGS database as of year-end 2018 and return and accounting data available during the first quarter of 2020. *ES* is the average of environment and social scores as of year-end 2018. Scores for each of environment (*ENV*), social (*SOC*) and governance (*GOV*) categories and overall ESG are obtained by assigning numeric scores for letter-graded ratings: 6 for A+, 5 for A, 4 for B+, 3 for B, 2 for C, 1 for D. *Covid Raw Return* is the 3-month raw return over the first quarter of 2020. *Covid Abn. Return* is raw return minus expected return, based on market model estimated over the 60-month period ending in December 2019. Accounting data are based on the end of 2019. *Market Capitalization* is in millions of wons. *Long-Term Debt* is computed as long-term debt divided by assets. *Short-Term Debt* is computed as short-term debt divided by assets. *Cash Holdings* is computed as cash divided by assets. *Profitability* is computed as annual operating income divided by assets. *Book-to-Market* is computed as book value of equity divided by market value of equity. *Negative B/M* is a dummy variable set to one when the book-to-market ratio is negative and zero otherwise. *Momentum* is cumulative raw return over January 2019 to December 2019. *Idiosyncratic Risk* is residual variance from the market model estimated over 60-month period ending in December 2019, using monthly data. In Panel C, I divide firms in the sample into two groups by firms' ES scores and report the summary statistics by ES groups. In Panel D, I divide firms in the sample into terciles by firms' ES scores and report the summary statistics by ES terciles. Financial firms and micro-caps (firms with a market capitalization below the median market capitalization of the KOSPI market as of year-end 2019) are removed from the sample. All stock and control variables are winsorized at the 1st and 99th percentiles.

Panel A: Summary statistics

| Variables | Mean | SD | p25 | p50 | p75 |
|---|---|---|---|---|---|
| *ES* | 3.1 | 1.1 | 2.0 | 3.0 | 4.0 |
| *ESG* | 3.0 | 1.1 | 2.0 | 3.0 | 4.0 |
| *ENV* | 2.8 | 1.4 | 2.0 | 3.0 | 4.0 |
| *SOC* | 3.4 | 1.2 | 3.0 | 3.0 | 4.0 |
| *GOV* | 3.1 | 1.0 | 2.0 | 3.0 | 4.0 |
| *Panic Raw Return* | -0.220 | 0.233 | -0.361 | -0.258 | -0.150 |
| *Panic Abn. Return* | -0.029 | 0.260 | -0.178 | -0.071 | 0.049 |
| *Market Capitalization* | 2,300,044 | 4,838,653 | 342,650 | 655,908 | 1,638,000 |
| *Long-Term Debt* | 0.098 | 0.105 | 0.004 | 0.067 | 0.158 |
| *Short-Term Debt* | 0.110 | 0.103 | 0.025 | 0.082 | 0.171 |
| *Cash Holdings* | 0.084 | 0.069 | 0.035 | 0.067 | 0.111 |
| *Profitability* | 0.055 | 0.060 | 0.024 | 0.046 | 0.080 |
| *Book-to-Market* | 1.123 | 0.908 | 0.424 | 0.816 | 1.630 |
| *Momentum* | -0.006 | 0.313 | -0.210 | -0.051 | 0.124 |
| *Idiosyncratic Risk* | 0.108 | 0.051 | 0.075 | 0.099 | 0.123 |

**Table 1**—*Continued*

Panel B: Correlation Matrix

| Variables | *ES* | *Panic Raw Return* | *Panic Abn. Return* | *Log (Mkt Cap)* | *L/T Debt* | *S/T Debt* | *Cash Hold.* | *Profit.* | *B/M* | *Neg. B/M* | *Mom.* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *Panic Raw Return* | -0.20 | | | | | | | | | | |
| *Panic Abn. Return* | -0.18 | 0.94 | | | | | | | | | |
| *Log Market Cap.* | 0.52 | -0.02 | -0.05 | | | | | | | | |
| *Long-Term Debt* | 0.27 | -0.14 | -0.09 | 0.15 | | | | | | | |
| *Short-Term Debt* | 0.04 | -0.10 | -0.03 | -0.17 | 0.20 | | | | | | |
| *Cash Holdings* | -0.18 | 0.19 | 0.18 | -0.04 | -0.25 | -0.18 | | | | | |
| *Profitability* | 0.02 | 0.06 | -0.03 | 0.15 | -0.23 | -0.25 | 0.14 | | | | |
| *Book-to-Market* | 0.18 | -0.28 | -0.28 | -0.12 | 0.16 | -0.01 | -0.25 | -0.18 | | | |
| *Negative B/M* | 0.01 | 0.02 | 0.04 | -0.02 | 0.22 | 0.04 | 0.03 | -0.13 | -0.09 | | |
| *Momentum* | -0.09 | 0.03 | -0.03 | 0.04 | -0.17 | -0.03 | 0.07 | 0.11 | -0.18 | -0.07 | |
| *Idiosyncratic Risk* | -0.23 | 0.15 | 0.25 | -0.16 | -0.03 | 0.23 | 0.15 | -0.24 | -0.46 | 0.02 | -0.01 |

**Table 1**—*Continued*

| Panel C: Summary Statistics by ES terciles | | | | | | | |
|---|---|---|---|---|---|---|---|
| | ES1 (Low) | | ES2 (Mid) | | ES3 (High) | | 1-3 Diff |
| Variable | Mean | SD | Mean | SD | Mean | SD | (t-stat) |
| *ES* | 2.05 | 0.40 | 3.18 | 0.24 | 4.62 | 0.59 | -40.41*** |
| *ESG* | 2.30 | 0.56 | 2.85 | 0.69 | 4.26 | 0.80 | -22.60*** |
| *ENV* | 1.56 | 0.73 | 3.06 | 0.73 | 4.41 | 0.65 | -33.31*** |
| *SOC* | 2.55 | 0.63 | 3.30 | 0.70 | 4.83 | 0.84 | -24.48*** |
| *GOV* | 2.73 | 0.84 | 2.94 | 0.93 | 3.73 | 1.02 | -8.60*** |
| *Panic Raw Return* | -0.16 | 0.31 | -0.24 | 0.16 | -0.28 | 0.13 | 4.39*** |
| *Panic Abn. Return* | 0.04 | 0.34 | -0.06 | 0.18 | -0.09 | 0.15 | 4.02*** |
| *Market Cap.* | 868,852 | 1,514,860 | 1,318,400 | 3,520,494 | 5,316,212 | 7,195,607 | -6.50*** |
| *Long-Term Debt* | 0.07 | 0.09 | 0.09 | 0.10 | 0.14 | 0.11 | -5.47*** |
| *Short-Term Debt* | 0.11 | 0.11 | 0.11 | 0.11 | 0.11 | 0.08 | -0.16 |
| *Cash Holdings* | 0.10 | 0.07 | 0.09 | 0.08 | 0.06 | 0.04 | 4.82*** |
| *Profitability* | 0.05 | 0.07 | 0.06 | 0.05 | 0.05 | 0.05 | -0.09 |
| *Book-to-Market* | 0.97 | 0.90 | 1.13 | 0.84 | 1.33 | 0.95 | -3.20*** |
| *Momentum* | 0.03 | 0.36 | 0.00 | 0.31 | -0.05 | 0.22 | 2.12** |
| *IVOL* | 0.12 | 0.06 | 0.11 | 0.05 | 0.09 | 0.04 | 4.98*** |
| *Div-Net Income* | 0.48 | 0.73 | 0.33 | 0.36 | 0.46 | 0.71 | 0.23 |
| *Div-Sales* | 0.02 | 0.02 | 0.02 | 0.02 | 0.01 | 0.02 | 0.98 |
| *Log Asset* | 20.3 | 1.1 | 20.7 | 1.1 | 22.4 | 1.5 | -12.65*** |
| *Tobin's Q* | 1.92 | 2.21 | 1.44 | 1.22 | 1.19 | 0.68 | 3.97*** |
| *Controlling Shareholder Ownership* | 0.43 | 0.17 | 0.45 | 0.16 | 0.41 | 0.16 | 1.03 |
| *Largest Shareholder Ownership* | 0.30 | 0.15 | 0.35 | 0.17 | 0.32 | 0.16 | -1.10 |
| *Free Cash Flows* | -0.03 | 0.12 | 0.01 | 0.09 | -0.01 | 0.10 | -1.12 |
| *Capital Expenditure* | 0.05 | 0.07 | 0.04 | 0.06 | 0.04 | 0.07 | 0.10 |
| *Efficiency (lack of)* | 0.94 | 0.29 | 0.92 | 0.12 | 0.93 | 0.11 | 0.68 |
| *Efficiency 3 (lack of)* | 0.25 | 0.35 | 0.16 | 0.18 | 0.13 | 0.15 | 3.83*** |
| *SGA-Asset* | 0.20 | 0.19 | 0.17 | 0.17 | 0.15 | 0.17 | 2.24** |
| *SGA-Sales* | 0.34 | 0.29 | 0.21 | 0.21 | 0.17 | 0.19 | 5.76*** |
| *Ad-Sales* | 0.02 | 0.03 | 0.01 | 0.02 | 0.01 | 0.02 | 2.72*** |
| *Leverage* | 0.29 | 0.34 | 0.32 | 0.36 | 0.39 | 0.31 | -2.52** |
| *Interest Coverage* | 259.7 | 1193.2 | 436.9 | 1958.6 | 48.4 | 198.0 | 2.11** |
| *Current Ratio* | 2.96 | 3.13 | 2.24 | 2.15 | 1.50 | 0.75 | 5.67*** |
| *No. employees* | 531 | 618 | 1,637 | 2,576 | 6,086 | 8,335 | -7.10*** |

Table 2 **Panic Period Returns and ES**

This table presents regression estimates of covid-period returns on *ES* and control variables. *Panic Returns* are raw buy-and-hold return and abnormal returns over the first quarter of 2020. In Panel A, I use the primary explanatory variable ES, which is the average between environment and social indices in 2009, as independent variable. In Panel B, I use dummy variables for ES terciles such that ES2 sets one if the firm is in the second tercile and zero otherwise, and ES3 sets on if the firm is in the third tercile and zero otherwise. Industry dummies are defined at the two-digit KSIC code level. In Panel C, I add KCGS governance category, dividend payout ratio relative to net income, board size, board independence (the fraction of outside directors), CEO-Chairman duality, and board ownership (share ownership by board members). Information on board are hand-collected from annual report. *Missing* is a dummy variable if annual report does not provide information on CEO-Chairman duality. Financial firms and micro-caps (firms with a market capitalization below the median market capitalization of the KOSPI market as of year-end 2019) are removed from the sample. All stock and control variables are winsorized at the 1st and 99th percentiles. Heteroskedasticity-consistent standard errors are presented in parentheses. ***,**, and * indicate that the parameter estimate is significantly different from zero at the 1%, 5%, and 10% level, respectively.

Panel A: ES: Raw and Abnormal Returns

| | Raw Ret (1) | Abn. Ret (2) | Raw Ret (3) | Abn. Ret (4) |
|---|---|---|---|---|
| *Intercept* | -0.159*** | -0.181*** | -0.490* | -0.293 |
| | (-3.19) | (-3.57) | (-1.95) | (-1.15) |
| *ES* | -0.030*** | -0.027*** | -0.031*** | -0.025** |
| | (-3.81) | (-3.37) | (-2.61) | (-2.15) |
| *Ln(Market Cap)* | | | 0.016 | 0.007 |
| | | | (1.34) | (0.61) |
| *Long-Term Debt* | | | -0.022 | 0.016 |
| | | | (-0.19) | (0.13) |
| *Short-Term Debt* | | | -0.149 | -0.182 |
| | | | (-1.11) | (-1.30) |
| *Cash Holdings* | | | 0.410* | 0.450* |
| | | | (1.75) | (1.79) |
| *Profitability* | | | 0.018 | -0.032 |
| | | | (0.09) | (-0.15) |
| *Book-to-Market* | | | -0.050*** | -0.042*** |
| | | | (-3.98) | (-3.21) |
| *Negative B/M* | | | 0.152** | 0.229*** |
| | | | (2.36) | (3.34) |
| *Momentum* | | | 0.026 | 0.000 |
| | | | (0.64) | (0.00) |
| *idiosyncratic Risk* | | | 0.053 | -0.133 |
| | | | (0.19) | (-0.44) |
| Four-factor loadings | Yes | Yes | Yes | Yes |
| Industry dummies | Yes | Yes | Yes | Yes |
| N | 391 | 391 | 391 | 391 |
| Adj.$R^2$ | 0.19 | 0.27 | 0.23 | 0.30 |

**Table 2**—*Continued*

| Panel B: ES: Dummies for Terciles of ES Score: Raw and Abnormal Returns | | | | |
|---|---|---|---|---|
| | Raw Ret (1) | Abn. Ret (2) | Raw Ret (3) | Abn. Ret (4) |
| *ES2* | -0.051* | -0.054** | -0.057** | -0.058** |
| | (-1.87) | (-1.97) | (-2.05) | (-2.05) |
| *ES3* | -0.085*** | -0.080*** | -0.079** | -0.071** |
| | (-3.51) | (-3.30) | (-2.58) | (-2.30) |
| *Ln(Market Cap)* | | | 0.012 | 0.004 |
| | | | (1.04) | (0.34) |
| *Long-Term Debt* | | | -0.037 | 0.005 |
| | | | (-0.32) | (0.04) |
| *Short-Term Debt* | | | -0.152 | -0.181 |
| | | | (-1.14) | (-1.31) |
| *Cash Holdings* | | | 0.403* | 0.447* |
| | | | (1.71) | (1.77) |
| *Profitability* | | | 0.030 | -0.018 |
| | | | (0.15) | (-0.09) |
| *Book-to-Market* | | | -0.054*** | -0.046*** |
| | | | (-4.28) | (-3.50) |
| *Negative B/M* | | | 0.140* | 0.213*** |
| | | | (1.95) | (2.80) |
| *Momentum* | | | 0.024 | -0.004 |
| | | | (0.57) | (-0.08) |
| *idiosyncratic Risk* | | | 0.053 | -0.134 |
| | | | (0.19) | (-0.44) |
| Four-factor loadings | Yes | Yes | Yes | Yes |
| Industry dummies | Yes | Yes | Yes | Yes |
| N | 391 | 391 | 391 | 391 |
| Adj.$R^2$ | 0.19 | 0.27 | 0.23 | 0.30 |

**Table 2**—*Continued*

| Panel C: ES: Controlling for Corporate Governance | | | | |
|---|---|---|---|---|
| | Raw Ret (1) | Abn. Ret (2) | Raw Ret (3) | Abn. Ret (4) |
| *ES* | -0.031** | -0.026** | -0.030** | -0.024* |
| | (-2.37) | (-1.99) | (-2.37) | (-1.93) |
| *GOV* | 0.002 | 0.004 | | |
| | (0.19) | (0.37) | | |
| *Dividend Payout Ratio* | | | -0.004 | -0.005 |
| | | | (-0.23) | (-0.25) |
| *Board Size* | | | -0.009* | -0.009 |
| | | | (-1.72) | (-1.57) |
| *Board Independence* | | | 0.122 | 0.145 |
| | | | (1.01) | (1.15) |
| *Duality* | | | 0.042 | 0.040 |
| | | | (1.34) | (1.25) |
| *Missing* | | | 0.003 | 0.007 |
| | | | (0.10) | (0.18) |
| *Board Ownership* | | | 0.134* | 0.144* |
| | | | (1.77) | (1.84) |
| Firm Characteristics | Yes | Yes | Yes | Yes |
| Four-factor loadings | Yes | Yes | Yes | Yes |
| Industry dummies | Yes | Yes | Yes | Yes |
| N | 384 | 384 | 384 | 384 |
| Adj.$R^2$ | 0.23 | 0.29 | 0.23 | 0.30 |

Table 3 **Returns surrounding the Panic period and ES**

This table presents difference-in-differences regression estimates of monthly returns on ES and control variables. I analyze differential impacts of ES on stock return surrounding the panic period. I estimate the following panel regression models:

$$Return_{i,t} = b_0 + b_1 ES_{i,2018} \times Panic_t + b_2 ES_{i,2018} \times PostPanic_t + b_3{}' \mathbf{X}_{i,t-1} + Month\ FE + Industry\ FE + e_{i,t} \quad (3)$$

where $Return_{i,t}$ is firm *i*'s monthly raw abnormal return from January 2019 to December 2020, $Panic_t$ is a dummy variable that equals one from January to March 2020 and zero otherwise, $PostPanic_t$ is a dummy variable that equals one from April to December 2020, and zero before this period, and $\mathbf{X}_{i,t-1}$ is a vector of lagged control variables. Firms' financial characteristics obtained from annual accounting data are the same as in the cross-sectional regression in Table 2, while market-based control variables (momentum, size, book-to-market, factor loadings) are updated monthly. Month and industry fixed effects are included in the regression. Standard errors are clustered by firm and month level and reported in parentheses. ***,**, and * indicate that the parameter estimate is significantly different from zero at the 1%, 5%, and 10% level, respectively.

| Variable | Raw Ret (1) | Abn. Ret (2) | Raw Ret (3) | Abn. Ret (4) |
|---|---|---|---|---|
| *ES x Panic* | -0.011*** | -0.010*** | -0.013*** | -0.012*** |
| | (-3.56) | (-3.34) | (-3.99) | (-3.91) |
| *ES x Post-panic* | 0.007*** | 0.004* | -0.000 | -0.003 |
| | (2.85) | (1.93) | (-0.03) | (-1.03) |
| Four-factor loadings | Yes | Yes | Yes | Yes |
| Firm Characteristics | No | No | Yes | Yes |
| Firm FE | Yes | Yes | Yes | Yes |
| Time (monthly) FE | Yes | Yes | Yes | Yes |
| SE clustered by | Firm | Firm | Firm | Firm |
| *ES x Post-panic - ES x Panic* | 0.017 | 0.014 | 0.013 | 0.009 |
| *p-Value* | (0.00) | (0.00) | (0.00) | (0.00) |
| *N* | 9,384 | 9,384 | 9,384 | 9,384 |
| Adj.$R^2$ | 0.26 | 0.04 | 0.29 | 0.09 |

Table 4 **Summary statistics (Determinants of ES)**

Panel A provides summary statistics of the dataset used to analyze the determinants of ES scores. The sample consists of yearly observations of firms listed on the KOSPI or KOSDAQ market with information available both in KCGS database and DataGuide database from 2015 to 2019. In Panel B, I divided firms into ES terciles. *Cash holdings*, *free cash flows*, *capital expenditure* and *debt* are scaled by total assets. Efficiency is defined sales minus income from continuing operations plus depreciation divided by sales, and Efficiency2 is gross margin minus income from continuing operations plus depreciation divided by sales. *Leverage* is total debt over total equity. *Market power* is firm's sales over total sales of the industry in which the firm operates. Financial and microcap stocks are removed from the sample. Microcap is defined as a stock with market capitalization below the median year-end market capitalization in the KOSPI market in the previous year. All accounting variables are winsorized at the 1st and 99th percentiles.

Panel A: Summary statistics

| Variables | Mean | SD | p25 | p50 | p75 |
|---|---|---|---|---|---|
| *ES* | 3.0 | 1.1 | 2.0 | 3.0 | 3.5 |
| *ESG* | 3.0 | 1.0 | 2.0 | 3.0 | 4.0 |
| *ENV* | 2.8 | 1.4 | 1.0 | 3.0 | 4.0 |
| *SOC* | 3.3 | 1.2 | 2.0 | 3.0 | 4.0 |
| *GOV* | 3.1 | 1.0 | 2.0 | 3.0 | 4.0 |
| *Log Asset* | 21.004 | 1.519 | 19.928 | 20.737 | 21.921 |
| *Profitability* | 0.054 | 0.058 | 0.023 | 0.046 | 0.080 |
| *Tobin's Q* | 1.570 | 1.381 | 0.861 | 1.082 | 1.719 |
| *Controlling Shareholder Ownership* | 0.430 | 0.163 | 0.312 | 0.430 | 0.542 |
| *Largest Shareholder Ownership* | 0.317 | 0.157 | 0.193 | 0.296 | 0.417 |
| *Cash Holdings* | 0.087 | 0.069 | 0.037 | 0.069 | 0.116 |
| *Free Cash Flows* | -0.002 | 0.097 | -0.038 | 0.011 | 0.049 |
| *Capital Expenditure* | 0.040 | 0.061 | 0.000 | 0.017 | 0.053 |
| *Efficiency (lack of)* | 0.929 | 0.166 | 0.866 | 0.932 | 0.972 |
| *Efficiency2 (lack of)* | 0.189 | 0.222 | 0.065 | 0.136 | 0.270 |
| *Ad-Sales* | 0.017 | 0.027 | 0.001 | 0.005 | 0.022 |
| *SGA-Asset* | 0.172 | 0.173 | 0.058 | 0.110 | 0.227 |
| *SGA-Sales* | 0.246 | 0.241 | 0.079 | 0.154 | 0.326 |
| *Donation-Sales* | 0.001 | 0.002 | 0.000 | 0.000 | 0.001 |
| *Dividend payout (scaled by net income)* | 0.268 | 0.498 | 0.000 | 0.128 | 0.289 |
| *Dividend payout (scaled by sales)* | 0.014 | 0.021 | 0.002 | 0.007 | 0.016 |
| *Leverage* | 0.339 | 0.349 | 0.063 | 0.246 | 0.508 |
| *Debt* | 0.212 | 0.165 | 0.060 | 0.197 | 0.337 |
| *Interest Coverage* | 400.216 | 2327.877 | 2.698 | 7.590 | 29.439 |
| *Current Ratio* | 2.336 | 2.505 | 1.045 | 1.548 | 2.547 |
| *Market Power* | 0.085 | 0.155 | 0.005 | 0.022 | 0.081 |
| *Number of employees* | 2,347 | 5,040 | 288 | 664 | 2,091 |

**Table 4**—*Continued*

| Panel B: Summary statistics by ES tercile | | | | | | | |
|---|---|---|---|---|---|---|---|
| | ES1 (Low) | | ES2 (Mid) | | ES3 (High) | | Difference |
| Variable | Mean | SD | Mean | SD | Mean | SD | (t-stat) |
| *GOV* | 2.83 | 0.79 | 2.94 | 0.82 | 3.47 | 1.10 | -12.34*** |
| *Log Asset* | 20.160 | 1.105 | 20.536 | 1.078 | 22.112 | 1.501 | -27.32*** |
| *Profitability* | 0.052 | 0.070 | 0.058 | 0.056 | 0.050 | 0.050 | 0.60 |
| *Tobin's Q* | 2.031 | 1.838 | 1.579 | 1.364 | 1.199 | 0.698 | 10.41*** |
| *Controlling Shareholder Ownership* | 0.425 | 0.173 | 0.442 | 0.158 | 0.423 | 0.158 | 0.14 |
| *Largest Shareholder Ownership* | 0.304 | 0.152 | 0.321 | 0.156 | 0.323 | 0.162 | -2.20** |
| *Cash Holdings* | 0.105 | 0.079 | 0.092 | 0.073 | 0.068 | 0.048 | 9.75*** |
| *Free Cash Flows* | -0.014 | 0.121 | 0.000 | 0.090 | 0.005 | 0.080 | -3.22*** |
| *Capital Expenditure* | 0.045 | 0.069 | 0.038 | 0.058 | 0.037 | 0.056 | 2.42** |
| *Efficiency (lack of)* | 0.937 | 0.253 | 0.919 | 0.124 | 0.932 | 0.099 | 0.41 |
| *Efficiency2 (lack of)* | 0.259 | 0.310 | 0.182 | 0.184 | 0.141 | 0.145 | 8.55*** |
| *Ad-Sales* | 0.026 | 0.032 | 0.014 | 0.025 | 0.013 | 0.022 | 8.20*** |
| *SGA-Asset* | 0.218 | 0.205 | 0.157 | 0.144 | 0.150 | 0.162 | 6.54*** |
| *SGA-Sales* | 0.372 | 0.294 | 0.212 | 0.198 | 0.178 | 0.188 | 13.91*** |
| *Donation-Sales* | 0.001 | 0.003 | 0.001 | 0.003 | 0.001 | 0.002 | 1.09 |
| *Dividend payout (scaled by net income)* | 0.225 | 0.456 | 0.256 | 0.447 | 0.313 | 0.569 | -3.17*** |
| *Dividend payout (scaled by sales)* | 0.016 | 0.024 | 0.014 | 0.021 | 0.012 | 0.018 | 2.84*** |
| *Leverage* | 0.276 | 0.323 | 0.324 | 0.358 | 0.403 | 0.350 | -6.86*** |
| *Debt* | 0.178 | 0.161 | 0.201 | 0.170 | 0.250 | 0.157 | -8.30*** |
| *Interest Coverage* | 709 | 3259 | 409 | 2209 | 167 | 1411 | 3.62*** |
| *Current Ratio* | 3.026 | 3.283 | 2.470 | 2.435 | 1.666 | 1.490 | 9.32*** |
| *Market Power* | 0.046 | 0.097 | 0.054 | 0.108 | 0.145 | 0.204 | -11.67*** |
| *Number of employees* | 454 | 540 | 1,054 | 1,981 | 5,060 | 7,333 | -17.09*** |

Table 5 **Determinants of ES**

This table presents the result of modeling determinants of annual ES score. Panel A includes six independent variables and Panel B includes additional control variable of lagged ES. Year and industry fixed effects are included in all models. All annual accounting variables are winsorized at the 1st and 99th percentiles. Standard errors are clustered by firm level and reported in parentheses. ***,**, and * indicate that the parameter estimate is significantly different from zero at the 1%, 5%, and 10% level, respectively.

| Panel A: Determinants of ES | | | | | | |
|---|---|---|---|---|---|---|
| Dep Variable | (1)<br>ES | (2)<br>ES | (3)<br>ES | (4)<br>ES | (5)<br>ES | (6)<br>ES |
| *Cash Holdings* | -0.463 | | | | | |
| | (-1.15) | | | | | |
| *Free Cash Flows* | | 0.375** | | | | |
| | | (2.04) | | | | |
| *Capex* | | | -0.380 | | | |
| | | | (-1.27) | | | |
| *Efficiency (lack of)* | | | | 0.177 | | |
| | | | | (1.10) | | |
| *Dividend/Net Income* | | | | | 0.073* | |
| | | | | | (1.80) | |
| *Leverage* | | | | | | -0.009 |
| | | | | | | (-0.10) |
| *SGA-to-Asset* | 0.473** | 0.416* | 0.447** | 0.436* | 0.432* | 0.443** |
| | (2.15) | (1.86) | (2.01) | (1.96) | (1.94) | (1.98) |
| *Ln(Asset)* | 0.445*** | 0.448*** | 0.448*** | 0.450*** | 0.446*** | 0.448*** |
| | (16.93) | (17.27) | (17.24) | (17.34) | (17.27) | (17.06) |
| *Profitability* | 0.025 | -0.224 | 0.005 | 0.287 | 0.015 | -0.027 |
| | (0.06) | (-0.49) | (0.01) | (0.52) | (0.03) | (-0.06) |
| *Tobins' q* | 0.019 | 0.019 | 0.019 | 0.015 | 0.019 | 0.018 |
| | (0.92) | (0.92) | (0.88) | (0.71) | (0.91) | (0.85) |
| *Current Ratio* | -0.006 | -0.007 | -0.008 | -0.006 | -0.008 | -0.008 |
| | (-0.58) | (-0.67) | (-0.80) | (-0.57) | (-0.74) | (-0.73) |
| Industry FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes |
| SE clustered by | Firm | Firm | Firm | Firm | Firm | Firm |
| N | 2,033 | 2,033 | 2,033 | 2,033 | 2,033 | 2,033 |
| Adj.$R^2$ | 0.544 | 0.544 | 0.543 | 0.543 | 0.544 | 0.543 |

**Table 5**—*Continued*

| Panel B: Determinants of ES with lagged ES control | | | | | | |
|---|---|---|---|---|---|---|
| Dep Variable | (1)<br>ES | (2)<br>ES | (3)<br>ES | (4)<br>ES | (5)<br>ES | (6)<br>ES |
| *Cash Holdings* | -0.352** | | | | | |
| | (-1.97) | | | | | |
| *Free Cash Flows* | | -0.029 | | | | |
| | | (-0.23) | | | | |
| *Capex* | | | 0.098 | | | |
| | | | (0.54) | | | |
| *Efficiency (lack of)* | | | | 0.101 | | |
| | | | | (1.37) | | |
| *Dividend/Net Income* | | | | | 0.062** | |
| | | | | | (2.52) | |
| *Leverage* | | | | | | -0.002 |
| | | | | | | (-0.05) |
| *Lagged ES* | 0.762*** | 0.763*** | 0.763*** | 0.762*** | 0.762*** | 0.763*** |
| | (39.89) | (39.51) | (39.57) | (39.57) | (39.84) | (39.61) |
| *SGA-to-Asset* | 0.235*** | 0.212** | 0.209** | 0.205** | 0.201** | 0.210** |
| | (2.60) | (2.31) | (2.30) | (2.27) | (2.22) | (2.31) |
| *Ln(Asset)* | 0.104*** | 0.106*** | 0.106*** | 0.107*** | 0.105*** | 0.106*** |
| | (7.82) | (8.05) | (8.03) | (8.13) | (8.07) | (7.85) |
| *Profitability* | -0.003 | -0.010 | -0.032 | 0.138 | 0.006 | -0.028 |
| | (-0.01) | (-0.04) | (-0.15) | (0.54) | (0.03) | (-0.13) |
| *Tobins' q* | 0.008 | 0.007 | 0.007 | 0.006 | 0.008 | 0.007 |
| | (0.95) | (0.78) | (0.77) | (0.69) | (0.92) | (0.79) |
| *Current Ratio* | 0.001 | 0.000 | 0.001 | 0.001 | -0.000 | 0.000 |
| | (0.35) | (0.04) | (0.13) | (0.31) | (-0.06) | (0.03) |
| Industry FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes |
| SE clustered by | Firm | Firm | Firm | Firm | Firm | Firm |
| N | 1,875 | 1,875 | 1,875 | 1,875 | 1,875 | 1,875 |
| Adj.$R^2$ | 0.792 | 0.792 | 0.792 | 0.792 | 0.793 | 0.792 |

## Table 6 **Firms' Expenditure and ES surrounding the panic period**

This table provides differential impacts of ES on firm spending surrounding the panic period. I run the following models over the period between the second quarter of 2015 and the fourth quarter of 2020 for different cost measures:

$$Expenditure_{i,t} = b_0 + b_1 ES_{i,2018} \times PrePanic_t + b_2 ES_{i,2018} \times Panic_t + b_3{}' \boldsymbol{X}_{i,t-1} + Quarter\ FE + Firm\ FE + e_{i,t} \quad (5)$$

*Total cost* is defined as sales minus income from continuing operations plus depreciation divided by sales. All accounting variables are winsorized at the 1st and 99th percentiles. Firm and quarter fixed effects are included in all models. Standard errors are clustered by firm level and reported in parentheses. ***,**, and * indicate that the parameter estimate is significantly different from zero at the 1%, 5%, and 10% level, respectively.

| Dependent variable | Total Cost / Sales (1) | SGA / Sales (2) | AD / Sales (3) | Change in in CapEx (4) | Change in FCF (5) |
|---|---|---|---|---|---|
| *ES x Pre-panic* | 0.016* | 0.085* | 0.001 | 0.403 | 0.398* |
| | (1.71) | (1.77) | (0.54) | (1.05) | (1.80) |
| *ES x Panic* | 0.009 | 0.070 | 0.001 | 0.327 | 0.077 |
| | (0.79) | (1.49) | (0.87) | (0.68) | (0.23) |
| Firm Characteristics | Yes | Yes | Yes | Yes | Yes |
| Firm FE | Yes | Yes | Yes | Yes | Yes |
| Time (quarterly) FE | Yes | Yes | Yes | Yes | Yes |
| SE clustered by | Firm | Firm | Firm | Firm | Firm |
| *ES x Pre-panic - ES x Panic* | 0.007 | 0.015 | -0.000 | 0.076 | 0.321 |
| *p-Value* | (0.46) | (0.57) | (0.51) | (0.85) | (0.31) |
| *N* | 6,247 | 6,723 | 5,612 | 4,205 | 6,451 |
| Adj.$R^2$ | 0.07 | 0.65 | 0.56 | 0.04 | 0.00 |

# 국문 초록

본 연구는 Covid-19에 따른 한국 주식시장의 급락 이벤트를 활용하여 기업의 환경·사회책임 활동이 주주가치를 개선한다고 보는 시각과 기업의 환경·사회책임 활동은 대리인 문제에 따른 결과로 보는 시각을 각각 테스트하였다. 먼저, 주주가치 개선의 시각에서는 주식 급락시장에서 ESG평가등급이 높은 주식이 양의 누적수익률을 가질 것으로 예측한다. 2020년 1분기 이벤트 기간의 누적수익률을 한국기업지배구조원의 E등급과 S등급을 평균한 점수에 따라 비교한 결과, 평균점수가 높을수록 유의한 음의 누적수익률을 가지는 것으로 나타났다. 또한, 이중차분모형 분석 결과 이러한 음의 효과는 이벤트 기간에서만 유효한 것으로 나타났다.

대리인비용 견해에 부합하는지 검증하기 위해 한국기업지배구조원의 E와 S 등급을 평균하여 얻은 ES변수는 투자비용과 양의 관계를 가진다는 첫번째 가설과 한국의 환경·사회책임 우수기업은 이벤트 기간 이전에 환경·사회적 투자가 많았을 것이라는 두번째 가설을 세웠다. ES 변수에 대한 회귀 분석 결과, ES 변수는 판매및관리비와 유의한 양의 관계를 가지며 회사규모 및 배당수익률의 함수임을 확인하였다. 다음으로, 투자비용에 대한 이중차분모형 분석 결과, 이벤트 이전의 기간 동안 ES 변수와 환경·사회책임 우수기업의 투자비용간 유의한 양의 관계를 가지지만 이벤트 기간에는 ES변수와 투자비용간 유의한 관계가 사라짐을 확인하였다.

본 연구는 비교적 연구가 활발히 진행되지 않던 경제침체 기간 동안 ESG 평가등급과 주식수익률 간의 관계에 대한 실증 분석결과를 제시하였다. 또한, ESG 분야에서 지배적인 입장을 가지는 주주가치 개선 가설(value-enhancing ESG perspective)에 반대되고 대리인비용 가설 (agency perspective on ESG)에 부합하는 실증결과를 제공하였다는데 연구의 의미가 있다.

**주요어 :** ESG, Covid-19 급락 시장, 주식수익률, 대리인 비용 ESG 가설, 주주가치 개선 ESG 가설

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