

## Article

# The Relationship between Corporate Sustainable Development Performance, Investor Sentiment, and Managerial Overconfidence

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**Abstract:** In the post-pandemic era, companies are facing challenges in their business development and may pay fewer attention to their sustainable development performance, whereas the investors are looking for better corporate sustainable development. Using a sample of Chinese listed companies during 2010–2018, this paper empirically examines the relation between corporate sustainable development performance, investor sentiment, and managerial overconfidence with econometric tools such as panel data regression and S-GMM estimation. Three kinds of corporate sustainable development activities as measured by Corporate Social Responsibility (CSR) indexes, including consumer rights, employee benefits, and environmental protection, are proved to have a positive impact on investor sentiment. Compared to the SME and GEM Board, investor sentiment in the Main Board is less affected by corporate sustainable development. Furthermore, investor's high sentiment leads to high managerial confidence in the SME and GEM Board, and managerial overconfidence is self-correcting over time. This paper illustrates why maintaining good corporate sustainable development performance is beneficial for listed companies from a new perspective.

**Keywords:** corporate sustainable development; corporate social responsibility; investor sentiment; managerial overconfidence



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## 1. Introduction

### 1.1. Background

In the post-pandemic era, companies are facing challenges in their business development and may pay fewer attention to its sustainable development performance, whereas the investors are looking for better corporate sustainable development. It has gradually become common knowledge that the evaluation of corporate development potential is not limited to financial performance [1] and has gradually been extended to the measurement of corporate sustainable development in different dimensions, including environmental protection [2], employee welfare [3], and social welfare [4], usually measured by CSR performance. The development of CSR began relatively late in China. There have been many negative effects of CSR, including food safety problems, environmental damage, overworking employees, and so forth, which obviously violated the sustainable development target and impacted the stock market greatly. This indicates that the bad performance of corporate sustainable performance, reflected by the negligence of companies in protecting the interests of employees and consumers, as well the environment, will have a great influence on the capital market.

China has gradually paid attention to corporate sustainable development practices in recent years, and the research on CSR performance has increased significantly [5]. China has attached great importance to the disclosure of CSR reports, which is synchronized with global trends. In October 2016, GRI (Global Reporting Initiative) released an updated guidance on the framework of sustainable development report, which replaced the old

G4 guidelines on 1 July 2018, and became a new standard for CSR reporting. The GRI framework makes the corporate performance on environmental protection, social charities, and employee benefits more transparent to the investors. Apart from this, more and more companies are forced to disclose CSR reports. The improvement of the CSR disclosure mechanism and the growing attention to sustainable development have gradually reduced information asymmetry between investors and companies in the capital market. Thus, stock investors may become more sensitive to companies' sustainable development performance than ever before.

### *1.2. Motivation and Contribution*

It has been shown that CSR performance has a positive impact on financial performance [6–9]. Therefore, it is possible that corporate sustainable development performance exerts a series of influence on the capital market. During the financial crisis, companies with better sustainable development performance gained higher social capital, and their stock returns were four to seven percentage points higher than those with poor sustainable development performance [10], which indicates that companies with better sustainable development performance have higher profitability by investing in stakeholders such as consumers and employees, especially when the level of trust is negatively impacted in the market.

Researches on the relation between investors' and managers' sentiment are rare, and are mostly based on the assumptions of investor irrationality and managerial rationality. The channel named "catering" has been verified as effective between investor sentiment and corporate behavior [11], and executives will rationally cater to investors' mood fluctuations. However, the limited rationality of management team co-exists with that of investors [12], that is, managers also have irrational sentiments, such as overconfidence. Therefore, it may be nontrivial to relax the managerial rationality assumption and explore the relation between investor sentiment and managerial overconfidence. Current studies focus mainly on the consequences of managerial overconfidence [13–16], rather than the causes of it. In particular, the limited rationality of these two groups of people is not discussed under the same framework. We empirically show the existence of the positive relation between investor sentiment and managerial overconfidence through empirical analysis of listed companies in China and contribute to the literature from the following aspects.

First, the current study focuses on the impact of corporate sustainable development on the external investors, instead of the usual corporate governance factors such as the manager's gender [17,18] and board characteristics [19,20]. The current study emphasizes the importance of investors in the external environment of CSR performance.

Second, we incorporate investor sentiment and managerial overconfidence into the same framework of corporate sustainable development and propose a channel through which corporate sustainable development practices affect managers. Then, we can explore the chain reaction of corporate sustainable development practices from a sentimental point of view, which may also contribute to behavioral finance.

Third, we distinguish the differences among these impacts on the Main Board, the SME (small and medium enterprise) Board, and GEM (growth enterprise market) Board, which reveals the heterogeneous reactions of the market in different development levels.

Furthermore, existing studies on the relation between corporate sustainable development and investors focus mostly on the disclosure of CSR, where dummy variables are used to define whether a company discloses CSR information in different dimensions [21–23]. These studies may not pay enough attention to CSR performance. In this study, we use a rich data set based on companies' financial and social responsibility reports to verify the impact of multi-dimensional corporate sustainable development performance on investor sentiment.

The rest of this paper proceeds as follows. Related literature is reviewed, and hypotheses are developed in Section 2. Data and measures of variables are described in Section 3.

Then, we show results on hypothesis tests in Section 4 and conduct some robustness checks in Section 5. Section 6 is the discussion, and Section 7 concludes.

## 2. Literature Review and Hypothesis Development

### 2.1. Corporate Sustainable Development Performance and Investor Sentiment

The information on corporate sustainable development performance is important for investors, while investor sentiment would usually be impacted by information or media about capital markets or companies [24]. Numerous studies have focused on the impact of CSR activities on financial performance [25–28]. However, scholars have disagreement on whether the investment in CSR produces equal or even greater economic returns. Some studies proved that the role of CSR performance is positive. According to the study of Cormier et al. [29], good performance in environmental protection is a great tool to attract investors and raise their expectations. Deng et al. [30] took the cases of takeovers by US companies as samples and found that acquirers with better CSR performance can save more time in mergers and acquisitions and achieve long-term stable growth in performance after the acquisition. Albuquerque et al. [31] developed an industry equilibrium model and proved that CSR activities could help reduce risk and raise the value of companies. Similarly, Benlemlih and Bitar [32] used the sample of US firms and investigated the positive relationship between CSR performance and investment efficiency. Announcements of CSR activities would generate positive abnormal returns during periods when investors place a valuation premium on CSR performance [33]. Companies engaging strongly in CSR activities prior to the COVID-19 event experienced less of an adverse impact than those with no or weak CSR activities, indicating the role of CSR activities in mitigating the negative impact on investor's expectations during pandemics [34]. The impact of CSR activities on corporate non-financial performance also attracts researchers' attentions. As the non-financial performance is another important part of the fundamentals of list companies, we would expect it is related to investor sentiment. Gallardo-Vázquez et al. [35] thoroughly examined how CSR initiatives would improve organizations' intellectual capital (IC) by integrating CSR practices into the configuration of each IC dimension. The improving effects are mostly proved empirically, which illustrate how organizations could gain competitive advantages including more legitimacy in the corresponding sector. Companies' perception of CSR strongly enhances their organizational commitment and organizational citizenship behavior, although this effect is weakened when employees attribute CSR practices to intrinsic motives [36]. However, another part of the scholars is pessimistic about CSR, believing that the investment in CSR activities will reduce future stock returns, thereby reducing corporate value [37]. In the research on CSR and the stock market, Krüger [38] found that investors significantly have more negative reactions to the negative news about CSR activities, but the reaction on positive news are slighter and less systematic. Using text analysis, it was further discovered that the positive CSR news of companies that were unlikely to have agency problems would lead to positive investor sentiment. CSR activities that are initiated by overconfident CEOs or by financially unconstrained firms are likely to harm firms' long-term performance [39]. Given the information signaling through CSR activities as reviewed above, the investor sentiment may be induced.

A similar argument can also be applied to SMEs supported by the existing literature. SMEs are usually much younger, much smaller in size than large companies, and CSR may play a different role. Actually, CSR is found to positively influence SMEs' financial performance [9,40,41]. Especially, during economic crises, CSR can also lead to market success for small firms [42,43]. CSR also affects SME supply chains and innovation practices positively [44]. The importance of eco-innovation, belonging to CSR activities, for SMEs' financial performance has been highlighted in the literature [45]. For SMEs, CSR facilitates increased innovation, enhanced reputation, business performance, and would be helpful for supply chain management [44,46].

In the light of stakeholder theory, companies' CSR activities, such as building image and brand recognition by satisfying consumers, employees, suppliers [47]), can strengthen the confidence of investors or investor sentiment [48–50]. Employees are one of the most important stakeholders of a company. It plays an important role especially in developing employees' job competence with a career development orientation, which fundamentally increases job satisfaction and thus motivation [51]. As highlighted in Palacios-Manzano et al. [7], the improved job satisfaction would further promote the positive impact of CSR on firm performance. At the same time, the unique experience and skills of each employee are utilized to improve the efficiency of the team and enhance corporate competitiveness [52]. Therefore, respecting the diversity [53] of employees has become an essential requirement for companies to assume social responsibility [52]. The purpose of diversity management has gradually expanded from eliminating prejudice to more profitable and sustainable development, and it's considered as a natural part of CSR activities, which would reflect the actual level of social responsibility within the companies [52,54]. By hiring employees including members in top management teams with more diverse educational backgrounds, work experiences, interests, and religious beliefs, an atmosphere of mutual respect and free communication can be fostered in the team, and the corporate performance would be improved finally [55,56]. Companies led by females benefit from higher corporate credit ratings [57]. The increase in gender and cultural diversities on board could even promote the other dimensions of CSR activities, for example, reducing CO<sub>2</sub> emissions [58]. As emphasized in the literature, the investment on improving employees' ability, for example, the internal and external training of employees, would help improve corporate performance [59]. By improving employees' quality of life at work, the companies may be more competitive [60]. Incorporating diversity management into corporate management can be understood as a practice that allows for the expression of more personal views [61], which increases employee satisfaction, motivates them to aim for corporate interests, and reduces agency costs [62]. Based on social exchange theory [63], a company's investment in managing age diversity increases employees' trust in the company, improves their job loyalty, and improves the company's financial performance [64]. In addition to employees, customers are also critical stakeholders and determine firm performance. It has been shown that CSR and firm value are positively related for firms with high customer awareness [65]. As emphasized in Gimeno-Arias [66], CSR improves firm performance when CSR actions are more oriented to more efficient management of human resources and customer satisfaction. Greater female representation on boards that link ESG can alleviate the negative effects of CEO overconfidence [67].

In addition to the impact of CSR activities on firm performance and the heterogeneities existing in the impact reviewed above, there are some natural differences between large companies and SMEs. As shown in Table 1, the average ages of Chinese listed companies in the Main Board market and the SME and GEM Board are 20 and 13, respectively. The Main Board market consists of large companies, whereas the SME and GEM Board features SMEs. Compared with large companies, SMEs are usually younger, and lack of managing knowledge and formal organizational structure. All these characteristics are likely to lead to poor organizational results for their stakeholders [9,40] or being more responsive to CSR activities. Considering all the argument in this subsection, we propose that:

**Table 1.** Market age and the number of companies.

	Mean Age	Number of Companies								
		2010	2011	2012	2013	2014	2015	2016	2017	2018
Main Board	20	597	612	620	675	671	708	774	925	979
SME and GEM Board	13	484	695	769	890	922	1034	1136	1309	1381

Abbreviation: SME: small and medium enterprise; GEM: growth enterprise market.

**Hypothesis 1.** *Corporate sustainable development performance has a positive impact on investor sentiment.*

**Hypothesis 2.** *The impact of Corporate sustainable development performance on investor sentiment is greater on investors in the SME and GEM Board than investors on the Main Board.*

Data comes from China Stock Market and Accounting Research (CSMAR) database.

## 2.2. Investor Sentiment and Managerial Overconfidence

With the development of research in behavioral finance, the influence of investor sentiment on corporate governance has been increasingly confirmed [68–70], and it has been confirmed that sentiment is positively related to realized stock returns in the short term [71] and affects asset valuation [72]. Some recent empirical study shows that investor sentiment positively influences Tobin's Q but negatively influences the return on assets (ROA) [73]. The trends in capital markets would influence managers' decisions and expectations, as the investors are important parts of stakeholders of the companies.

In the capital market, optimism or overconfidence is not only the individual traits of managers, but also a characteristic being updated dynamically [74]. The capital flow appears to be a mechanism by which investor sentiment spreads across markets and contributes to global effects [75]. Current studies focus mainly on the consequences, rather than the causes of managerial overconfidence. Roll (1986) first used the concept of managerial overconfidence to explain value-destroying mergers [76]. The positive side of managerial overconfidence is also highlighted in the literature. Galasso and Simcoe (2011) [77] find that overconfident CEOs, particularly for those in more competitive industries, are more likely to pursue innovation. In their seminal paper, Hirshleifer et al. (2012) [78] find that firms with overconfident CEOs have greater return volatility. In particular, they would invest more in innovation, produce more innovation results reflected in more patents and patent citations, and achieve greater innovative success. A recent study by Kim et al. (2022) [79] suggests that CEO overconfidence is an important factor, inducing higher and predictable performance of companies. The negative side of managerial overconfidence also possibly exists. Schrand and Zechman found that managerial overconfidence can increase the likelihood of financial statement fraud [80]. When analyzing investors and corporate managers under the same framework, Arif and Lee [81] proposed corporate investment peaks when investors have positive sentiments. Malmendier and Tate also pointed out that since corporate investment is a management decision, managerial overconfidence accounts for the overestimation of income, leading to over-investment [82]. Even though the importance of managerial overconfidence is obvious, the study on the cause of managerial overconfidence is limited. In an implicit way, Adam et al. proposed that the financial success of past investment decisions leads to managerial overconfidence, although past speculative losses cannot reduce managerial overconfidence [83]. As shown by Baker and Wurgler (2006), investor sentiment influences subsequent stock returns, especially for small stocks, young stocks, etc., [12]. Therefore, we think that an abnormally high stock return can lead to managerial overconfidence, especially for SMEs.

Given the discussion above, it would be expected that the mentality of managers may be affected by investor sentiment. When the sentiments of investors and managers are biased, corporate executives and managers will revise their expectations based on the changes in investor sentiment. The heterogeneity across large companies and SMEs has been highlighted in the last subsection. Hence, we hypothesize:

**Hypothesis 3.** *Investors' high sentiment will lead to high managerial overconfidence.*

**Hypothesis 4.** *Managerial overconfidence of SME and GEM Board listed companies is more significantly affected by investor sentiment than Main Board listed companies.*



### 3. Data and Sample Overview

#### 3.1. Sample Selection and Data Source

Our research is based on listed companies in China. We use CSR to measure corporate sustainable development performance. The CSR data of the listed companies is from Hexun database, and the financial data is from the China Stock Market and Accounting Research (CSMAR) database. Considering that the disclosure of corporate social responsibility reports has been standardized in China since 2010, we select the data from 2010 to 2018. Following Shao and Lv [84], we exclude ST (special treatment) stock companies which are on the verge of being delisted and observations with abnormal values, and obtained 3248 listed companies, covering 31 provinces (autonomous regions and municipalities) and 79 industries in China.

#### 3.2. Measures of Variables

##### 3.2.1. Corporate Sustainable Development Performance: CSR

The professional evaluation index system of the Hexun database is based on the social responsibility reports and financial statements released by these companies, and five dimensions are included. On the basis of Hexun's scoring, we reduce each sub-item according to the corresponding percentage of different industries and obtain the original weighted scores of each dimension. Detailed information and specific measurement indicators are provided in Table 2.

Table 2. CSR components.

	Level-1 Sub-Indicators	Level-2 Sub-Indicators	Level-3 Sub-Indicators
CSR -Total	CSR -Employee	Performance	Per capita income employees Employee training
		Safety	Safety inspection Safety training
		Caring for employees	Employee caring consciousness List of members of caring for employees Consolation money for employees
	CSR -Consumer	Product quality	Quality management awareness Certificate of quality management system
		After-sales service	Customer satisfaction survey
		Integrity	Fair competition among suppliers Anti-bribery training
	CSR -Environment	Environmental management	Environmental protection consciousness Environmental management system certification Investment in environmental protection Number of pollutant discharge types Number of energy-saving measure types
	CSR -Public	Contribution value	Ratio of income tax to total profits Public donation amount

##### 3.2.2. Investor Sentiment

The book-to-market value (*BM*), momentum indicator (*MOMENTUM*), turnover rate (*TURN*), and Tobin's Q value (*TOBINQ*) are commonly considered as the variable to reflect investor sentiment. Following Baker and Wurgler [12], we respectively regress each of the four raw proxies on variables reflecting companies' financial status, development potential, and the degree of risk. Then, we take the residuals to eliminate the impact of fundamental factors on investment behavior. We perform principal component analysis on these four residuals and select two principal components whose eigenvalues are above 1.00, explaining 64.77% of the sample variance. Finally, after weighting the two principal

components according to the contributing rate, we define *SENT* as the new index of investor sentiment. The index is calculated as follows:

$$SENT_{ijpt} = -2.390BM_{ijpt} + 2.043MOMENTUM_{ijpt} - 1.394TURN_{ijpt} + 2.742TOBINQ_{ijpt} \quad (1)$$

where subscripts *i*, *j*, *p*, and *t* denote company, industry, province, and year, respectively.

### 3.2.3. Managerial Overconfidence

According to the method proposed by Lin et al. [85], if the predicted value of corporate profit exceeds the actual value, then the managers can be considered overconfident.

Detailed variable definitions in our study are provided in Table 3. Table 4 provides the descriptive statistics of variables.

**Table 3.** Variable definitions.

	Definition
<i>SENT</i>	Investor sentiment. A comprehensive index measured by book-to-market value, momentum indicator, turnover rate, and Tobin Q value.
<i>OVEROPT</i>	A dummy variable that equals 1 if the company executives are overconfident, and 0 otherwise.
<i>CSR_Total</i>	A comprehensive indicator based on corporate responsibility for the shareholders, the consumers, the employees, the public, and the environment. Detailed information is attached in Table 1.
Corporate Social Responsibility (CSR) components	
<i>CSR_Consumer</i>	The score of a company protecting the interests of all consumers.
<i>CSR_Environment</i>	The score of a company's performance in protecting the environment.
<i>CSR_Employee</i>	A sub-index based on the average wage, dividends, insurance provision, and expenditure for employee training.
<i>CSR_Public</i>	A sub-index based on the amount of donation and the pay on tax.
Control Variables	
<i>SIZE</i>	Measured by a firm's total assets for the year.
<i>AGE</i>	The number of years since a firm was established in a certain year.
<i>CONC</i>	Ownership concentration. Measured by share proportion of the top 3 largest shareholders.
<i>CEO_Chair</i>	A dummy variable that equals 1 if the CEO is also given the job of chairman, and 0 otherwise.
<i>Exe_Share</i>	The executive shareholding.
<i>Leverage</i>	Financial leverage ratio.
<i>ROE</i>	Return on equity.
<i>OM</i>	Operating margin.
<i>ALR</i>	Assets-liability ratio.
<i>PE</i>	Price-earning ratio.

**Table 4.** Summary statistics.

Variable	N	Mean	SD	Min	Median	Max
<i>SENT</i>	15,181	−0.926	5.076	−42.802	0	14.993
<i>OVEROPT</i>	7030	0.654	0.476	0	1	1
<i>CSR_Total</i>	15,181	25.738	16.314	−18.450	22.710	87.870
<i>CSR_Consumer</i>	15,181	11.553	29.864	0	0	100
<i>CSR_Environment</i>	15,181	8.951	24.506	0	0	100
<i>CSR_Employee</i>	15,181	18.814	22.245	−1.067	10.533	100
<i>CSR_Public</i>	15,181	23.760	21.836	−75	20.850	100
<i>SIZE</i>	15,181	69.906	813.361	0.040	2.668	22,786.910
<i>AGE</i>	15,181	15.503	5.822	1	15	51
<i>CONC</i>	15,181	49.843	15.917	0.565	49.602	98.290
<i>CEO_Chair</i>	15,181	0.316	0.465	0	0	1
<i>Exe_Share</i>	15,181	0.176	0.219	0	0.040	0.897
<i>Leverage</i>	15,181	3.330	143.825	−45.365	1.094	16,495.730
<i>ROE</i>	15,181	0.037	1.542	−176.380	0.072	0.990
<i>OM</i>	15,181	10.851	398.537	−4878.286	0.103	35,846.070
<i>ALR</i>	15,181	0.346	0.211	0.003	0.323	2.803
<i>PE</i>	15,181	118.798	3450.135	0	37.147	420,284.600

Note: The observations of *OVEROPT* are fewer because of the restrictions on the disclosure of the companies' forecasted financial information.

## 4. Results

### 4.1. The Impact of Corporate Sustainable Development Performance on Investor Sentiment

Following Yang and Baasandorj [6], we use panel regression analysis to identify the effects of corporate sustainable development performance on investor sentiment. The econometric model is as follows:

$$SENT_{ijpt} = \alpha_0 + \alpha_1 CSR_{ijpt-1} + \gamma X_{ijpt} + u_j + u_p + u_t + \varepsilon_{ijpt} \quad (2)$$

where the subscript  $i, j, p$ , and  $t$  denote firm, industry, province, and year, respectively. *SENT* represents the investor sentiment. *CSR* refers to dependent variables in five dimensions: *CSR\_Total*, *CSR\_Consumer*, *CSR\_Employee*, *CSR\_Public*, and *CSR\_Environment*.  $X_{ijpt}$  is a vector of the control variables, including indicators of risk and development. Detailed information is shown in Table 4. Considering the possible lag effect of *CSR* [86], we use a 1-year lag for the independent variable (*CSR*), which also helps eliminate the reverse causality problem. In addition, because of the differences in policy and other factors across provinces and industries, we use the econometric model with three-way fixed effects.  $u_j, u_p, u_t$  represent industry, province, and year fixed effects, respectively.

Table 5 presents the regression results in five dimensions. We estimate five models measuring *CSR* performance from five different aspects. As shown in Column (1) and (2), the coefficients on *CSR\_Total* are statistically significant at the 1 percent level, suggesting that *CSR* performance has significantly positive effect on investor sentiment. When we use the sub-items of *CSR* as dependent variables from Column (3) to (10), we find that the positive effects of *CSR* are also statistically significant at the 1 percent level in different dimensions. Furthermore, the coefficients on *CSR* performance in the Main Board market are higher than those in SME and GEM Board markets. The results imply that investors in growing markets are more susceptible to *CSR* events. This is not necessarily a bad thing, because from another perspective, investors in growing markets tend to rationally judge from the *CSR* performance to determine whether the company has the capacity for sustainable development and is worth investing in.



Table 5. The impact of CSR performance on investor sentiment.

	(1) Main Board	(2) SME and GEM Board	(3) Main Board	(4) SME and GEM Board	(5) Main Board	(6) SME and GEM Board	(7) Main Board	(8) SME and GEM Board	(9) Main Board	(10) SME and GEM Board
<i>CSR_Total</i>	0.875 ** (0.355)	2.725 *** (0.565)								
<i>CSR_Consumer</i>			0.527 *** (0.167)	2.072 *** (0.276)						
<i>CSR_Environment</i>					0.379 * (0.213)	2.527 *** (0.322)				
<i>CSR_Employee</i>							0.750 *** (0.246)	3.561 *** (0.420)		
<i>CSR_Public</i>									−0.236 (0.325)	0.185 (0.540)
<i>SIZE</i>	0.070 (0.053)	10.224 *** (1.964)	0.073 (0.053)	9.932 *** (1.912)	0.079 (0.051)	9.877 *** (1.919)	0.071 (0.053)	9.544 *** (1.871)	0.090 * (0.050)	11.056 *** (1.995)
<i>AGE</i>	−5.809 ** (2.338)	−3.286 (2.111)	−5.831 ** (2.332)	−3.261 (2.110)	−5.776 ** (2.330)	−3.301 (2.109)	−5.645 ** (2.328)	−2.956 (2.111)	−5.742 ** (2.323)	−3.332 (2.109)
<i>CONC</i>	4.829 *** (0.532)	−2.196 *** (0.742)	4.879 *** (0.532)	−1.961 *** (0.743)	4.908 *** (0.533)	−1.960 *** (0.743)	4.819 *** (0.535)	−1.907 *** (0.741)	4.985 *** (0.531)	−2.087 *** (0.745)
<i>CEO_Chair</i>	12.392 (16.913)	−65.248 *** (20.539)	11.124 (16.895)	−64.132 *** (20.499)	12.068 (16.907)	−63.331 *** (20.505)	12.296 (16.914)	−63.776 *** (20.474)	11.615 (16.932)	−67.569 *** (20.531)
<i>Exe_Share</i>	247.857 ** (116.287)	−779.166 *** (48.684)	256.315 ** (116.256)	−769.391 *** (48.694)	248.941 ** (116.514)	−773.587 *** (48.659)	255.843 ** (115.836)	−776.295 *** (48.599)	235.613 ** (115.881)	−777.350 *** (48.775)
<i>Leverage</i>	0.024 *** (0.003)	0.524 (0.459)	0.022 *** (0.003)	0.425 (0.450)	0.022 *** (0.003)	0.396 (0.445)	0.022 *** (0.003)	0.457 (0.454)	0.022 *** (0.003)	0.399 (0.446)
<i>ROE</i>	−404.489 *** (104.595)	−23.588 *** (23.291)	−390.860 *** (103.031)	−15.084 (29.544)	−381.800 *** (102.595)	−14.993 (29.320)	−391.484 *** (102.972)	−20.393 (24.479)	−373.708 *** (102.011)	−6.439 (34.064)
<i>OM</i>	0.046 *** (0.014)	0.120 * (0.083)	0.044 *** (0.013)	0.111 (0.087)	0.045 *** (0.013)	0.098 (0.090)	0.045 *** (0.013)	0.077 (0.090)	0.044 *** (0.013)	0.174 * (0.093)
<i>ALR</i>	−268.174 *** (32.056)	−175.023 *** (59.299)	−270.220 *** (39.017)	−194.864 *** (58.541)	−269.761 *** (39.038)	−193.806 *** (58.562)	−271.649 *** (39.097)	−179.229 *** (58.627)	−269.436 *** (39.015)	−199.239 *** (58.871)
<i>PE</i>	0.014 (0.011)	0.002 *** (0.0002)	0.013 (0.011)	0.002 *** (0.0002)	0.013 (0.012)	0.002 *** (0.0002)	0.014 (0.011)	0.002 *** (0.0002)	0.012 (0.012)	0.002 *** (0.0002)
<i>Constant</i>	243.519 *** (60.267)	257.545 *** (54.015)	256.628 *** (59.347)	299.302 *** (51.771)	259.098 *** (59.313)	301.269 *** (51.729)	247.628 *** (59.273)	251.391 *** (52.294)	268.871 *** (60.257)	319.504 *** (53.254)
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	2948	6207	2948	6207	2948	6207	2948	6207	2948	6207
Adjusted R <sup>2</sup>	0.337	0.157	0.337	0.159	0.336	0.159	0.337	0.161	0.335	0.155

Note: Robust standard errors are in parentheses. \*\*\*, \*\*, and \* indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

As for control variables, investor sentiment (*SENT*) seems to be significantly positively correlated with firm size (*SIZE*) in SME and GEM Board markets, and negatively correlated with ownership concentration (*CONC*) and executive shareholding (*Exe\_Share*). In summary, Hypotheses 1 and 2 are supported.

#### 4.2. The Spread of Sentiment from Investors to Top Management Team

To examine Hypothesis 2, we adopt the following logistic regress model:

$$OVEROPT_{ijpt} = \beta_0 + \beta_1 SENT_{ijpt} + \gamma X_{ijpt} + \varepsilon_{ijpt} \quad (3)$$

In order to reduce omitted variable bias, we add a set of control variables. Following previous research [87–89],  $X_{ijpt}$  is a vector of the control variables, including indicators of risk and development. Detailed information is shown in Table 4.

Table 6 reports the parameter estimates together with levels of significance. Column (3) reports the model of SME and GEM samples, showing that investor sentiment has a modest effect on managerial overconfidence ( $\beta = 0.0002$ ,  $p < 0.01$ ) in growing markets. However, as shown in Column (2), there is no significant effect on companies listed on the Main Board. In mature markets, corporate management's estimates of the company's future development are not easily affected by investor sentiment in the stock market. Rising investor sentiment will not lead managers to be overly optimistic about companies' future profits. Similarly, low investor sentiment can hardly affect the objective forecasts of future business conditions. Therefore, Hypotheses 3 and 4 are supported.

**Table 6.** The impact of investor sentiment on managerial overconfidence.

	(1) Total Sample	(2) Main Board	(3) SME and GEM Board
<i>SENT</i>	0.0002 *** (0.00003)	−0.00002 (0.0002)	0.0002 *** (0.00004)
<i>SIZE</i>	−0.008 *** (0.003)	−0.005 (0.004)	−0.004 (0.004)
<i>AGE</i>	−0.008 (0.006)	−0.044 ** (0.022)	0.003 (0.006)
<i>Exe_Share</i>	0.394 *** (0.143)	0.393 (3.077)	0.258 * (0.147)
<i>ROE</i>	1.874 *** (0.434)	0.360 (0.449)	2.530 *** (0.510)
<i>ALR</i>	0.362 ** (0.170)	−0.013 (0.450)	0.457 ** (0.184)
<i>Constant</i>	0.618 *** (0.155)	1.495 ** (0.615)	0.464 *** (0.161)
N	7030	651	6379

Note: \*\*\*, \*\*, and \* indicate statistical significance at the 1%, 5%, and 10% levels, respectively. Limited by space, we only show significant key variables here.

## 5. Robustness Checks and Further Discussion

### 5.1. Further Tests for the Relationship between Corporate Sustainable Development Performance, Investor Sentiment and Managerial Overconfidence

To investigate the robustness and effectiveness of our findings, we perform a number of checks through the following ways:

First, considering that there is not much room to work with corporate sustainable development practices in financial firms due to the differences in nature between the financial industry and others, we exclude observations of financial companies. With the smaller sample size, the impact of corporate sustainable development performance on investor sentiment is still significant. Table 7 reports the regression results. Investors in growing markets are more sensitive to corporate sustainable development activities than those in relatively mature markets.

Table 7. Robustness checks with sample selections.

	(1) Main Board	(2) SME and GEM Board	(3) Main Board	(4) SME and GEM Board	(5) Main Board	(6) SME and GEM Board	(7) Main Board	(8) SME and GEM Board	(9) Main Board	(10) SME and GEM Board
<i>CSR_Total</i>	0.900 ** (0.380)	2.489 *** (0.748)								
<i>CSR_Consumer</i>			0.550 *** (0.189)	1.941 *** (0.378)						
<i>CSR_Environment</i>					0.380 * (0.233)	2.366 *** (0.454)				
<i>CSR_Employee</i>							0.778 *** (0.271)	3.292 *** (0.549)		
<i>CSR_Public</i>									−0.351 (0.319)	0.240 (0.655)
<i>SIZE</i>	−0.031 (0.125)	11.903 *** (1.309)	−0.028 (0.124)	11.564 *** (1.303)	−0.0004 (0.124)	11.523 *** (1.303)	−0.033 (0.125)	11.178 *** (1.308)	0.038 (0.124)	12.737 *** (1.285)
<i>AGE</i>	−6.063 *** (2.207)	−3.554 * (2.030)	−6.093 ** (2.206)	−3.545 * (2.027)	−6.050 *** (2.209)	−3.591 * (2.027)	−5.881 *** (2.208)	−3.225 (2.027)	−6.010 *** (2.211)	−3.599 * (2.032)
<i>CONC</i>	4.952 *** (0.482)	−2.175 *** (0.703)	5.002 *** (0.480)	−1.963 *** (0.702)	5.026 *** (0.480)	−1.962 *** (0.702)	4.944 *** (0.481)	−1.911 *** (0.701)	5.110 *** (0.482)	−2.076 *** (0.704)
<i>CEO_Chair</i>	12.334 (17.855)	−67.870 *** (19.736)	10.995 (17.845)	−66.424 *** (19.713)	11.842 (17.863)	−65.929 *** (19.715)	12.365 (17.846)	−66.403 *** (19.694)	11.057 (17.875)	−70.230 *** (19.743)
<i>Exe_Share</i>	247.954 * (132.888)	−780.855 *** (44.695)	256.792 * (132.918)	−771.858 *** (44.662)	249.185 * (133.117)	−775.725 *** (44.640)	256.317 * (132.919)	−769.193 *** (44.636)	236.791 * (132.894)	−779.098 *** (44.755)
<i>Leverage</i>	0.023 (0.021)	0.456 (0.941)	0.021 (0.021)	0.367 (0.939)	0.022 (0.021)	0.341 (0.939)	0.021 (0.021)	0.399 (0.939)	0.021 (0.021)	0.341 (0.941)
<i>ROE</i>	−389.399 *** (82.175)	−21.370 (51.200)	−375.585 *** (81.344)	−13.988 (50.937)	−366.812 *** (81.364)	−13.881 (50.932)	−376.042 *** (81.363)	−18.785 (50.919)	−359.743 *** (81.260)	−5.649 (51.024)
<i>OM</i>	0.045 ** (0.018)	0.120 (0.296)	0.043 ** (0.018)	0.110 (0.296)	0.044 ** (0.018)	0.098 (0.296)	0.044 ** (0.018)	0.080 (0.296)	0.043 ** (0.018)	0.168 (0.296)
<i>ALR</i>	−262.492 *** (36.991)	−202.837 *** (59.823)	−264.582 *** (36.936)	−220.676 *** (59.358)	−265.436 *** (36.976)	−219.462 *** (59.358)	−265.680 *** (36.932)	−205.131 *** (59.403)	−266.384 *** (36.978)	−225.402 *** (59.487)
<i>PE</i>	0.015 (0.015)	0.002 (0.002)	0.014 (0.015)	0.002 (0.002)	0.014 (0.015)	0.002 (0.002)	0.015 (0.015)	0.002 (0.002)	0.013 (0.015)	0.002 (0.002)
<i>Constant</i>	243.265 *** (53.375)	270.045 *** (54.240)	256.782 *** (52.555)	308.188 *** (51.339)	260.179 *** (52.641)	309.994 *** (51.305)	246.991 *** (52.884)	263.189 *** (52.308)	273.125 *** (52.877)	325.027 *** (52.536)
<i>Year</i>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<i>Province</i>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<i>Industry</i>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<i>N</i>	2893	6126	2893	6126	2893	6126	2893	6126	2893	6126
<i>Adjusted R<sup>2</sup></i>	0.333	0.160	0.334	0.162	0.333	0.162	0.334	0.163	0.332	0.158

Note: Robust standard errors are in parentheses. \*\*\*, \*\*, and \* indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Second, we change the description of managerial overconfidence from dummy variable (*OVEROPT*) to continuous variable (*OVEROPT\_val*), where *OVEROPT\_val* is the predicted value of corporate profit minus the actual value. Then, we construct a panel regression model with time fixed effect as follows:

$$OVEROPT\_val_{ijpt} = \beta_0 + \beta_1 SENT_{ijpt} + \gamma X_{ijpt} + u_j + u_p + u_t + \varepsilon_{ijpt} \quad (4)$$

As shown in Table 8, from Column (1) to Column (3), The spread of sentiment from investors to top management team is significant in the growing market. This further supports our previous findings.

**Table 8.** The impact of investor sentiment on managerial overconfidence.

	FE			S-GMM		
	(1) Total Sample	(2) Main Board	(3) SME and GEM Board	(4) Total Sample	(5) Main Board	(6) SME and GEM Board
<i>OVEROPT_val-1</i>				−0.085 *** (0.022)	−0.336 *** (0.018)	−0.087 *** (0.016)
<i>SENT</i>	0.008 *** (0.002)	−0.016 (0.015)	0.007 *** (0.001)	0.006 (0.006)	0.008 *** (0.001)	0.011 * (0.006)
<i>SIZE</i>	0.805 *** (0.112)	0.104 (0.262)	1.641 *** (0.153)	0.990 *** (0.310)	−0.479 *** (0.033)	1.757 *** (0.259)
<i>AGE</i>	−1.088 *** (0.230)	−1.350 (2.138)	−0.672 *** (0.238)	−0.263 (0.317)	−0.846 *** (0.299)	−0.020 (0.356)
<i>CONC</i>	0.175 ** (0.083)	−0.121 (0.479)	0.248 *** (0.084)	0.184 (0.137)	−0.021 (0.123)	0.063 (0.160)
<i>CEO_Chair</i>	2.877 (2.374)	−10.178 (17,127)	2.503 (2.359)	0.025 *** (3.529)	19.604 (1.703)	2.820 (3.718)
<i>Exe_Share</i>	3.398 (5.545)	−67.960 (213.987)	−0.370 (5.492)	−13.989 (9.370)	73.565 ** (29.367)	−10.788 (11.634)
<i>Leverage</i>	−0.010 (0.069)	−0.211 (0.459)	−0.091 (0.074)	−0.182 (0.140)	0.081 *** (0.009)	−0.301 (0.202)
<i>ROE</i>	40.539 *** (5.695)	21.931 (20.150)	44.653 *** (6.021)	280.840 *** (59.278)	35.619 *** (12.662)	592.108 *** (63.785)
<i>OM</i>	−0.002 (0.005)	0.001 (0.007)	−0.029 (0.035)	−0.136 *** (0.046)	−0.079 *** (0.007)	−0.121 *** (0.026)
<i>ALR</i>	1.146 (6.869)	−15.506 (33.420)	−5.084 (7.129)	−39.237 * (23.709)	66.750 *** (4.352)	5.120 (24.673)
<i>PE</i>	−0.0001 (0.0002)	0.001 (0.009)	−0.0001 (0.0002)	−0.0002 (0.0006)	−0.011 ** (0.006)	−0.0004 (0.0005)
<i>Constant</i>	22.217 *** (6.095)	53.387 (52.512)	12.712 ** (6.080)	8.851 (9.055)	4.519 (9.273)	−29.417 *** (10.821)
Fixed effect						
Year	Yes	Yes	Yes	Yes	Yes	Yes
Province	Yes	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes	Yes
<i>p</i> -value of AR (2)				0.13	0.91	0.12
<i>p</i> -value of Hansen stat.				0.19	0.87	0.20
Adjusted R <sup>2</sup>	0.062	0.060	0.080			
N	6321	425	5886	4456	200	4256

Note: \*\*\*, \*\* and \* indicate statistical significance at the 1%, 5% and 10% levels, respectively.

### 5.2. S-GMM Estimation

Further, in order to examine the lag effect of investor sentiment, we introduce the  $t - 1$  period variable of managerial overconfidence (*OVEROPT\_val*) as an independent variable and develop a dynamic panel model as Equation (5):

$$OVEROPT\_val_{ijpt} = \gamma_0 + \gamma_1 OVEROPT\_val_{ijp,t-1} + \gamma_2 SENT_{ijpt} + \gamma_3 X_{ijpt} + u_j + u_p + u_t + \varepsilon_{ijpt} \quad (5)$$

The dynamic change process of manager sentiment is significant ( $\gamma_1 < 0, p < 0.01$ ). The coefficients of the lag terms of managerial overconfidence ( $OVEROPT\_val_{ijp,t-1}$ ) is negative both in the Main Board market and the SME and GEM Board market as in Column (4) to Column (6) of Table 8, indicating that the self-correcting mechanism exists in corporate governance. If the management finds that the estimates for the previous year's operations were too optimistic, it will then adjust the forecast and its attitude will turn relatively conservative. This is consistent with the results of Byoun's study in 2008. The speed at which an enterprise adjusts its financial structure differs depending on the gap between its goals and operating conditions. When the debt exceeds managers' expectations, the adjustment speed is around 33% and falls to 20% when the debt is lower than expected [90]. Apart from this self-correcting mechanism, the impacts of investor sentiment on managers are significant, and the delivery of sentiment is more effective in the SME and GEM Board market than in the Main Board.

Therefore, managerial overconfidence is affected by both internal and external factors. Managers will make timely adjustments based on their estimation bias, and are sensitive to investor sentiment, especially in growing markets.

## 6. Discussion

The present study validated the hypotheses proposed. After controlling for the major factors accelerating investor sentiment such as ROAs and other firm-level characteristics, CSR is still a significant determinant of investor sentiment. The current results confirm that improving corporate sustainable development performance, particularly in the dimensions of customer rights, employee welfare, and environmental protection, offers the opportunities for raising investors' enthusiasm, which may improve the companies' stock market performance. These CSR strategies help to ensure active external capital market atmosphere and accumulate potentials for companies' further development. The present finding is a useful complement to the literature examining the relationship between CSR and market sentiment, where only the impact of market sentiment on CSR has been highlighted [91].

Thus, this research provided corroborating evidence that exercising CSR can influence corporate financial and non-financial performance, which partially confirms Albuquerque et al. [31], Naughton et al. [33], and Valdez-Juárez and Mauricio Castillo-Vergara's [45] results. Different from them, the present finding does not directly examine the impact of CSR activities on corporate performance but rather explores the comprehensive outcome of the CSR-induced corporate performance, as reflected in the stock market. As an important part of stakeholders of companies, the market investors' reactions would be closely related to listed companies' development potentials. As suggested by Gimeno-Arias et al. (2021) [66], Peng (2015) [92], Green (2019) [93], and Gallardo-Vázquez et al. (2019) [35], CSR actions oriented to human resources and customer satisfaction would improve the firm performance. The employee welfare improvement may indicate sufficient diversity [52], which finally improve the corporate performance [64]. In addition, investors would be attracted by companies' good performance in environmental protection [29,94]. The present finding partially confirms these results and proposes a new next-step consequence from the perspective of investor sentiment.

The second hypothesis was validated, since CSR can improve the performance of SMEs in different ways, as shown in [9,40–46,66]. As an important complement to the literature, the present findings indicate that CSR activities initiated by SMEs among the listed companies would induce more significant impact on the investors than those initiated by larger companies. This may indicate that CSR activities of SMEs convey more information regarding the healthy development of the companies. Admittedly, another reason may be that the SME and GEM Board attracts relatively immature investors. Nevertheless, the present finding highlights the importance of maintaining good corporate sustainable development performance for SMEs from a new perspective. This finding may further convince SMEs that CSR activities can help them gain competitiveness [7,42,43,46].



The present study's results, as in the validated hypotheses 3 and 4, also show the existence of transmitting the external market enthusiasm to the internal managerial enthusiasm, reflected by managerial overconfidence. The impact of investor sentiment on traditional corporate performance, such as on the stock returns or firm values, has been well examined [71–73]. The present findings focus on the impact of investor sentiment, a measure for investor confidence [95], on the non-traditional corporate performance, that is managerial confidence. Higher investor sentiment would induce larger managerial overconfidence. This is consistent with the existing findings on the impact of investor sentiment on traditional corporate performance, in the sense that the source of managerial overconfidence may be the improved traditional corporate performance. The present findings highlight the “abnormal” reactions of managers to investor sentiment, which may be the extra driver of companies' sustainable development, since managerial overconfidence may induce more innovations [77], larger R&D input [96], and higher predictable performance [78].

Combing all the validated hypotheses together, this study shows how rational CSR activities would induce irrational managerial behavior. The existing literature has explored how CSR initiatives would impact human resources management [35,66], supply chain management [46], and others. The present findings add to this strand of literature by examining the CSR impact on the behavioral management, showing the existence of the possible psychological force promoting the improvement in corporate management.

Finally, a particularly interesting result was the confirmation that the induced managerial overconfidence can be self-correcting in a short period. As the managerial overconfidence may also negatively impact the corporate performance [39,80,97], it would be a concern if managerial overconfidence would be unlimitedly accumulated. The present finding indicates that the managerial overconfidence could be within a reasonable scope, so the seemingly irrational managerial behavior could converge to a rational status.

## 7. Conclusions, Limitations, and Future Research

The present research's findings contribute to the literature on CSR and behavioral finance, providing a more holistic vision of broad issues in corporate sustainable development. On the one hand, better performance in three dimensions of corporate sustainable development, i.e., consumer rights, environmental protection, and employee benefits, reflected by well-developed CSR indexes, would positively impact the investor sentiment. This finding directly identifies how good CSR activities would possibly induce higher expectations from the market investors. In addition, this induced effect on investor sentiment would be transmitted to managers' higher expectation on the companies, reflected by managerial overconfidence. This transmission describes one channel on how the internally rational corporate decision, reflected by CSR activities, would transfer to seemingly irrational manager sentiment, reflected by managerial overconfidence. On the other hand, the findings indicate that the force of CSR activities driving the transmission is heterogenous. For listed companies in the relatively immature market, the force is strong, reflected in the more significant results we figured out. This study's contribution is a comprehensive version of CSR, investor sentiment, and managerial overconfidence where the competitiveness in the capital market generated by companies' sustainability strategies would transfer to the companies' internal driver and confidence for potential development. The empirically validated hypotheses discussed in the previous sections show that the theoretically sound findings can be achieved in real world contexts with detailed firm-level data and numerical CSR indexes.

As evidenced in the existing literature, in addition to the promoting effect on companies' profitability or innovations, managerial overconfidence may induce potential problems to companies. However, as we empirically showed in Section 5, managers for listed companies in both the Main Board and SME and GEM Board will timely adjust their overconfidence. It can be rationally expected that the overconfidence would not be unrestrictedly accumulated, and the dark side of overconfidence may be minimized by the managers.

In addition, the estimation results also display strong heterogeneity of firm size. This study has shown that investors in the SME and GEM Board markets are more sensitive to CSR performance than those in the Main Board market. Accordingly, these investors may easily lead to managerial overconfidence in the listed companies of the corresponding stock market, and the transmission process as described above may be more efficient for SMEs. Therefore, this study contributes to the research on SMEs' incentive of promoting CSR activities.

The above findings have various academic and management implications. First, the results help to theoretically understand the important relationship between CSR, investor sentiment, and managerial overconfidence for companies. The importance of applying CSR strategies to gain the enthusiasm from the investors and further achieve the internal force from managerial overconfidence was confirmed. The timely self-correction to overconfidence was also confirmed. These findings contribute to expanding the existing literature in both CSR and behavioral finance. Thus, this study provides a preliminary yet promising framework for researchers who want to explore the roles of other important variables of management or corporate sustainability studies in the relationships discussed in the current work.

Second, the findings have useful managerial implications. Given heterogeneous sizes of the companies, it can be a feasible strategy for companies to inspire investor confidence through corporate sustainable development activities, such as improving product quality and after-sales service, investing more in employee welfare and putting more effort into diversity management, and raising the awareness of environmental protection. This may in turn become the source of managers' enthusiasm, accelerating the development of the companies. On the other hand, it is also important to curb managerial overconfidence in the circumstance of overheat investment, especially for managers of growing companies. This may help avoid some irrational risk decisions.

Our current research is among the first try to explore the relationship between corporate sustainable development performance, investor sentiment, and managerial overconfidence within the same framework. The limitation of this first try should be highlighted, and then the further investigation can be conducted to confirm or extend the findings. First, our sample is for one single country. Even though the selected country is widely considered as a representative for management or finance research within the Eastern Asian emerging economies, an international level sample or sample from other emerging economies or developed economies would allow for possibly more fruitful results and validate or expand the current results.

Second, we do not have information on the micro-level detailed decision process within the management team, which would reflect how the external investor irrationality would drive the internal managerial irrationality with the force of corporate sustainable development performance. Other interview-based quantitative research or qualitative research may be incorporated to provide more insights.

Third, the diversities existing in stakeholders of each company and the diversities across companies in different industries would naturally affect the actual level of social responsibility assumed by the companies, which may not be fully and correctly measured by some standardized CSR indexes. In addition, those non-measured yet observable CSR performance may induce investor sentiment and managerial overconfidence consequentially. An industry or company-based case study may help to complement the understanding of the relationship between corporate sustainable development performance, investor sentiment, and managerial overconfidence explored in the current study.

Given the above results and limitations, further research can be investigated based on the promising framework developed in this study, which should help both academics and business practitioners better understand how corporate sustainable development, investor sentiment, and managerial overconfidence would interact. Researchers may want to adopt qualitative research or interview-specific listed companies to discover the micro-level internal mechanism within management teams about our findings. At the same time,

researchers may apply samples from other countries or even international level samples to validate or further explore our findings, which may help the corresponding countries or regions improve both corporate sustainable development and corporate governance.

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