


## Article

# Carbon Emission Regulation, Green Boards, and Corporate Environmental Responsibility

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**Abstract:** In this study, we examine various effects of carbon emission regulation enacted in South Korea. We provide empirical evidence of regulated firms strategically hedging against potential risks by increasing the number of directors with environment-related backgrounds. We also find that this relationship is clearly evidenced when the firm is owned by a lower proportion of foreign investors. Further analysis shows that these directors successfully change their firms to become environmentally friendly. Overall, we conclude that the role of governments in promoting green finance is crucial. The findings of this study may be used as a guideline for decision makers and environmental policymakers to create systems and policies to increase the firm's awareness about the environment in relation to corporate environmental responsibility (CER) ratings of firms.

**Keywords:** emission regulation; board characteristics; corporate environmental responsibility



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## 1. Introduction

Being environmentally responsible is becoming more important for sustainable growth at both firm and national levels. To effectively reduce greenhouse gases (GHGs), the South Korean government enacted a comprehensive law that compels all firms, regardless of their financial status, to disclose their GHG emission to the public if it exceeded 125,000; 87,500; and 50,000 tons of carbon dioxide equivalent (tCO<sub>2</sub>-eq) in 2011, 2012, and 2014, respectively. The South Korean government enacted the Framework Act on Low-Carbon, Green Growth in 2010, whereby, in accordance with Article 42 (6), the Minister of Environment issued comprehensive policy measures as the Principles of Target Management for Greenhouse Gases and Energy. The law is established to regulate and reduce firms' GHG emissions. In addition to the emission history disclosure, firms are regularly monitored by government agencies and are given emission guidelines that should be followed. Therefore, regulated firms are exposed to a number of risks, for example, disclosing previously confidential information about their emissions and their manufacturing details to third parties may result in negative environmental publicity.

However, navigating regulations is difficult as many firms encounter these environmental regulations for the first time, and board members may not be familiar with such laws. Therefore, regulated firms have higher incentives to hire CEOs and directors who have work or academic experience in environment-related fields—hereinafter, we define these as green CEOs and green directors, as components of green boards. Directors' prior experiences are well reflected in their management styles [1,2]. As green CEOs and directors would have higher level of knowledge of GHG emissions and policies related to them, they may be able to navigate the regulations. Ultimately, they may enhance a firm's competitive advantage in corporate environmental responsibility (CER).

Therefore, in this study, we investigate the extent to which the compliance with environmental regulations, which compels firms to disclose their emissions data, affects the

composition of the boards of these firms. Since green CEOs and green directors constitute environment-field-related expertise, we hypothesize that their management style may be reflected in a firm's corporate environmental responsibility (CER) performance metrics. If the corporate decisions by newly hired green CEOs or directors are towards firm's green growth, then the government agencies such as the Korea Corporate Governance Service (KCGS) would note such changes thus reflect on the Corporate Social Responsibility (CSR) grade.

Quantitatively measuring the level of CER or CSR engagement is difficult. Therefore, this study uses firm-level CER and CSR scores from the KCGS database to proxy them. Prior studies often use the KCGS database to measure a firm's CSR level (Kim, 2009 [1]). The data source provides a firm's CER scores from grade "D" to grade "A+." KCGS provides CER scores of all KOSPI exchange listed firms and some companies listed on the KOSDAQ exchange. For KOSDAQ listed firms, KCGS evaluates their CER level if institutions inquire. Furthermore, to mitigate the subjectivity issue, KCGS uses various sources, such as corporate disclosure information, supervisory authority reports, government reports, and news data. In addition, KCGS tries to meet international standards, such as the Organisation for Economic Co-operation and Development (OECD) corporate governance principles and ISO26000, as well as the Korean law. Therefore, prior studies examining the Korean CSR or CER often use the KCGS database [3].

Regression analysis shows that regulated firms would be more likely to hire both green CEOs and green directors. We further show that such relationships manifest when there is lower proportion of foreign institutional ownership. Employing a propensity score matching (PSM) approach [4], we confirm that the relationship does not occur due to endogeneity.

Hereinafter, we assess the effectiveness of green CEOs and directors as factors influencing the firm's attitude toward CER. The extensive literature commonly postulates that managing CER is beneficial. For example, prior studies show that environmental management positively affects the future performance of firms [5–7], reduces the cost of equity [8], and improves corporate innovation [9]. However, there is very little investigation of mechanisms that influence positive CER management. Thus, we test whether green boards successfully lead a firm's attitude toward CER and report that the proportion of green boards is positively associated with a firm's attitude toward CER, as measured by CER ratings.

This study makes clear contributions to the literature. While there are many studies on the effects of environmental regulation on financial and operational performance of firms [10–12] or on corporate disclosure to develop an environmental strategy [13,14], studies on how regulation influences the composition of board characteristics are limited. Thus, our study contributes to the existing literature by, first, identifying an additional possible outcome of environmental regulations. Second, we highlight the role of governments as their sanctions positively induce firms to have higher awareness of green finance.

The remainder of this paper is structured as follows. In Section 2, we review the literature on managerial behavior. Section 3 describes the data. Section 4 shows the main results of our analysis. Finally, we discuss our conclusions in Section 5.

## 2. Literature Review and Hypothesis Development

Classic theories emphasize firm-level or industry-level explanations as primary determinants of firm's policies and decisions [15–17]. Typical example is the trade-off between the tax deductibility and bankruptcy costs. However, recent evidence began to note what has not been clearly predicted in the traditional theories [18]. Studying the role of manager's behavior and its effects on corporate decisions is an example. A growing literature highlights the importance of the board members for a firm's policies [19–23]. Bertrand and Schoar (2003) [19] investigate whether individual managers affect corporate behavior. The article finds that managers from earlier birth cohorts appear on average to be more

conservative, and that managers who hold an MBA degree seem to more aggressively seek managers.

Benmelech and Frydman (2015) [1] analyze the relationship between military service of managers and their decisions, financial policies, and outcomes. The authors provide empirical evidence that military service is associated with conservative behavior and conservative corporate policies. Furthermore, they also find that those managers are less likely to engage in corporate investment or corporate fraudulent activities.

Similarly, Cain and McKeon (2016) [2] and Sunder et al. (2017) [23] use a unique pilot license status data to show that managers' hobbies of flying airplanes are positively associated with the firm's innovation (Sunder et al., 2017). In addition, Cain and McKeon (2016) [2] show that firms led by those managers have higher equity return volatility above the amount explained by compensation components. A proliferating literature focuses on how managers' prior experiences affect corporate policies such as leverage [21], corporate innovation [23]. However, not many have observed the effects of managers' prior experiences in environmental related fields and their future decisions.

Regarding the literature on CER, a vast literature has underscored the importance of CER. Especially, environmental responsibility is an important research topic for sustainable growth [24–26]. Prior studies have well examined how environment-related risks affect societies. For instance, Vesalon et al. (2013) [27] examine the environmental risk involved in a proposed gold-mining project and find that environmental risk has a socially constructed horizon and that counter-discourses on risk represent a fundamental contribution of the environmental protesters to the anti-mining movement. Furthermore, Shahzad et al. (2020) [28] find that CSR practices have a significant influence on environmentally sustainable development. Authors argue that CSR activities should be embedded in the organizational environmental strategies for green innovation since CSR dimensions have positive relations with environmentally sustainable development.

Studies thus highlight the importance of policies that could enhance the level of environmental responsibility and also mitigate the climate issues. For instance, Eitan (2021) [29] find that policymakers tend to focus on promoting mitigation strategy rather than an adaptation strategy. The findings shed light on the important role of international influence which tends to emphasize mitigation over adaptation. Furthermore, May Tan-Mullins and Mohan (2013) [30] argue that since the environmental protection is weak in developing countries, there is a need for governments to create a legislative and institutional framework. It is also important to examine the effectiveness of the environmental regulation. Masud et al. (2018) [31] show that banking companies disclosed more green information in line with environmental regulation.

A strand of studies has shown that being environmentally responsible positively affects firm performance [32–44], and innovation [45]. For instance, Deng and Cheng (2019) [41] find that CER and stock market performance has a positive correlation. In addition, researchers found that CER contributes to lowering a firm's information risk [46], increases firm risk [47,48], enhances value of shareholders [49], and increases board diversity [50]. However, there also exists studies that ESG activities negatively affect firm performance [51]. For instance, Kim and Lee (2020) criticized the overinvestment behavior to maintain certain ESG performance [52]. There are also researchers that maintain a neutral view on firm's CER engagement. Chapple et al. (2005) [53] finds that CER strength does not affect firm performance. Kim and Statman (2012) [54] insist that corporation control CER activities consistent with the interest of shareholders.

While studies on examining the effects of CER are proliferating, relatively less attention has been given to investigating factors that drive such decisions. Previous research shows that corporate governance structure [55], board of directors affects the ESG performance [56], institutional ownership structure [57], and outside directors such as corporate social responsibility (CSR) committees also have positive effects on ESG performance [58]. Furthermore, several researchers have shown that environmental regulations [59], business leaders' governmental intervention [60], religion [61], and lowering

financial constraints [62] promote CER decisions. On the other hand, few researchers insist that government has responsibility to encourage corporations to engage in CER [63,64].

Based on prior studies on board characteristics and CER, there is a gap between those two strands of literature. Therefore, this research aims to first show how firms respond to environmental regulations and second show how board diversity, especially a board's experiences related to its environment, can explain the variation in the CER performances. To formally put the two hypotheses:

**Hypothesis 1.** (Other things being equal) *Environment regulation induces firms to increase the proportion of green CEOs and green directors.*

**Hypothesis 2.** (Other things being equal) *The proportion of green CEOs and directors is positively associated with CER.*

### 3. Data and Methodology

#### 3.1. Environmental Regulation Data

The regulations compelling those firms emitting GHGs in excess of 125,000 tCO<sub>2</sub>-eq in disclosing their emission information were enacted in 2010. The emission information is made public in the annual business reports (comparable to the 10-K in the United States of America), which are available from the DART database (comparable to the EDGAR database in the United States of America). We manually transcribe this emissions information from these annual reports.

#### 3.2. Green Boards Data

We identify green CEOs and green directors using the TS2000 database. This database provides information on the education and work experience of CEOs and directors of public firms. We define a green CEO as an indicator variable with an assigned value of one where the CEO has either educational or prior work experiences in an environment-related area. Similarly, we define a green director as a continuous variable with an assigned value equal to the proportion of green directors of the total number of directors.

#### 3.3. CER Rating Data

In many cases, researchers overcome the difficulties of quantitatively measuring the level of CER engagement by using proxy measurements. The Korea Corporate Governance Service (KCGS) database provides an annual CER score for each firm.

Figure 1 illustrates the green CEO ratio, green director ratio, and the number of regulated firms annually. Note that both the green CEO and green director ratios have increased significantly after enactment of the environmental regulation in 2010. Furthermore, we find that the number of regulated firms also increased because of the stricter emission restriction enacted in 2012 and 2014.

#### 3.4. Control Variables

In addition, we add a number of variables to control for unobserved heterogeneity. These include log(assets), Tobin's q, log(sales), asset tangibility, leverage, cash, and cash flow. Furthermore, we employ year and industry fixed effects throughout. All errors are clustered for each firm.

#### 3.5. Sample

Although the regulation was enacted in 2010, our final dataset spans from 2012 to 2019 to observe the effects of the regulation after the enactment by lagging all control variables. Furthermore, we limited the data to those of manufacturing firms to which the law exclusively applies. Thus, the data sample comprised 10,240 firms' financial year observations. All variables and their sources are provided in Table 1.

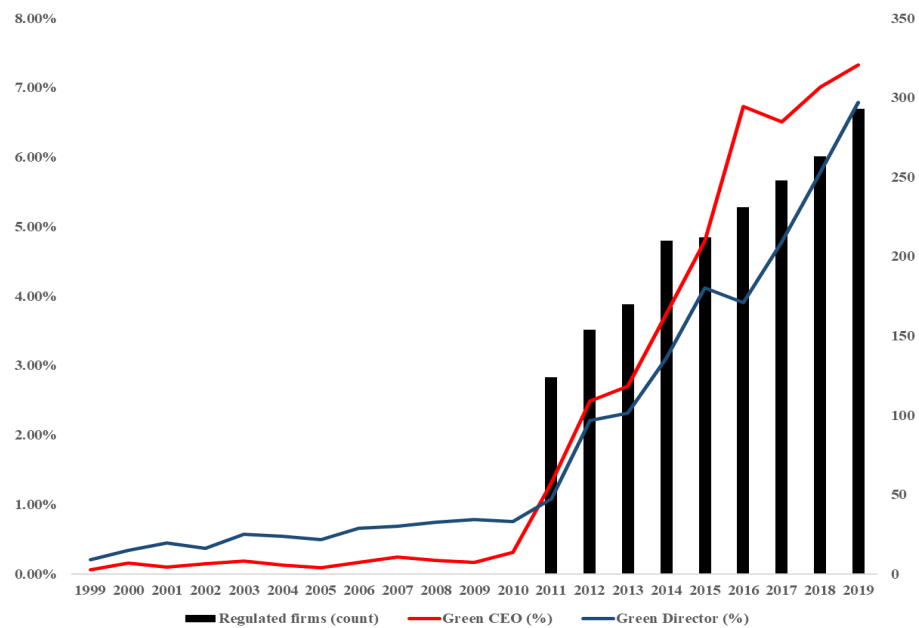


Figure 1. Green CEOs, green directors, and the number of regulated firms.

Table 1. Variable description.

Variable Name	Description	Source
Green CEO	An indicator variable that equals one if the firm is managed by a CEO with an academic or work experience in environment related fields	TS2000
Green Director	A proportion of directors who have academic or work experiences in environment related fields	TS2000
Regulation	An indicator variable that equals one if the firm is regulated under the environment regulation act	DART
CER Score	Firm's score on the environment section from the CSR score, ranging from "D" to "A+".	KCGS
CSR Score	Firm's aggregated score from the environment, social, and governance sections, ranging from "D" to "A+"	KCGS
Tobin's q	Tobin's q calculated as follows: (the market value of common stock + book value of preferred stock + (current liabilities – current assets) + long-term debts)/book value of total assets	COMPUSTAT
Log(sales)	Log of a firm's sales	COMPUSTAT
Tangibility	Net tangible assets calculated as follows: total assets – intangible assets – total liabilities	COMPUSTAT
Cashflow	Free cash flow calculated as follows: net income + (depreciation/amortization) – change in working capital – capital expenditure	COMPUSTAT

## 4. Main Results

### 4.1. Descriptive Statistics

The descriptive statistics are presented in Table 2. Panel A reports summary statistics for non-regulated firms, and Panel B provides information of regulated firms. By comparison, it should be noted that, on average, compared to non-regulated firms, regulated firms have a higher number of green CEOs and directors. Furthermore, we found that the average CER scores of regulated firms are higher than those of non-regulated firms. However, the differences in the interpretation of the results obtained through a univariate

analysis may be ascribed to bias resulting from other, unobserved variables. Therefore, we employed the regression analysis model with a number of control variables and fixed effects to further test our hypotheses.

**Table 2.** Descriptive statistics.

<b>Panel A. Non-Regulated Firms</b>					
	<b>Obs.</b>	<b>Average</b>	<b>S.D.</b>	<b>Min.</b>	<b>Max.</b>
Green CEO	8693	0.013	0.112	0	1
Green director	8693	0.001	0.016	0	0.467
CER score	2967	3.859	1.149	0	7
Tobin's q	8693	1.335	1.333	0.038	55.823
Log(sales) (million KRW)	8693	5.151	0.64	2.379	8.362
Tangibility (million KRW)	8693	32,603.95	219,000	0	$1.40 \times 10^7$
Cashflow (million KRW)	8693	11,507.05	121,000	−295,000	$1.02 \times 10^7$
<b>Panel B. Regulated firms</b>					
Green CEO	1547	0.095	0.293	0	1
Green director	1547	0.007	0.028	0	0.429
CER score	1249	4.825	0.977	0	7
Tobin's q	1547	1.012	0.536	0.165	8.26
Log(sales) (million KRW)	1547	6.089	0.735	4.512	8.387
Tangibility (million KRW)	1547	359,000	951,000	1421.263	$1.35 \times 10^7$
Cashflow (million KRW)	1547	149,000	693,000	−226,000	$1.31 \times 10^7$

Note. Panel A reports the descriptive statistics of non-regulated firms and Panel B provides the statistics for regulated firms. The data period spans from 2012 to 2019. Green CEO is an indicator variable, which is equal to one if the firm is managed by a CEO who has a prior job or academic experience in environment-related fields. Green director is a proportion of directors with prior job or academic experiences in environment field. CER score is a continuous variable of scores with 0 representing "D" grade and 7 representing "A+" grade. Other control variables are Log(asset), Tobin's q, Log(sales), Tangibility, Leverage, Cash, and Cashflow.

## 4.2. Regulation and the Green Board

### 4.2.1. Baseline Regression Results

In this subsection, we employ a logistic regression and pooled ordinary least squares (OLS) estimation method to test for the relation between the environmental regulation and the board diversity. Thereafter, we use PSM to match the potential effects of endogeneity.

The estimation result is reported in Panel B of Table 3. Column (1) provides the result for the green CEOs, and Column (2) shows the result for the green directors. We found that regulated firms are 56.9% more likely to be managed by green CEOs and have a 2% higher proportion of green directors when compared with non-regulated firms.

**Table 3.** Effects of the environmental regulation on the board characteristics.

<b>Panel A. Summary Statistics between the Treated Group and the Control Group</b>				
<b>Variable (Lagged)</b>	<b>Treated</b>	<b>Control</b>	<b>Bias</b>	<b>t-Statistics</b>
Tobin's q	1.3527	1.6198	−22.5	−1.32
Log(sales)	5.7749	5.7656	1.1	0.15
Tangibility	$4.6 \times 10^5$	$3.5 \times 10^5$	10.8	1.47
Cashflow	$2.3 \times 10^5$	$1.9 \times 10^5$	16.9	0.42
Industry	36.138	37.144	−5.6	−0.84
Year	2015.0	2014.9	2.9	0.45
<b>Panel B. Results of the OLS regression with and without PSM</b>				
	<b>(1)</b>	<b>(2)</b>	<b>(3)</b>	<b>(4)</b>
<b>Variable (Lagged)</b>	<b>Non-PSM Green CEO</b>	<b>Non-PSM Green Director</b>	<b>PSM Green CEO</b>	<b>PSM Green Director</b>
Regulation	0.002 **	0.002 **	0.079 *	0.012 *

Table 3. Cont.

Panel B. Results of the OLS regression with and without PSM				
	(1)	(2)	(3)	(4)
	(2.337)	(2.337)	(1.665)	(1.824)
Tobin's q	0.000	0.000	−0.004	−0.001
	(1.076)	(1.076)	(−0.890)	(−1.449)
Log(sales)	−0.001 **	−0.001 **	−0.006	−0.024 ***
	(−2.288)	(−2.288)	(−0.215)	(−6.943)
Tangibility	0.000	0.000	−0.000 *	−0.000
	(0.986)	(0.986)	(−1.723)	(−0.272)
Cashflow	−0.000	−0.000	0.000 ***	0.000
	(−0.573)	(−0.573)	(3.160)	(1.173)
Constant	0.010 ***	0.010 ***	0.524 ***	0.192 ***
	(3.744)	(3.744)	(3.489)	(9.731)
Observations	10,649	10,649	982	982
Adjusted R-squared	0.291	0.291	0.174	0.510
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes

Note. This table provides the estimation result of the regression analyzing the effects of the environmental regulation on the board characteristics. Panel A reports the result of propensity score matching (PSM), and Panel B reports the regression results using the matched sample. Columns (1) and (2) show the result without PSM samples, and Columns (3) and (4) provide results of PSM samples. We used logit regressions on Columns (1) and (3). Furthermore, these results include control variables as well as industry and year fixed effects. Reported in parentheses are t-value based on standard errors clustered by firm. \*, \*\*, and \*\*\* indicate significance at the 10%, 5%, and 1% levels, respectively.

We then employ PSM to dilute the effects of endogeneity. PSM quantifies the sensitivity of the results for the primary causal variable to unobserved correlated omitted variables [65]. First, we perform a logit regression on the regulation indicator variable. Thereafter, we selected all control variables to balance the confounding factors in the matching procedure. Panel A of Table 3 provides the matching result. It should be noted that the differences between the treatment and comparison groups are statistically insignificant for all variables, indicating that the samples are well matched. The regression analysis results using PSM are presented in Columns (3) and (4) of Panel B. We found that the regulation has a positive effect on the proportional composition of green boards. Overall results indicate that firms respond to the environmental regulations strategically. As a short-term measure, firms hire green CEOs and directors with the assumption that they will manage compliance with the regulations efficiently and increase their CER.

#### 4.2.2. Effects of the Foreign Investors

In this subsection, we test for the effects of monitoring by foreign investors. In previous studies, it is generally accepted that foreign investors in emerging markets seek out short-term investments [66,67]. As environmental projects are often long term, a higher proportion of foreign shareholders may discourage the firms from hiring green CEOs and green directors.

The results of the analysis are presented in Table 4. As CEOs are considerably important people in firms [19,68], the board would be motivated to recruit green CEOs under the regulations. However, short-term investors such as foreign investors may discourage firms from hiring green CEOs. To test the effects of foreign institutional investors on firm's willingness to employ green CEOs and green directors, we employed an interaction term analysis where we interacted the regulation status dummy and foreign ownership variable. Our findings concur with those of previous studies in that the likelihood of firms hiring green CEOs is evidenced only in firms managed by foreign minority investors. These results indicate that short-term investors will encourage firms to focus on short-term projects.

**Table 4.** Effects of the foreign institutional investors.

Variable (Lagged)	(1)	(2)
	Green CEO	Green Director
Regulation * Foreign Ownership	−0.003 ***	−0.005
	−9.122	−1.369
Observations	10,158	10,649
Adjusted R-squared	0.162	0.01
Controls	Yes	Yes
Year FE	Yes	Yes
Industry FE	Yes	Yes

Note. This table shows the results of further analysis. The table provides subsample analysis results with before and after the emission trading scheme regulation enacted in 2014 and low and high proportion of the foreign institutional ownership (low if the stock ownership by foreign investors is below 50% and high for the rest). Furthermore, all results include control variables used in Table 3 as well as industry and year fixed effects. Reported in parentheses are t-value based on standard errors clustered by firm. \* and \*\*\* indicate significance at the 10%, 5%, and 1% levels, respectively.

#### 4.3. Green Boards and CER Rating

Our second hypothesis is explained by investigating the role of the green board in improving corporate CER competitiveness. It is assumed that the expectation for regulated firms in hiring green CEOs or directors is the improvement of their competitive advantage through CER. Therefore, we assessed the impact of green boards through an empirical analysis of CER scores.

The results of our analysis are shown in Table 5. As CER is graded alphabetically (“A+” and “D”), adopting a pooled OLS regression is not an appropriate method for analysis. Therefore, we used a rank ordered logistic regression, which finds popular acceptance as a method of analysis using sequential variables [69,70]. Columns (1) and (2) show that both green CEOs and green directors increase the CER rating of firms, and Columns (4) and (5) show that green CEOs and green directors are also able to increase the overall CSR score. Interesting result emerged when we ran the regression again using a new variable that indicated that firms that hire both green CEO and green director. Results show that hiring both green CEO and green director in the same year resulted in higher increment in both CER and CSR scores compared to cases where we hired only green CEO or green director. This implies that when both the CEO and directors have a common environment-related background, there exists a synergistic effect that positively affects firm’s CER performance. Overall results indicate that green CEOs and directors impact the CER competitive advantage of firms.

**Table 5.** Effects of the green CEOs and directors on firm’s CER score and CSR score.

Variable (Lagged)	(1)	(2)	(3)	(4)	(5)	(6)
	CER	CER	CER	CSR	CSR	CSR
Green CEO only	0.398 *** (4.470)			0.305 ** (2.690)		
Green director only		3.719 ** (2.230)			2.344 *** (3.520)	
Both Green CEO & director			4.047 ** (2.430)			6.975 *** (4.400)
Observations	4206	4206	4206	4206	4206	4206
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes

Note. This table provides the estimation result of the regression analyzing the effects of the green board on the CER score. Columns (1) and (2) provide the results for the green CEO and the green director, respectively. Columns (3) and (4) show the results for the overall CSR score, which is calculated by the sum of three categories: environmental (E), social (S), and governance (G). Furthermore, results include control variables as well as industry and year fixed effects. Reported in parentheses are t-value based on standard errors clustered by firm. \*\* and \*\*\* indicate significance at the 10%, 5%, and 1% levels, respectively.



## 5. Discussion and Conclusions

This study identified the advantages of green finance under the exogenous environmental regulation in South Korea. Unlike previous studies that investigated the effects of regulation on financial or operational performance, we focused on the internal organization of firms. Analysis results show that regulated firms respond to regulations strategically by increasing the proportion of green CEOs and directors. We also examined the role of green CEOs and directors, especially in relation to the CER ratings of firms, and found that green boards succeed in raising the CER ratings of firms. This implies that the regulated firm's decision to recruit green CEOs and directors as a hedge against the risks of disclosure is successful.

Being environmentally responsible is becoming an important question and task worldwide. Global warming is now a significant factor that needs to be seriously considered. Prior literature has mostly focused on examining the roles of government-level policies and how the introduction of such policies affects global warming. At the same time, it is also important to recognize how companies respond to such policies and changes. Our first finding that companies increase the proportion of green CEOs and directors in response to environmental regulations implies that firms view environmental risk as one of the key risks they have to tackle. Since environmental risk differs from other conventional risks, firms hire managers with a background in environment-related fields. Furthermore, another finding that such firms managed by green managers are more environmentally responsible is encouraging and has policy implications. Prior studies have commonly argued that CER is beneficial for a firm's sustainable growth. Since our research has shown that hiring green managers benefits firms in multiple ways, policymakers may use this research to design policies that may help firms to hire green managers. Furthermore, the findings of this study may also be used as a guideline for decision makers and environmental policymakers to create systems and policies to increase the firm's awareness about the environment in relation to CER ratings of firms. Specifically, we emphasize the role of governments in promoting greener production as our results show that the regulation effectively diversifies a firm's board characteristics and attitude toward green finance.

One clear limitation of the research is on the data. While we were able to obtain the Korean listed firms' managerial background and information such as their education level and prior work experience, we could not get access to non-listed firms' data. Since the TS2000 database, which we used to obtain the education and work experience status, updates the information for publicly listed firms, we were not able to access information about other firms. This lack of the data leads to the potential future research. If the data of non-listed firms is available, researchers could compare how small-and-medium sized non-listed firms respond to publicly listed firms. Listed firms are generally larger in size and profitability compare to non-listed firms. Therefore, the statistically significant relationship we have investigated using the data sample of listed firms may not be observed for non-listed firms. Then, this would also imply that governments should impose different policies and sanctions for small-and-medium sized companies.

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