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The Influence of Firms' Pragmatic Legitimacy on Investors' Perceptions of Their Environmental Protection Activities

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Abstract: This study demonstrates the mechanisms by which the pragmatic characteristics of legitimacy influence the promotion of corporate social responsibility activities, focusing on firms and investors. We hypothesize that the more aggressive a firm is in its environmental protection efforts, the higher the reduction in investment risk from its environmental performance. Multiple regression analysis was performed for Japanese chemical-related industries from 2017 to 2019. The results revealed that firms that balance environmental performance with business profits should invest in environmental protection activities and improve their environmental performance without touting profitability. The findings reveal the need to incorporate a profitability perspective when considering the relationship between environmental protection activities and investor perceptions.

Keywords: CSR; legitimacy; pragmatic characteristics; investor; environmental performance; information asymmetry

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1. Introduction

Previous studies have applied the concept of legitimacy to markets [1] and entrepreneurship [2]. In recent years, there has been a growing interest in research on corporate activities with a focus on sustainable development in society. This interest is related to firms actively engaging in corporate activities while being aware of their social contributions, as well as because of the 17 Development Goals for a Sustainable Society (SDGs) adopted by the United Nations. The concept of sustainable development was first defined in the Brundtland Report by the World Commission on Environment and Development (WCED), as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" [3]. Tomislav summarizes that sustainable development is supported by three pillars: environmental sustainability, social sustainability, and economic sustainability [4]. This author further posits that while one of the pillars may become sustainable, others may become unsustainable, and that this is one of the challenges of sustainable development. Manioudis and Meramveliotakis also emphasized the need for an interdisciplinary approach to sustainable development and highlight the importance of utilizing various theories to expand our knowledge on the topic [5]. Amid this new societal framework that places importance on sustainable development, there is also a movement to reevaluate the concept of legitimacy.

Legitimacy is "the generalized perception or assumption that the actions of an entity are desirable, proper, or appropriate within some socially constructed system of norms, values, beliefs, and definitions" [6] (p. 574). For firms, legitimacy affects the trust of stakeholders [7] and has a role in maintaining and improving relationships with them [8]. Therefore, firms implement a variety of strategic activities to gain legitimacy from their stakeholders, for example, detailed reporting of business activities [9] and building of relationships with non-governmental organizations and others [10]. One of the means of gaining corporate legitimacy that has grown in interest in recent years is engagement in corporate social responsibility (CSR) activities. CSR activities refer to a firm's sustainable

economic, environmental, and social activities [11]. Previous studies on CSR activities have demonstrated their impact on firms' cost of capital, operating costs, and stock market value [12,13]. However, few studies have demonstrated the pragmatic aspects of the relationship between firms and investors, and this is an important research topic that is yet to be explored. Suchman [6] classified legitimacy into pragmatic, ethical, and cognitive legitimacy. Pragmatic legitimacy is the perception that stakeholders derive from direct interactions with firms that involve private greed [6]. For firms, the pragmatic aspect of CSR activities is to continually obtain funds from investors. For investors, the pragmatic aspect involves earning dividends from the firms they invest in and profit from stock trading. It is necessary to maintain investors' pragmatic perceptions to obtain stable capital from investors. In other words, it is necessary to balance the results of CSR activities with the firm's profits.

Environmental protection is compatible with the results and benefits of CSR activities. Environmental protection activities have a positive impact on reducing operating costs [13], and help firms gain recognition from environmentally conscious investors [14]. Firms have also adapted to environmental regulations as part of their CSR activities. For example, Sumitomo Chemical has developed an acrylic resin that reduces environmental impact to comply with regulations on greenhouse gas emissions and is linking its CSR activities with its business [15]. In this way, while the need to comply with regulations becomes pressing, more firms link their business activities to environmental protection activities. Based on the above, this study poses the question of whether the pragmatic characteristics of legitimacy may influence the promotion of CSR activities. No previous studies consider business profits in the mechanisms behind investors' perceptions of environmental protection activities. Therefore, this study aims to demonstrate that investors' perceptions of the compatibility between a firm's environmental protection activities and business profits are affected by the pragmatic characteristics of legitimacy, and to demonstrate the mechanisms by which investors' perceptions change.

This study makes four theoretical contributions to CSR research. First, we empirically analyze how investors perceive a firm's environmental performance, incorporating a pragmatic legitimacy perspective. Next, we demonstrate that differences in the rate of improvement in environmental performance affect how investors perceive environmental protection activities. Then, we demonstrate that investors' perceptions of environmental protection activities change when profitability is considered. Finally, we demonstrate that investors are more sensitive to the environmental protection activities of firms in the broadly defined chemical industry than in other industries. These contributions reveal that the more proactive a firm is in its environmental protection efforts, the lower the investment risk for investors.

1.1. Literature Review and Hypotheses Development

1.1.1. Pragmatic Legitimacy and Environmental Protection Activities

Investors expect to see an increase in corporate value through a firm's sustainable growth resulting from its environmental protection activities and increased profits through stock trading and increased dividends. Suchman [6] defined the perception of a firm that arises from such investor pragmatism as the pragmatic legitimacy that a firm acquires. At a minimum, firms must respond to investors' return on investment [16], which allows for new and stable funding. Therefore, firms strive to increase investor recognition by paying dividends on their profits and increasing their business profits. Simultaneously, firms must conduct environmental protection activities and adhere to social systems to eliminate or reduce environmental regulations' impact, thereby raising investors' expectations for sustainable growth and gaining recognition. This leads to the following question: how do a firm's environmental protection activities relate to gaining recognition from investors?

1.1.2. Investor Perceptions of Environmental Protection and Information Asymmetry

Prior studies have examined the impact of environmental protection activities on investors' perceptions of a firm. Ok and Kim [17] found that environmental protection activities are unrelated to investors' perception of a firm, while El Ghoul et al. [18] demonstrated that environmental protection activities are related to firm perception. This is because, in different industries and national systems, investors perceive environmental protection activities differently [19]. Indeed, Truong and Nagy [20] demonstrate that high market uncertainty negatively influences how investors perceive environmental protection activities. Additionally, Zheng et al. [21] demonstrate that national cultural differences influence the justification of investment decisions. Thus, industry characteristics and national culture differences create information asymmetries between firms and investors. The information asymmetry in corporate financing—that is, the state in which firms possess information that investors do not [22]—influences the system and how environmental protection activities are perceived. Corporate managers are better aware of what their organizations can do than investors [22], and can thus correctly recognize the value that firms place on environmental protection activities [23]. This is because managers are involved in the business, unlike investors, who make quantitative judgments based on performance. However, when investors have a strong interest in environmental protection activities, the information asymmetry of investors toward environmental protection activities decreases. In this case, the investors' risk of investing in a firm that engages in environmental protection activities is lowered, and they expect sustainable growth, thus recognizing the firm as an investment target. Based on the above, the way to make investors adequately aware of a firm's environmental protection activities is to ensure that investors and management have the same level of awareness of environmental protection activities to the extent possible.

1.1.3. Environmental Performance and Information Asymmetry

Reducing information asymmetry lowers the risk of investing in a firm, and the investors perceive the firm's environmental protection activities favorably and expect sustainable growth. Firms can reduce information asymmetry by reporting their CSR activities in detail to the outside world [24], and by obtaining environmental certifications [25]. Meanwhile, high information asymmetry makes it difficult for investors to determine the balance between the earnings and risks of a firm's business activities, which increases investment risk and decreases perception based on expectations regarding the firm's sustainable growth. Therefore, detailed external reporting of a firm's CSR activities decreases the information asymmetry between firms and investors and increases investors' expectations [26]. If a firm with poor CSR performance makes detailed disclosures, investors may interpret this as an indication that it is willing to improve its performance. Weber [27] presents an opposite view for the interpretations of investors regarding a firm with poor CSR performance that makes detailed disclosures; specifically, the detailed disclosure of poor CSR performance could be interpreted as a mere attempt by these firms to appear enthusiastic about their CSR activities, which reduces investors' perception [27,28]. To eliminate the information asymmetry arising from the possibility of such false reporting, Japanese firms obtain environmental certifications such as ISO 14001 [29] in conjunction with their environmental protection activities [25]. Environmental certification is an international standard created by the International Organization for Standardization to improve corporate activities that impact the environment. Acquiring international standards improves investor confidence in a firm because these standards mandate binding environmental regulations and audits [25]. Prior research has demonstrated that the stronger the environmental regulation, the more positive the impact of protection activities in the supply chain on firms' sustainable growth [30]. However, environmental certification can also lower investor expectations. Prior studies have demonstrated no difference in environmental performance between firms with and without environmental certification, and that environmental performance does not improve after certification [31]. Conversely, Ruiz-Blanco et al. [32] argue that reporting mechanisms that reduce information asymmetry also reduce false reporting of

environmental protection activities. Therefore, actual environmental performance has a greater impact than the presence or absence of environmental certification. This is because a firm with high environmental performance can improve the quality of its activity reports [33], and reduce the information asymmetry between the firm and investors. As a result, we believe that the risk of investing in the firm will decrease, and the firm will be perceived as an investment target. This leads to the first hypothesis.

Hypothesis 1. *The higher the firm's environmental performance, the lower the investors' risk of investing in the firm.*

1.1.4. Balancing Environmental Performance and Business Profitability

Investors increasingly distrust environmental, social, and governance (ESG) investments—which take environmental, social, and corporate governance into account—owing to the difficulty of balancing investment returns with solving social issues [15]. In this situation, firms will not engage in environmental protection activities because they believe doing so will increase information asymmetry with investors who do not possess sufficient knowledge regarding ESG investments. The reputation of ESG investment management is poor. However, empirical studies suggest that investors' awareness of environmental protection activities will increase over time [34,35]. In addition, society's growing interest in the SDGs has led to intense scrutiny of firms that burden the environment, and firms are expected to make efforts to improve their environmental performance, regardless of ESG investments. Therefore, firms are forced to invest in environmental protection and must balance it with their business.

Naturally, some firms are enthusiastic about environmental protection activities, and others are not; the latter do not recognize the importance of such activities and cease related efforts because they think it is difficult to balance these activities with business activities. In such cases, firms that do not improve their environmental performance are caught between the demands of investors for better environmental performance and the profits of their operations [36,37]. Further, since these firms cannot conduct high-quality environmental protection activities, their costs increase. A firm that engages in environmental protection activities without results and whose profits decline creates a vicious cycle that leads to a loss of investor confidence and an increase in investment risk. Conversely, some firms actively engage in environmental protection activities. Asahi Kasei, a firm that is enthusiastic about environmental protection, is developing a carbon dioxide separation and recovery system for commercialization, a key technology for achieving carbon neutrality, which can be used to generate biogas [38]. Such firms that actively engage in environmental protection activities succeed in lowering their investment risk. This is because while the profits from the business activity may be lower, investors perceive the social value of the business activity to be higher. In the current study, we consider the investment behavior of such investors from the perspective of investor psychology.

1.1.5. Investor Regret and Investment Decisions

Investors tend to value the benefits of business activities over environmental performance [39]. Considering this, we believe that the investors' perception of a firm based on its environmental performance will be degraded by their perception of the benefits of its business activities. Meanwhile, in the current social framework, where there is a need to balance environmental protection activities with the benefits of business activities, the perception of environmental performance may strongly influence investors' investment decisions. This investment decision is influenced by investor regret [40]. Zeelenberg [41] (p. 93) defined regret as follows: "Regret is a negative, cognitively based emotion that we experience when realizing or imagining that our present situation would have been better had we decided differently." Let us assume that investors consider environmental performance and the benefits of a firm's business activities when investing. In this case, there are two scenarios in which investors compare the firms they invest in to avoid regrets:

first, environmental performance is high while business activity profits are low; second, environmental performance is low while business activity profits are high. Let us consider an investor's regret in these two scenarios. When investments are made in favor of profits from business activities, regret arises from the loss of profits generated by the sustainable growth of firms with high environmental performance. Meanwhile, when investments are made in favor of environmental performance, regret arises from losses that result in lower-than-expected profits from business activities. However, if there are lower profits from business activities and investments were made in favor of environmental performance, investor regret could be smaller than if the investments were made in favor of profits from business activities. Indeed, Cordeiro and Tewari [42] demonstrated that firms with high reputations concerning CSR activities are valued by investors in the short and long term. In addition to this, Vohra and Davies [40] demonstrated that well-regarded CSR activities mitigate regret over not selling shares in firms whose stock prices have declined. In other words, while the potential exists for regret to occur in both scenarios, we believe that the regret generated by an investment that prioritizes environmental performance will be smaller. As mentioned earlier, the more proactive a firm is in its environmental protection efforts, the lower the investment risk for investors; this is affected by regret caused by the aforementioned investment behavior. Based on these considerations, we posit that in a society where environmental protection activities and business activities must be compatible, investors will continue prioritizing firms with high environmental performance even if their profitability is low.

Hypothesis 2. *The low investment risk that firms gain from environmental performance is engendered by investors who are willing to lower their profits and are more aggressive.*

The article is organized as follows. Section 2 discusses the dataset and the statistical methods used to test the hypotheses, and explains how the model is selected. In Section 3, the results are presented. Section 4 discusses the theoretical and practical contributions of the results. Finally, a summary of the research is presented in Section 5.

2. Materials and Methods

2.1. Data and Analysis

This study collected data at three different periods from 2017 to 2019 (April 2016 to March 2019) on firms in the Japanese chemical industry in the broad sense of the term, that is, firms in the chemical industry based on the Japan Standard Industrial Classification and firms in chemical-related industries that utilize chemical reactions. Specifically, firms dealing with textiles, pulp and paper, chemicals, pharmaceuticals, petroleum and coal, rubbers, glass and earthenware, steel, nonferrous metals, and metal products were included. Of these, textile products and chemicals, pharmaceuticals, petroleum and coal, and rubber products are recognized as chemical industries in a broad sense of the term [43]. The industries to which each firm belongs were defined based on the industrial classification in the ESG edition of the CSR Company Hand Book and the corresponding industries in Bloomberg's industrial classification.

We did not collect data from 2020 onwards because the COVID-19 pandemic greatly influenced the performance of firms in the years after its onset. Furthermore, this study focused on Japanese firms because almost all listed manufacturing firms are ISO 14001-certified; this certification is required for firms to engage in environmental protection activities at a certain level. We believe that it may be easier for investors to judge and compare the firms they invest in when the firms are under similar conditions, and the similar conditions of Japanese firms in the chemical industry may provide such a setting. This makes this specific context suitable for our examinations of the impact of the compatibility between a firm's active CSR activities and its business activity profitability on investor perceptions.

In addition, chemical-related industries use chemical reactions to produce intermediates from inputs such as petroleum and coal, and they produce large amounts of greenhouse gases, waste materials, and wastewater in the manufacturing process. Therefore, the firms' stakeholders and the firms themselves are sensitive to environmental protection issues. Bortnowska and Seiler also stated that the chemical industry has a strong impact on ecosystems, making it so that the environmental protection efforts of related firms affect their reputation in society [44]. Furthermore, Japanese chemical-related industries are the fourth largest exporters in the world [45], and the second largest in Japan after the automobile industry [46]. Considering these particularities, we believe that Japanese chemical-related industries are worthy of study.

Data on the environmental impact of each firm due to its business activities were obtained from the FY2017, FY2018, and FY2019 editions of the CSR Company Hand Book ESG Edition of the Toyo Keizai Digital Contents Library of Toyo Keizai Inc. Financial data were obtained from Nikkei Value Search, and additional data on cost of equity for 2018–2020 (April 2017 to March 2020) were obtained from Bloomberg for the dependent variable with a lag of one year. Firms with total assets of 3,093,070 million yen or more and firms with CO_2 Emissions of 74.97186 tons or more were considered outliers. The total number of firms obtained was 694, and the valid data stemmed from 123 firms. In total, 369 observations were used for analyses.

The software used for statistical analysis was Stata. The Breusch–Pagan Lagrange multiplier test and robust Hausman test were applied when selecting the analysis method. The Breusch–Pagan Lagrange multiplier test analyzes whether the error terms in the panel data are heteroskedastic. If the error term is subject to heterogeneous variance, it will affect the regression analysis and impede accurate analysis. Multiple regression analysis using robust standard errors was performed since the test results were significant ($p < 0.01$), and heteroscedasticity occurred. In addition, a robust Hausman test was performed considering the robust standard errors. The robust Hausman test uses robust standard errors to test whether a fixed or random effects model is more appropriate. However, since the robust Hausman test is performed using the bootstrap method, the results of each test were different; they were sometimes significant and sometimes nonsignificant. Therefore, the analysis was conducted using a random effects model using robust standard errors and a fixed effects model. A random effects model using robust standard errors was selected owing to the high adjusted coefficient of determination of the random effects model. The intraclass correlation coefficients were checked. The results showed that the correlation between firms in the panel was 0.55 and the cluster correlation in the panel was as high as 0.79. Therefore, an intraclass correlation is likely present. Previous studies have used generalized estimation [47] in cases where intraclass correlations occur and can be considered. Therefore, generalized estimation, an extended form of the variate effects model, was additionally conducted as a robustness check. Generalized estimation allows for an analysis that considers intraclass correlations and assumes that the correlation between firm heterogeneity and the independent variable is nonzero [48].

2.2. Dependent Variable

The dependent variable was ***Cost of equity* (*t* + 1)** (representing investors' perceptions of the firm) with a one-year lag to the other variables. Cost of equity refers to the magnitude of return relative to the investor's investment risk [49]. From the investor's perspective, an increase in the cost of equity means an increase in the investment risk. Conversely, a decrease in the cost of equity means a decrease in the investment risk for investors. Firms with lower investment risk can raise funds more easily and grow sustainably. Previous studies have used the cost of equity as an index of investors' perceptions of firms undertaking CSR activities [17,18,34,50,51]. Therefore, we considered it an appropriate proxy variable for investor perception.

2.3. Independent Variable

The environmental impact of greenhouse gases was used as the environmental performance variable for Hypothesis 1 and Hypothesis 2. Data on variables other than greenhouse gas emissions, such as waste material emissions and total wastewater discharge, were also considered for environmental performance. However, in Japan, global warming is now recognized as one of the most critical issues to be addressed. Efforts are underway to decarbonize the country. We focused on greenhouse gases because we believe that, among the various variables and topics pertaining to environmental protection activities, investors may be the most concerned about greenhouse gas emissions. However, greenhouse gas emissions vary greatly depending on firm size. Therefore, the environmental performance variable was calculated based on the environmental impact of greenhouse gases in Equation (1), which considers firm size. ***CO_2 emissions*** represent the amount of carbon dioxide (tons) the firm emits through its business activities per million yen of sales. When calculating this, the year (t) of the panel is aligned. Lower ***CO_2 emissions*** mean higher environmental performance, and higher ***CO_2 emissions*** mean lower environmental performance. We standardized ***CO_2 emissions***.

$$\boldsymbol{CO_2\ emissions} = \frac{\boldsymbol{CO_2\ emissions\ emitted\ by\ the\ firm}(\boldsymbol{t})}{\boldsymbol{sales}(\boldsymbol{t})}. \quad (1)$$

Earnings per share was used as a measure of corporate profit in Hypothesis 2. ***Earnings per share*** represents a firm's profitability. In making investments, investors focus on how their capital generates profits. ***Earnings per share*** is a suitable measure of profitability and easy for investors to capture, and it helps in assessing whether investor perceived profitability is related to lower investment risk arising from a firm's high environmental performance. Prior studies demonstrating the relationship between CSR activities and stock price, cost of capital, and cost of equity have used projected ***Earnings per share*** as a profitability variable [18]. Conversely, this study used actual ***Earnings per share*** values. This is because the calculation methods and values of the projected ***Earnings per share*** vary depending on the database used by the investor and because investor reactions to the projected figures vary. The actual values recorded were utilized to account for these differences in how investors receive financial information. We standardized ***Earnings per share***.

To demonstrate the interaction effect of Hypothesis 2, an interaction variable (***Earnings per share*** × ***CO_2 emissions***) was created. The interaction variable was obtained by multiplying ***Earnings per share*** and ***CO_2 Emissions***. In addition, a graph of the interaction effect was created to interpret the impact of the compatibility between profit and environmental performance in a firm's business activities on ***Cost of equity*** **(t + 1)**.

2.4. Control Variables

First, we used ***Total assets*** for assessing firm size [52]. Second, there are differences in the scale at which environmental protection investments can be made depending on the financial condition of the firm. Since environmental protection investments increase the future profitability of firms [53], it is expected that, over time, there will be differences in environmental performance. In this regard, Oh, Chang, and Martynov [54] used a return on assets (***ROA***) since they consider differences in the profitability of CSR activities in terms of return on assets; we used this as a control variable in the current study as well.

Third, since investors consider the stability of a firm's capital [52], past researchers used ***Current ratio*** as a control variable, which was also applied in our models. Fourth, past scholars have also employed the ***Debt ratio*** because a firm's environmental performance affects its debt ratio when raising funds [55]; thus, we used this as a control variable in this study. Fifth, many Japanese firms have ISO 14001 certification, and self-audits are included in the ISO 14001 environmental management system. Hao et al. [56] demonstrated that the audit system of firms engaged in environmental protection activities facilitates the reduction in the risk of stock price crash due to CSR activities. To consider this in

their assessments, they created an ***Environmental audit dummy***, which was 1 if the firm conducted environmental audits, and 0 otherwise; we employed this dummy in our model.

Sixth and final, a ***Broadly defined chemical industry dummy*** was created to distinguish between chemical-related industries and chemical production industries; it was 1 if the firm was included in the chemical industry in the broad sense, and 0 otherwise. The ***Broadly defined chemical industry dummy*** includes the textiles and chemicals, pharmaceuticals, petroleum and coal, and rubber industries. Compared to other industries, the chemical industry handles more hazardous chemicals, and stakeholders tend to be more conscious of environmental protection and accident prevention [44]. Therefore, the firms themselves are actively involved in environmental protection activities, and this dummy variable serves to account for differences in environmental performance.

We standardized ***Total assets***, ***ROA***, ***Current ratio***, and ***Debt ratio***.

3. Results

Based on results for basic statistics (Table 1) and the correlation table (Table 2), it was unlikely for multicollinearity issues to be present in our data; still, to confirm the lack of multicollinearity, we checked the variance inflation factor. We found that the maximum value was 1.47 and the threshold value was less than 10, making multicollinearity not a concern [57]. In Table 3, Models I, II, and III are the variable effects models; Models IV, V, and VI are the fixed effects models; and Models VII, VIII, and IX are the generalized estimation models. Each analytical model consists of three models: a baseline model with only control variables; a model with additional independent variables; and a full model with additional interaction variables. Based on the results of the robust Hausman test, both the variable effects model and the fixed effects model were adopted. Upon comparing the adjusted coefficients of determination (i.e., goodness of fit of the models), we concluded that the variable effects model was suitable because its values were higher than those of all other models; the fixed effects model was included only for reference purposes and not used for the analyses and tests.

Hypothesis 1, which required for ***CO_2 Emissions*** to not be significant in Models II and VIII, was not supported. The results for Models III and IX show that ***CO_2 Emissions*** ($p < 0.05$) and ***Earnings per share*** ($p < 0.05$) and the interaction variable ***Earnings per share*** $\times$ ***CO_2 emissions*** (Model III: $p < 0.05$; Model IX: $p < 0.01$) were all significant. Therefore, a graph was created to confirm the interaction effect.

Table 1. Basic statistics.

No.	Variables	Mean	S.D.	Min	Max
1	Cost of equity (t + 1) #	0.00	1.00	−2.88	3.27
2	Total assets #	0.00	1.00	−0.86	4.60
3	ROA #	0.00	1.00	−2.07	6.83
4	Current ratio #	0.00	1.00	−0.91	8.02
5	Debt ratio #	0.00	1.00	−1.16	5.97
6	Environmental audit dummy	0.95	0.22	0.00	1.00
7	Broadly defined chemical industry dummy	0.67	0.47	0.00	1.00
8	Earnings per share #	0.00	1.00	−7.25	10.6
9	CO_2 emissions #	0.00	1.00	−0.51	5.28

is standardized. Observations = 369, and the number of firms = 123. ROA, return on assets.

Table 2. Correlation.

No.	Variables	1	2	3	4	5	6	7	8	9
1	Cost of equity (t + 1) #	1								
2	Total assets #	−0.016	1							
3	ROA #	−0.114	0.155	1						

Table 2. *Cont.*

No.	Variables	1	2	3	4	5	6	7	8	9
4	Current ratio #	−0.290	−0.111	0.072	1					
5	Debt ratio #	0.173	0.181	−0.289	−0.382	1				
6	Environmental audit dummy	−0.018	0.057	−0.006	−0.033	−0.012	1			
7	Broadly defined chemical industry dummy	−0.143	0.030	0.193	0.027	−0.132	−0.009	1		
8	Earnings per share #	0.043	0.140	0.468	0.025	−0.082	0.028	0.039	1	
9	CO_2 emissions #	0.073	0.281	0.019	−0.092	0.074	0.024	0.061	0.102	1

is standardized. Observations = 369, and the number of firms = 123. ROA, return on assets.

Table 3. Analysis results.

No.	Variables	Dependent: Cost of Equity (t + 1) #								
		Random Effects Model			Fixed Effects Model			Generalized Estimation (exc)		
		I	II	III	IV	V	VI	VII	VIII	IX
2	Total assets #	−0.028	−0.059	−0.052	0.384	0.308	0.265	−0.029	−0.060	−0.053
		[0.058]	[0.062]	[0.061]	[0.588]	[0.553]	[0.565]	[0.058]	[0.061]	[0.060]
3	ROA #	−0.034	−0.096	−0.094	−0.044	−0.071	−0.066	−0.034	−0.096	−0.094
		[0.062]	[0.064]	[0.063]	[0.076]	[0.101]	[0.101]	[0.062]	[0.063]	[0.062]
4	Current ratio #	−0.203 *	−0.200	−0.202 *	0.465	0.030	0.023	−0.208 *	−0.205 *	−0.208 *
		[0.121]	[0.12]	[0.120]	[0.158]	[0.178]	[0.180]	[0.118]	[0.119]	[0.116]
5	Debt ratio #	0.023	0.024	0.027	−0.453 ***	−0.490 ***	−0.490 ***	0.025	0.026	0.029
		[0.086]	[0.089]	[0.088]	[0.179]	[0.167]	[0.167]	[0.085]	[0.088]	[0.087]
6	Environmental audit dummy	−0.232	−0.237	−0.265	−0.364	−0.327	−0.338	−0.228	−0.233	−0.261
		[0.338]	[0.33]	[0.332]	[0.379]	[0.376]	[0.378]	[0.335]	[0.331]	[0.328]
7	Broadly defined chemical industry dummy	−0.271 *	−0.264 *	−0.274 *				−0.270 *	−0.262 *	−0.273 *
		[0.153]	[0.16]	[0.151]				[0.151]	[0.153]	[0.149]
8	Earnings per share #		0.104 **	0.093 **		0.031	0.025		0.104 **	0.094 **
			[0.043]	[0.042]		[0.059]	[0.060]		[0.043]	[0.042]
9	CO_2 emissions #		0.089	0.116 **		0.323 *	0.329 *		0.087	0.115 **
			[0.069]	[0.053]		[0.183]	[0.182]		[0.068]	[0.051]
10	Earnings per share $\times CO_2$ emissions			−0.132 **			−0.046			−0.134 ***
				[0.052]			[0.083]			[0.052]
	Constant	0.401	0.401	0.448	0.345	0.310	0.326	0.396	0.396	0.444
		[0.368]	[0.366]	[0.365]	[0.360]	[0.356]	[0.360]	[0.365]	[0.362]	[0.360]
	Number of firms	123	123	123	123	123	123	123	123	123
	Observations	369	369	369	369	369	369	369	369	369
	R-squared (between)	0.171	0.181	0.202	0.051	0.021	0.020			
	Qic_u							344	342	339

Model selection test	Chi-squared	*p*-Value
Breusch–Pagan Lagrange multiplier test	74.31 ***	0.000
Robust Hausman test	Yes	Yes

is standardized. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$ [ ] is the standard error. ROA, return on assets.

Figure 1 shows the simulated interaction effect (***Earnings per share*** × ***CO₂ emissions***) in Models III and IX. The higher the ***Cost of equity*** **(*t* + 1)**, the higher the investment risk of the investor, and the lower the ***Cost of equity*** **(*t* + 1)**, the lower the investment risk of the investor. Moreover, the higher the ***CO₂ emissions***, the lower the environmental performance. In the straight line represented by the triangle, Earnings per share (−2 S.D.) represents the condition where ***Earnings per share*** is two standard deviations below the mean. In the circled line, Earnings per share (+2 S.D.) represents the condition when ***Earnings per share*** is two standard deviations above the mean. Moreover, when ***CO₂ emissions*** are low, ***Cost of equity*** **(*t* + 1)** ***is lower*** when ***Earnings per share*** is low. In other words, when environmental performance is high, the more aggressive the firm is in its environmental protection efforts while not showing off its profitability, and the lower the investment risk. These results support Hypothesis 2, which shows that investors can incur lower investment risks when firms are more aggressive in their environmental performance and firms are willing to lower their profits.

To further elaborate and understand the results of the analysis, additional analyses were conducted by dividing the firms into four groups based on the rates of improvement in environmental performance from 2017 to 2019, and the results are shown in Table 4.

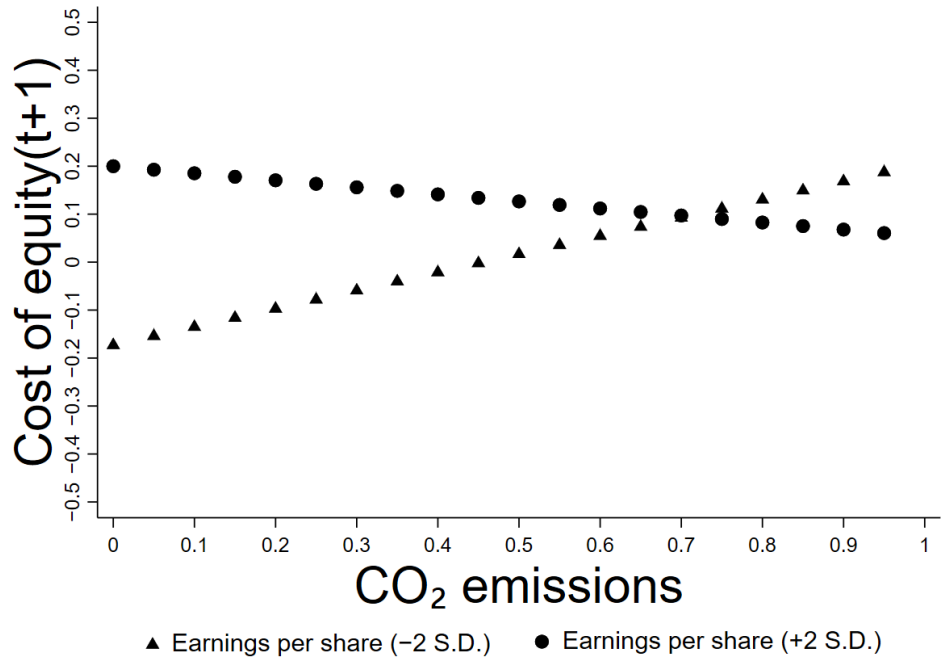

Figure 1. Graph of the interaction effect (Earnings per share × CO_2 emissions).

The analytical methods and variables are the same as those used in the hypothesis testing analyses. The results of the group with high rates of improvement in environmental performance are shown in Models I and II; those of the group with medium rates are shown in Models III and IV; those of the group with low rates are shown in Models V and VI. Models VII and VIII show the results of a combined group of high and medium environmental performance improvement rates. The results show that ***Earnings per share*** (Models I and III: $p < 0.05$) was positively significant for the high and medium groups, but was not significant for the low group. Meanwhile, ***CO₂ emissions*** was not significant for the high and medium groups, but was positively significant for the low group (Model V: $p < 0.05$).

To better understand the analysis, we compared the combined group of high and medium rates (Model VII) with the low group (Model V). In this comparison, ***CO₂ emissions*** was positively significant only in the low group (Model V: $p < 0.05$); regarding ***Earnings per share***, it was positively significant only in the combined group of high and

medium rates (Model VII: $p < 0.05$). In other words, only in the low environmental performance group, the investors' risk of investing in a firm decreased with higher environmental performance, and higher profitability was not associated with lower investment risk. In the combined group of high and medium rates, higher environmental performance was not associated with lower investment risk, but higher profitability was associated with increased investment risk.

We also performed an interaction analysis between environmental performance and profitability. The results show that Model VI for the low group did not hold because ***Earnings per share*** was not significant; Model VIII for the combined group of high and medium showed the interaction effect as ***CO_2 Emissions*** ($p < 0.10$), ***Earnings per share*** ($p < 0.05$), and ***Earnings per share*** × ***CO_2 emissions*** ($p < 0.05$) were all significant (Figure 2). The graph in Figure 2 shows that when ***CO_2 emissions*** are low, both ***Earnings per share*** and ***Cost of equity (t + 1)*** are lower. In other words, when environmental performance is high, the more aggressive the firm is in environmental protection without touting profitability, the lower the investment risk.

Table 4. Analysis results of the random effects model by group.

		Dependent: Cost of Equity (*t* + 1) #							
	Variables	**High**		**Medium**		**Low**		**High and Medium**	
No		**I**	**II**	**III**	**IV**	**V**	**VI**	**VII**	**VIII**
2	Total assets #	−0.058	−0.062	−0.217 *	−0.224 *	−0.017	0.021	−0.097	−0.103
		[0.087]	[0.089]	[0.125]	[0.130]	[0.099]	[0.108]	[0.079]	[0.077]
3	ROA #	−0.110	−0.111	0.161	−0.141	0.075	0.061	−0.126	−0.117
		[0.116]	[0.118]	[0.120]	[0.115]	[0.097]	[0.098]	[0.081]	[0.081]
4	Current ratio #	−0.075	−0.062	−0.368 ***	−0.374 ***	−0.404 ***	−0.390 ***	−0.190	−0.195
		[0.173]	[0.173]	[0.132]	[0.136]	[0.119]	[0.115]	[0.150]	[0.149]
5	Debt ratio #	−0.079	−0.081	0.065	0.027	−0.025	0.031	−0.007	−0.016
		[0.116]	[0.114]	[0.145]	[0.156]	[0.136]	[0.123]	[0.113]	[0.112]
6	Environmental audit dummy	0.140	0.129	−0.490 *	−0.468 *	−0.210	−0.260	−0.305	−0.290
		[0.702]	[0.713]	[0.272]	[0.268]	[0.372]	[0.366]	[0.589]	[0.584]
7	Broadly defined chemical industry dummy	−0.273	−0.257	−0.175	−0.225	−0.530 *	−0.481 *	−0.122	−0.150
		[0.231]	[0.231]	[0.322]	[0.323]	[0.280]	[0.257]	[0.200]	[0.195]
8	Earnings per share #	0.195 **	0.197 **	0.185 **	0.095	0.006	0.022	0.130 **	0.107 **
		[0.099]	[0.095]	[0.081]	[0.091]	[0.083]	[0.081]	[0.053]	[0.054]
9	CO_2 emissions #	0.159	0.176*	0.029	0.083	0.160 **	0.183 **	0.084	0.121 *
		[0.101]	[0.107]	[0.110]	[0.086]	[0.069]	[0.075]	[0.085]	[0.067]
10	Earnings per share ×CO_2 emissions		0.114		−0.315 **		−0.131 ***		−0.165 **
			[0.070]		[0.13]		[0.049]		[0.082]
	Constant	0.046	0.055	0.602 *	0.654 *	0.520	0.550	0.378	0.400
		[0.753]	[0.766]	[0.357]	[0.340]	[0.433]	[0.422]	[0.624]	[0.620]
	Number of firms	41	41	41	41	41	41	82	82
	Observations	123	123	123	123	123	123	246	246
	R-squared (between)	0.160	0.152	0.264	0.267	0.446	0.507	0.135	0.152

is standardized. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. [ ] is the standard error. ROA, return on assets.

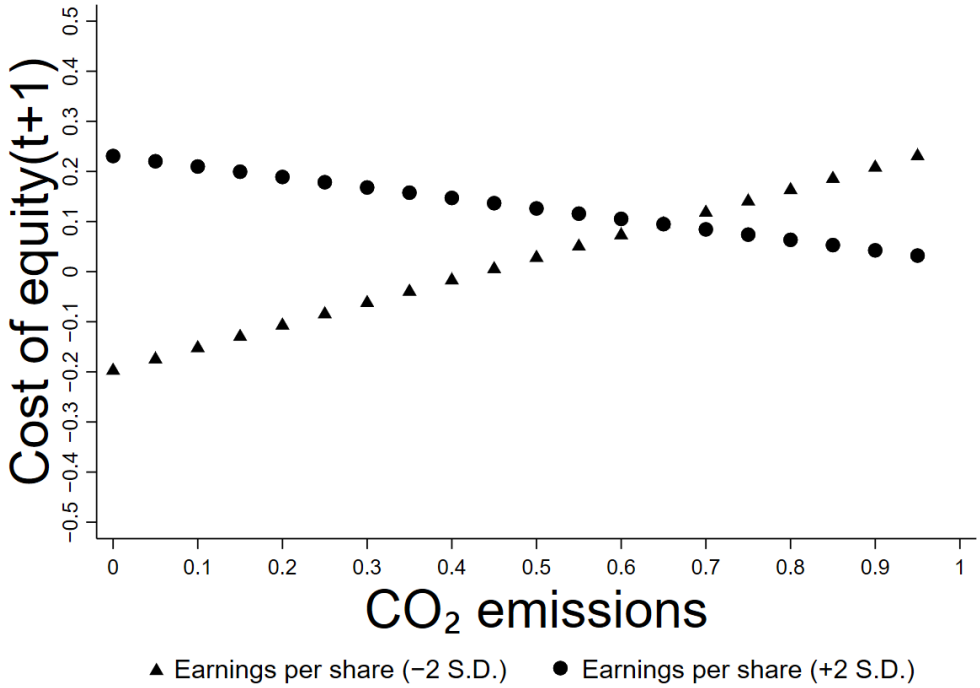

Figure 2. Graph of the interaction effect for the high and medium groups.

4. Discussion

Focusing on pragmatic legitimacy, this study investigated the impact of the compatibility of CSR activities and business interests on investor perceptions. The study revealed not only the impact of greenhouse gas emissions on investor perceptions but also differences in the impact of greenhouse gas emissions based on the rate of improvement in greenhouse gas emissions. In selecting the analytical model, we performed the Breusch–Pagan Lagrange multiplier and robust Hausman tests. Further, generalized estimation was performed in addition to adopting variable and fixed effects models using robust standard errors to increase robustness. The analysis results demonstrate that greenhouse gas emissions positively impact investors' cost of equity and that the lower the greenhouse gas emissions, the lower the investors' investment risk. In addition, we grouped firms based on their rate of improvement in environmental performance and demonstrated the interactive effects of earnings per share and greenhouse gas emissions on investors' cost of equity capital. This analysis considers that when investors make investment decisions about firms, they pay attention to the compatibility between the firm's business profitability and environmental protection performance. Since there was no significant interaction effect in the group with a low rate of improvement in environmental performance, it becomes evident that the most critical factor in investors' investment decisions is the profitability of the business; this finding is consistent with the evidence in previous research [39]. Meanwhile, as the rate of improvement in environmental performance increased, interaction effects became apparent, indicating that investors' perception of—and eventually their investment behaviors toward—firms changed as the environmental performance improved. This means that firms' active engagement in environmental protection activities can reduce investors' investment risk, making it easier for firms to raise funds.

4.1. Implications

4.1.1. Theoretical Implications

This study has four major theoretical contributions. First, the empirical analysis incorporates the pragmatic legitimacy perspective to investigate the mechanism by which investors perceive firm environmental performance. This contributes to the theory of legitimacy and CSR research. Few studies have considered the pragmatic legitimacy perspective

while focusing on environmental protection activities among CSR activities. Among the few studies that have focused on environmental protection, Cordeiro and Tewari [42] demonstrated that a firm's financial performance affects how investors perceive the firm's environmental protection activities. However, the relevant prior studies have focused only on theories related to investors, and have not discussed the pragmatic characteristics of legitimacy. They have also failed to analyze the impact of environmental protection activities on investors' perceptions, including about firm profitability [13], and no consensus exists thus far on the impact of environmental protection activities on investors' investment risk. Expanding the prior literature, this study demonstrates that the reduction in investment risk that firms can obtain from engaging in environmental protection activities is present in groups with higher rates of environmental performance improvement, and this is because of the pragmatic characteristics of legitimacy.

Second, another theoretical contribution of this study to CSR research lies in its demonstration that differences in the rate of improvement in environmental performance affect how investors perceive firms' environmental protection activities. While there was not a strong demand for improved firm environmental performance in the past, there is now a strong demand from investors for activities aimed at decarbonization. In this context, our results showcase that firm profitability affects investors' investment risk for firms with medium or high rates of improvement in environmental performance. At the same time, improved environmental performance in firms with low rates of improvement in environmental performance led to reduced investment risk.

Third, this study shows that the investors' perception of environmental performance changes when profitability is considered, contributing once more to CSR research. Zheng et al. [21] argue for the need to identify the internal factors that influence investors' perception of legitimacy. Truong and Nagy [20] also argue that there is a need to identify the influence of passion and preparedness on investors. The novelty of the current research in this context lies in finding that the investors' perception of environmental protection activities is influenced by investors' regret about firm profitability. This study also reveals that for firms with high and medium rates of improvement in environmental performance, it is better to show to investors that they are willing to engage in environmental protection activities rather than touting profitability.

The fourth and final contribution to CSR research lies in the showcasing that investors are more sensitive to the environmental protection activities of firms in the broadly defined chemical industry than to the activities of firms in other industries. Prior studies have demonstrated that the results of environmental protection activities vary by industry [19]. The results of the current analyses reveal that the broadly defined chemical industry has a negative impact on investment risk; specifically, it had a negative impact on the cost of equity. Furthermore, in the high and medium firms for rate of improvement in environmental performance, the broadly defined chemical industry showed no impact. This means, on the one hand, that when investors make investment decisions based on the rate of improvement in environmental performance, they will invest in firms that are actively engaged in environmental protection activities regardless of industry. On the other hand, when investors make investment decisions without focusing on the aforementioned rate, firms that belong to the broadly defined chemical industry are more likely to be investment targets.

4.1.2. Managerial Implications

This study has four practical contributions. First, when making investment decisions, current investors are generally focusing on firms' compatibility between business profitability and environmental protection activities. For example, ESG funds in the U.S. are investing in firms with high ESG ratings from rating agencies, seeking to balance profitability [58]. In Japan, the government sees the decarbonization of the chemical industry as a new business opportunity, and investments in decarbonization-related sectors are becoming more prominent [59]. Furthermore, our findings show that the profitability

perspective influences investors' perceptions of firms' environmental protection activities. Thus, we suggest for managers to try and make their environmental protection activities as profitable as possible, and not merely carry them out, as this may make it more likely for them to be able to raise funds.

Second, there is a need to establish a system to properly evaluate the environmental protection activities of firms in Japan. For firms with a medium or high rate of improvement in environmental performance, this study shows that investors give priority to the profitability of business activities. However, if environmental protection activities are not properly evaluated, not only will fewer firms be proactive in this manner, but they may also engage in false reporting. Ruiz-Blanco et al. [32] argue for the need to improve the ability of stakeholders to assess the misreporting of firms' activities. It is therefore clear that investors need to change their perceptions and ensure that firms that are more committed to environmental protection activities are more highly rated. We also demonstrate that investors perceive more favorably firms with a low rate of improvement in environmental performance as these firms engage more in environmental protection activities. This means that investors invest in firms with low environmental performance because they expect them to have growth potential. In other words, investors invest in anticipation of increased profits to be gained from the sustainable growth of a firm. This study clarified that such a virtuous circle needs to be established even for groups with a medium or higher rate of improvement in environmental performance.

Third, our findings show that firms that are proactive in environmental protection succeed in reducing investment risk. Specifically, firms with a high and medium rate of improvement in environmental protection, which had been working to balance environmental protection activities with their business activities, and that showed high profitability indicators, were in fact causing concerns among investors. In our current society, which is requiring a shift to greater sustainability, firms should not engage in half-hearted environmental protection activities, but rather in thorough and meaningful ones. This research also shows that firms with lower rates of improvement in environmental protection and investing aggressively in environmental protection could reduce investment risk. This corrects a somewhat widespread belief of managers that environmental protection activities do not lead to corporate valuation, and may have a significant impact on management decisions.

Fourth, we found that the chemical industry, in its broad sense, is more likely to be focused on by investors. Among Japanese firms in the broadly defined chemical industry, their industrial structures have been changing according to the Japanese economy's growing awareness of environmental protection activities. For example, Mitsubishi Chemical Holdings Corporation separated and restructured its petrochemical and carbon businesses, and after analyzing future demand and profitability, concluded that it would withdraw from these industries [60]. In addition, since the chemical industry in the broad sense of the term encompasses firms that handle many intermediate materials for final products, we believe that trends in this industry will have a bearing on Japanese firms' overall awareness of environmental protection activities. These findings indicate that firms in the broadly defined chemical industry, which are more sensitive to investor reaction, should be, and perhaps are even expected to be, proactive in their environmental protection activities.

4.2. Limitations and Future Research Directions

This study has three limitations. First, the analysis results may vary depending on the industry and period under study. Although the industries covered in this study were chemical-related, different results could be obtained by expanding the scope to include all manufacturing industries. The analysis results demonstrated a relationship between the broadly defined chemical industry and the cost of equity. This indicates that the broadly defined chemical industry is more sensitive to investor reactions than other industries. Additionally, only recently have efforts been made in Japan to improve management's awareness of the importance of taking environmental protection activities into account,

and investors' awareness of environmental protection activities is expected to gradually increase. Moreover, future researchers are urged to conduct longitudinal examinations of how environmental performance assessment is expressed in the cost of equity. Scholars are encouraged to incorporate different industries and years of examination in their future studies.

Second, although we used earnings per share for firm profitability, there are more suitable indicators for this variable. Investors evaluate firms from multiple perspectives, including growth potential and safety, and different indicators can thus change the way environmental performance is perceived.

Third, there are missing data in our dataset of firms in the chemical-related industries. Further, there were deficiencies in the greenhouse gas data of chemical-related industries, which were used as an environmental performance indicator. Since some firms were excluded from the analyzed data while conducting the panel analysis, it is necessary to collect alternative data in future research.

Nonetheless, these limitations do not detract from this study's contribution, which demonstrates the impact of investors' pragmatic legitimacy perspective on the mechanisms that promote environmental protection activities among Japanese firms.

Future research prospects include identifying factors that promote the compatibility between environmental protection activities and business interests. The promotion of this compatibility is related to internal corporate influences and social institutions. Analyzing the impact of promoting factors of such compatibility on investors' perceptions may enable us to identify the corporate activities required in a sustainable society.

5. Conclusions

This study aimed to demonstrate that investors' perceptions of a firm's compatibility between its environmental protection activities and business profits are affected by the pragmatic characteristics of legitimacy, and to present the mechanisms by which investors' perceptions change. Prior research has considered the decrease in the cost of capital and cost of equity due to environmental protection activities as variables influencing investors' increased expectations about firms' sustainable growth [15]. The results of our analysis first demonstrated that the higher the environmental performance of a firm, the lower the investors' risk of investing in the firm. While previous studies have shown that environmental performance does not affect investment risk [14], we showed that this is not the case for Japanese firms in chemical-related industries.

Next, we demonstrated that the reduction in investment risk that firms obtain from their environmental performance is engendered by investors who are willing to lower their profits and are more aggressive. This reveals that firms incorporating environmental protection in their business activities have the advantage of actively investing in environmental protection without touting their profitability. Then, an additional analysis by the rate of improvement in environmental performance demonstrated that investors are more willing to invest in firms that are improving their environmental performance. In addition, an interaction effect occurred in the firms with high and medium rates of improvement, demonstrating that the higher the rate of improvement in environmental performance, the more important it is to balance environmental protection activities with business activities. These findings reveal the need to incorporate a profitability perspective when considering the relationship between environmental protection activities and investor perceptions. Furthermore, this study elucidates the mechanism through which investors' perceptions of firms change and their investment behavior shifts as environmental performance improves.

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