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The Quality of Corporate Social Responsibility Information Disclosure and Enterprise Innovation: Evidence from Chinese Listed Companies

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Abstract: The Chinese government has implemented a series of corporate social responsibility (CSR)-related policies in recent years, aiming to achieve high-quality economic development and transformation. To assess the effectiveness of these CSR policies, this study empirically explores the relationship between the quality of CSR information disclosure and corporate innovation performance using data from A-share listed companies in Shanghai and Shenzhen, China, from 2009 to 2020. The results show that: (1) Improvement in the quality of CSR information can significantly improve corporate innovation performance. (2) Further analysis reveals that the improvement of CSR information quality not only helps to reduce the agency costs and alleviate the financing constraints of enterprises but also reduces the cost of external interpretation of corporate innovation projects and conveys a good corporate image by attracting the attention of analysts and the media, which all contribute to the improvement of corporate innovation performance. This study further refines the mechanism of the impact of CSR disclosure on firms' innovation performance, which may provide guidance to governments in developing and improving CSR disclosure systems in the future.

Keywords: CSR disclosure quality; innovation performance; agency costs; financing constraints; analyst attention; media attention

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1. Introduction

In the past 40 years of reform and opening up, China has achieved rapid economic growth by relying on the input of large amounts of resources and cheap factors of production. However, this extensive mode of economics has also brought about many problems, such as excessive consumption of resources and environmental degradation. As China's economy enters a "new normal", the development model that takes GDP as the sole guide to economic growth can no longer support the healthy and rapid development of China's economy. The stagnation of industrial productivity has become a major drag on China's macroeconomic growth. Therefore, promoting economic development through the development of science and technology has become an important approach for China to overcome the middle-income trap. The report of the 19th National Congress of the Communist Party of China clearly states that "Innovation is the primary driver of transformation of China's economy towards high-quality development and the basis for building a modern economic system". Therefore, the implementation of an innovation-driven economic development strategy has become the key to promoting the transformation of China's economy into an eco-economic development mode. In this context, how to guide enterprises to carry out scientific and technological innovation through appropriate policies has become an urgent issue in the process of economic transformation in China.

With the growing global concern over economic and environmental sustainability, it has gradually become a trend for countries to require companies to disclose information on their CSR activities. Since the 21st century, the Chinese government has also introduced a series of policies related to CSR information disclosure, aiming to further promote the transformation of enterprises and accelerate the achievement of strategic goals for

sustainable economic development. Numerous studies have shown that CSR reports, as an important vehicle for corporate non-financial information, can effectively improve the transparency of corporate information and are therefore usually helpful in alleviating problems such as agency conflicts and adverse selection in companies [1–3], which is beneficial to business and development. However, in China, CSR reporting by some companies is mandatory for disclosure due to policy considerations. As a result, although the government does not mandate these companies to undertake more CSR activities, companies with poor CSR performance will undoubtedly experience increased pressure from regulators and stakeholder groups in a more transparent information environment. As a result, the increased spending on CSR activities forced by increased pressure from external regulation will inevitably crowd out the resources needed for business activities, which in turn leads to poor business performance [4]. Therefore, the implementation of CSR policies may also have a negative impact on business development in terms of the direct and indirect costs resulting from CSR disclosure.

The Chinese government's goal in implementing CSR policies is to drive firms to focus on improving the quality of their own operations and development, which is in line with the purpose of firms to engage in innovative activities [5]. However, in past studies, scholars have mostly focused on the short-term economic consequences of early CSR disclosure policy shocks on Chinese firms [4,6,7] while neglecting the relationship between CSR disclosure and firms' long-term development. Therefore, in this paper, we focus on whether the improvement of CSR information disclosure quality can drive firms to engage in high-quality development, in particular, whether it can improve firms' innovation performance.

Earlier studies on CSR disclosure have been conducted mainly based on data from firms in developed economies, and a large body of research has empirically explored the impact of CSR disclosure on the development of firms from the perspective of information asymmetry. For example, Dhaliwal et al. [1] found that CSR information disclosure can effectively improve the information transparency of firms, which enables investors and analysts to accurately assess the firm's current financial position and future growth prospects. Therefore, CSR disclosure can effectively reduce the friction between companies and stakeholders, which is beneficial to the improvement of firms' business performance [2]. Similarly, Kim et al. [3] found that CSR information is effective in revealing the type of corporate manager, which can help investors better assess a company's reputation and business risks.

However, considering that most CSR information in developed economies is voluntarily disclosed by companies, there has been controversy among scholars as to whether CSR disclosure really contributes to alleviating the information asymmetry problem. Some scholars argue that corporate managers may voluntarily disclose CSR information for specific business motives, and thus research based on voluntarily disclosed CSR information may lead to serious endogeneity problems [6]. Unlike the CSR disclosure rules in developed markets in Europe and the US, the Chinese government has adopted a combination of mandatory and voluntary CSR disclosure requirements for listed companies since 2008. Therefore, in order to effectively alleviate the endogeneity problem in the setting of CSR-related studies, some scholars have set up quasi-natural experiments by using exogenous shocks from China's mandatory CSR disclosure policy in 2008 and combined with a difference in difference (DID) method to examine the economic consequences of CSR disclosure on firms [5,6]. Based on research on this policy, a large body of literature has found CSR disclosure to be effective in improving the information transparency of Chinese firms [5,6]. However, there is still controversy among scholars as to whether the policy is benefiting the development of firms. On the one hand, some scholars argue that the improved information environment brought about by mandatory CSR disclosure helps to reduce firms' agency costs and thus improve their investment efficiency [6]. On the other hand, there are other scholars who point out that mandatory CSR disclosure

forces companies to devote a large number of resources to CSR activities, resulting in high short-term operating costs and thus negatively impacting their business performance [4].

Innovative R&D projects are often characterized by high risk, high investment, and long payback periods compared to traditional projects, yet improvements in a company's innovation performance can significantly enhance its productivity and market competitiveness. Therefore, compared to examining the changes in indicators such as firms' current economic performance and secondary market share prices [4,8], research on the relationship between CSR disclosure and innovation performance can present a more intuitive picture of the role of CSR policies on firms' sustainability prospects and long-term value [5]. Therefore, if the improvement in the quality of CSR information is effective in increasing the level of innovation of enterprises, then it can prove that the series of CSR information disclosure policies issued by the Chinese government have made a positive impact in promoting the transformation of enterprises to high-quality development. From the existing research, scholars have studied the mandatory CSR information disclosure policy enacted by the Chinese government in 2008 and found that mandatory CSR information disclosure has a positive impact on corporate innovation performance [5]. However, the policy was actually implemented in 2008 to include only over 200 well-governed listed companies, while with the further implementation and improvement of the relevant policy, nearly 4000 listed companies disclosed CSR information in 2020. As shown in Figure 1, the number of A-share listed companies publishing independent CSR reports has risen from 511 in 2009 to 3861 in 2020, according to RSK Global Responsibility Assessment. Therefore, studies based on mandatory CSR information disclosure policies are not representative in terms of sample selection, and it is difficult to quantify the impact of CSR information quality on firms' innovation performance by examining the impact of mandatory CSR policy alone. In addition, there is also other literature that has examined the impact of a single aspect of CSR disclosure on corporate innovation. For example, Hu et al. [9] found that improvements in the quality of corporate environmental information disclosure can significantly improve the green innovation performance of firms. However, CSR information includes not only environmental information about the enterprise but also a variety of information such as customer satisfaction, company–employee relations, and creditor relations. Therefore, the disclosure of CSR information enables investors and stakeholder groups to assess the business situation and development prospects of a company from a wider range of perspectives than a single corporate environmental information disclosure [1,4,10], which may have a greater impact on the overall innovation performance of the firm. Based on the above analysis, this paper selects data from Chinese A-share listed companies from 2009 to 2020 to examine the relationship between the quality of CSR information disclosure and corporate innovation performance and attempts to fill in the gaps of existing studies.

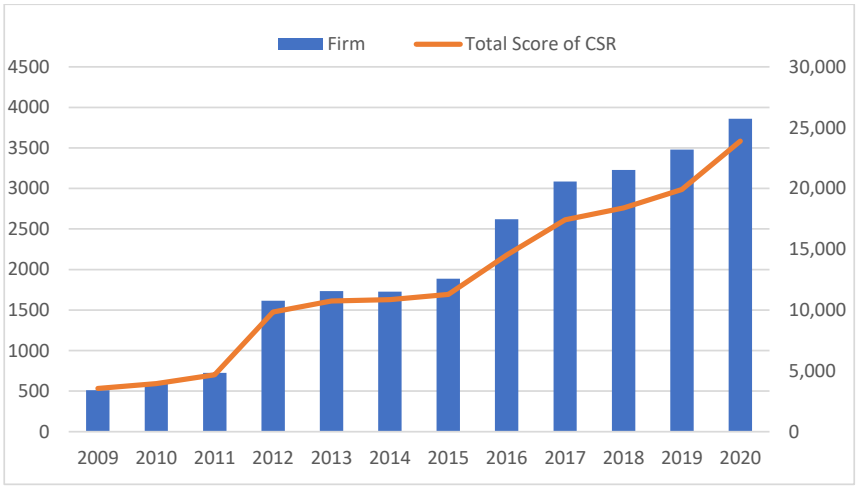

Figure 1. Trend of CSR information disclosure.

Compared to past studies, the contributions of this paper are as follows. First, compared to previous literature that set up studies based on the 2008 mandatory CSR policy, this paper is more representative and current in the selection of the sample of firms, and by scoring the quality of CSR disclosure, this study can better quantify the impact of CSR disclosure on firms' innovation performance. Second, the economic consequences of CSR disclosure are usually related to a country's economic development status and cultural contextual attributes, and firms in different countries may respond to the same CSR drivers in strikingly different ways [11,12]. Relative to previous literature, our study enriches the economic consequences of CSR disclosure on Chinese listed firms, which can be useful for other developing countries. Third, previous literature on CSR disclosure usually focuses only on the impact of internal factors such as financial constraints and management efficiency on corporate innovation, while this paper also examines the role of external factors such as analyst attention, media attention, and corporate reputation, which further enrich the mechanism of CSR disclosure's impact on firms' innovation performance.

2. Theoretical Analysis and Research Hypotheses

2.1. CSR Information Quality, Agency Costs, and Innovation Performance

The opacity of corporate information is an important trigger for agency conflict, which is one of the critical factors inhibiting the innovative activities of firms [13,14]. Research has shown that because the personal financial structure of corporate managers is relatively simple and significantly correlated with corporate performance, they are generally less willing to take risks than ordinary shareholders [15]. In an opaque information environment, the information dominance of managers gives them the opportunity to satisfy their own risk-averse strategies at the expense of shareholders [16], which in turn creates a disincentive for firms' innovative activities. A large amount of empirical evidence has shown that CSR disclosure allows companies to passively communicate with the external environment, making it difficult for managers to conceal negative news about the firm and increasing the transparency of the firm's investment activities [17]. Therefore, according to principal-agent theory, the higher the quality of CSR disclosure, the lower the friction between firms and investors, which not only discourages managers from taking private profits but also helps investors to better understand the firm's innovation projects, thus mitigating the negative impact of agency conflicts and adverse selection on the firm's innovation performance. Moreover, according to stakeholder theory, companies should pursue the overall interests of all stakeholders, which makes it necessary for companies to consider the interests of stakeholders and be subject to their constraints when making business decisions [18]. Thus, in a more transparent information environment, long-term interest-oriented stakeholders are able to obtain a more accurate picture of a company's CSR performance and use it to pressure management, which can help drive activities that enhance the long-term value of the company, such as innovation [5]. Therefore, I expect that improvements in the quality of CSR disclosure can reduce firms' principal-agent problems and improve firms' innovation performance.

2.2. CSR information Quality, Financing Conditions, and Innovation Performance

Overcoming the problems of adverse selection and moral hazard arising from information asymmetry is undoubtedly crucial to the long-term development of a company's strategy. According to signal transmission theory, enterprises are often motivated to send their internal signals to the outside world in order to capture the trust and support of investors and stakeholder groups, which can help them gain better opportunities for growth. Studies have shown that publishing high-quality CSR information can help companies send friendly and green signals to the public, which not only helps to build a good corporate image but also reduces investors' risk concerns, thus greatly helping to alleviate companies' financing constraints [19]. For example, Hu et al. [20] conducted a study based on data from Chinese listed companies and found that disclosing CSR information can effectively help companies broaden their financing channels. Similarly, a study by Goss

and Roberts [21] found that firms that made CSR disclosures were able to obtain loans from banks at lower interest rates. In order to undertake R&D and innovation activities, especially those requiring long payback periods, firms often need to consume significant financial resources to ensure that R&D capital can be invested in innovation projects on a sustainable basis [22,23]. Therefore, I expect that improvements in the quality of CSR information can effectively increase the sustainability of firms' innovative activities by improving their external financing conditions.

2.3. CSR Information Quality, Analyst Attention, and Innovation Performance

Based on information asymmetry theory, numerous studies have shown that CSR information, as an effective complement to financial information, can also effectively reduce the cost of analysts' access to internal corporate information, which can significantly enhance the accuracy of analysts' earnings forecasts [1]. Given that the improvement in the quality of CSR information allows analysts to obtain more information about companies at a lower cost, I expect that the improvement in the quality of CSR disclosure is likely to attract more analyst attention to companies. Moreover, it has been suggested that analysts usually pay extra attention to items that are highly relevant to the future value of the firm, such as intangible assets and R&D expenditures, and may devote extra effort to tracking and analyzing such items [24]. Thus, an increase in analyst attention can also help investors and stakeholders to better understand the long-term value of a firm's innovation activities, which can effectively reduce adverse selection problems and prevent financing constraints arising from adverse selection [25], which ultimately benefits the firm's ability and willingness to innovate [26]. In addition, analysts' monitoring of firms' innovation processes can also enhance the efficiency of innovation funds [27], which can also help improve firms' innovation performance. Therefore, I expect that improvements in the quality of CSR information disclosures can enhance a company's innovation performance by attracting the attention of analysts.

2.4. CSR Information Quality, Media Attention, and Innovation Performance

In the current age of information explosion, media coverage, as an important channel for stakeholders to learn about firms, may have an important impact on firms' innovation activities. Firstly, the external monitoring governance role of media coverage on firms has been well documented in many studies [28,29]. For example, it is noted that as an external mechanism of corporate governance, media monitoring can effectively restrain the opportunistic behavior of corporate management and improve corporate governance [30], which facilitates the advancement of innovative activities of firms [31]. Second, as people's awareness of environmental protection and social welfare increases, the strong public demand for corporate CSR information may increase the news media's tracking and reporting of CSR activities [32]. Studies have shown that the news media, as effective disseminators of CSR information, can convey the image of corporate social responsibility to the outside world in a timely manner [33]. For example, Xu et al. (2011) point out that the media, as external monitors of CSR activities, play an important part in shaping public opinion, uncovering CSR-related events, and exposing corporate fraud and violations. Therefore, by disclosing high-quality CSR information, companies can distinguish themselves from less socially responsible companies and enhance their market reputation with the signal transmission function of the media [34], and for companies under reputational pressure, there is also an incentive to improve their media reputation by disclosing high-quality CSR information to capture the favor of stakeholders and consumers [35].

There is no doubt that the improvement of corporate reputation enables enterprises to obtain more support from investors and stakeholders in the capital market [36,37], which not only helps to alleviate firms' financing constraints but also effectively reduces the obstacles encountered by firms' innovation projects [38]. Moreover, under the influence of the reputation mechanism, the pressure generated by the favor of investors and stakeholders can also promote the innovation activities of enterprises [5]. Therefore, I expect that the

improved quality of CSR information disclosure can drive firms' innovation performance by attracting media attention.

Based on the above analysis, I expect that improvements in the quality of CSR disclosure can improve firms' innovation performance through four channels: agency costs, financing constraints, analyst attention, and media attention. I therefore propose the following hypotheses.

H1: *The quality of CSR information disclosure is positively related to a firm's level of innovation.*

H1a. *An improvement in the quality of CSR information disclosure can alleviate the problem of agency conflicts, which in turn can contribute to a firm's innovation performance.*

H1b. *Improvements in the quality of CSR disclosure can improve the financing conditions of firms, which in turn can contribute to their innovation performance.*

H1c. *Improvements in the quality of CSR disclosure can drive innovation performance by attracting analysts' attention.*

H1d. *Improvements in the quality of CSR disclosure can drive innovation performance by attracting media attention.*

3. Research Design

3.1. Data Sources

The research sample was drawn from non-financial firms that were listed on the Shenzhen Stock Exchange and Shanghai Stock Exchange between 2009 and 2020. Referring to existing studies [4,10], this paper selected a sample of firms that also needed to satisfy the following four requirements: (1) eliminating the samples with financial abnormalities such as ST and *ST and companies listed in the financial sector; (2) eliminating the samples with missing values of variables; (3) eliminating the samples with a CSR index score of less than 0; (4) performing 1% Winsorize processing. The final sample comprised 19,970 firm-year observations. Data on CSR disclosures were obtained from corporate annual reports and independent CSR reports, which are available from the RSK database or the Hexun database. Other firm-level data were obtained from the CSMAR database. Media data were obtained from the CNRDS database, which covers almost all well-known newspapers and online financial media in China.

3.2. Variable Design

In this study, I take the innovation performance of enterprises as the explained variable. Innovation is a multi-stage process that includes R&D investments, inventions, patents, and innovation activities (production or market launch). In this paper, I choose the number of corporate patents as a proxy variable for a firm's innovation performance for the following reasons: firstly, patents are easier to obtain than other measures of a firm's degree of innovation and can be broken down into different technological areas. Secondly, in most studies, scholars have consistently identified patents as one of the important innovation indicators for measuring technological development achievements [39]. Specifically, two indicators of corporate innovation patents were selected: the number of patents applied for by the company during the year (PA1) and the number of patents granted to the company during the year (PA2). The number of patent applications (PA1) is used instead of R&D investment because patent applications are the most intuitive technological representation of a firm's innovation output. Moreover, it is more stable and reliable than R&D investment and can fully reflect a firm's intention to innovate [40]. In addition, it is also important to consider whether a firm's true innovation performance has become better. Therefore, I also use the number of patents granted (PA2) as a proxy variable for a firm's innovation, which directly captures the firm's current technological progress.

As an explanatory variable, the construction of the quality of CSR information disclosure indicators is the core of this paper. Referring to existing research [6,41], I used content

analysis to quantitatively evaluate the quality of CSR information disclosure of enterprises. The construction of this explanatory variable is based on the CSR research data of relevant listed companies in the CSMAR database. CSMAR classifies the contents of CSR disclosure into ten categories, i.e., Shareholder Relations, Creditor Relations, Employee Relations, Supplier Relations, Customer Relations, Environmental Protection, Public Relations and Charities, CSR Policies, Work Conditions, and Deficiency in CSR performance. Following the research of Wang et al. [6], I define dummy variables for each category according to whether the CSR information disclosed by the company includes the information of this category. If it does, the respective dummy variable equals 1 and 0; otherwise, CSRscore is the sum of these ten dummy variables. In addition, the third-party authoritative agencies for rating CSR information included RKS and Hexun. Among them, RKS only includes statistics on companies that voluntarily disclose CSR reports, which has a narrower sample coverage, while Hexun has established 30%, 15%, 15%, 20%, and 20% weight scoring criteria from five aspects of shareholder responsibility, employee responsibility, supplier responsibility, environmental responsibility and social contribution responsibility, which is more accurate and objective. Therefore, with reference to the existing study [42], I also used Hexun's CSR index (HXCSRscore) as an explanatory variable and for robustness testing.

In the mechanism test section, a firm's agency cost (Ac) is measured by the firm's management expense share [43], which is equal to the ratio of management expense to operating revenue, and the firm's financing terms are measured by its cost of debt (Cost), which is equal to the firm's interest expense divided by the sum of the firm's long- and short-term debt. Analyst attention (Analyst) equals the natural logarithm of the number of analysts following the firm [6,7]. A firm's media attention (Media) equals the natural logarithm of the number of media coverage of the firm.

Referring to existing studies related to firms' innovation performance [6,37], the control variables in this paper are selected as follows: enterprise scale, growth, listed years, cash holdings, asset–liability ratio, profitability, shareholding ratio of major shareholders, and Tobin's Q. Research has shown that the larger a firm is, the more resources it has at its disposal, which creates strong support for R&D activities [44]. Existing views on the relationship between a firm's age and its ability to innovate are inconsistent. A firm's innovative capacity may be positively related to its time of establishment [45], but the excessive age of the enterprise may also hinder t its innovative activities [46]. In addition, enterprises with better profits usually have a higher level of competition, so their demand for innovation is more pronounced. An increase in a firm's Tobin's Q improves the firm's ability to raise equity financing and therefore may also have a positive effect on a firm's innovative activity. At the same time, the revenue growth rate and the proportion of large shareholders are related to a firm's growth and management efficiency, respectively, both of which may also affect innovative activities to a certain extent. The symbols of the variables and their definitions are presented in Table 1.

Table 1. Description of variables used in this study.

Variable	Symbol	Definition
Patent application	PA1	The logarithm of the number of enterprise innovation patent applications
Patent authorization	PA2	The logarithm of the authorized number of enterprise innovation patents
CSR Disclosure Quality	CSRscore	Total score of CSR information disclosure calculated according to CSMAR database
Agency cost	Ac	Management expense divided by operating income
Debt cost	Dc	Interest expense divided by total debt
Analyst's attention	Analyst	The logarithm of numbers of analysts following a firm
Media's attention	Media	The logarithm of numbers of media reports about a firm
Enterprise scale	Size	The logarithm of total assets.
Listed years	Age	The logarithm of the company's listing years

Table 1. *Cont.*

Variable	Symbol	Definition
Profitability	Roa	The net profit divided by total assets
Growth	Growth	Annual growth rate of operating income
Cash holdings	Cash	The ratio of cash holdings to total assets
TobinQ	TQ	The ratio of the market value of the enterprise to the replacement cost of capital
Asset–liability ratio	Lev	The ratio of total debt to total assets
Shareholding ratio of major shareholders	Top1	The fraction of shares held by the largest shareholders

3.3. Model Design

Regression Equations (1) and (2) were established to test the influence relation of CSR disclosure quality with corporate innovation (Hypothesis H1). As it generally takes time for innovation processes to generate observable outputs due to the fact that innovation represents a long-term investment in intangible assets [40], I choose to focus on one-year-ahead innovation output variables:

$$PA1_{it+1} = \beta_0 + \beta_1 CSRscore_{it} + \sum \beta_i Controls_{it} + Industry + Year + \varepsilon_{it+1} \quad (1)$$

$$PA2_{it+1} = \beta_0 + \beta_1 CSRscore_{it} + \sum \beta_i Controls_{it} + Industry + Year + \varepsilon_{it+1} \quad (2)$$

Regression Equations (3)–(6) were established to investigate the Relationship between the quality of CSR disclosure and agency costs, cost of debt, analyst attention, and media attention (H1a, H1b, H1c, and H1d):

$$Ac_{it} = \beta_0 + \beta_1 CSRscore_{it} + \sum \beta_i Controls_{it} + Industry + Year + \varepsilon_{it} \quad (3)$$

$$Dc_{it} = \beta_0 + \beta_1 CSRscore_{it} + \sum \beta_i Controls_{it} + Industry + Year + \varepsilon_{it} \quad (4)$$

$$Analyst_{it} \ \beta_0 + \beta_1 CSRscore_{it} + \sum \beta_i Controls_{it} + Industry + Year + \varepsilon_{it} \quad (5)$$

$$Media_{it} = \beta_0 + \beta_1 CSRscore_{it} + \sum \beta_i Controls_{it} + Industry + Year + \varepsilon_{it} \quad (6)$$

In Equations (1)–(6), β is the estimation coefficient. Industry and Year are representative of the virtual industrial variable and the virtual time variable, respectively, which are used to control the fixed industrial effect and fixed year effect so that these regressions can provide more reliable results after excluding the fixed industrial effect and fixed time effect, and ε in all the above equations are random disturbance items.

4. Test Results

4.1. Statistical Description Results

Descriptive statistics for all variables are shown in Table 2. the means and standard deviations for PA1 (PA2) are 2.558 (2.409) and 1.771 (1.682), respectively, indicating a significant variation in innovation performance between the sample firms. The minimum, median and maximum values of CSRscore are 1, 7, and 10, respectively, and the mean and standard deviation are 5.941 and 2.316, respectively, indicating that the quality of CSR disclosure of most companies is below 6 and there is a certain extent of variation in the quality of CSR disclosure among enterprises. Ac has a mean of 0.090 and a standard deviation of 0.074, while Dc has a mean of 0.054 and a standard deviation of 0.034, indicating that agency costs and financing conditions vary widely between firms. Analyst has a mean of 2.047 and a standard deviation of 0.909, and Media has a mean of 5.309 and a standard deviation of 1.054, both within a reasonable range of values.

Table 2. Summary statistics.

Variable	Obs	Mean	Min	Median	Max	SD
PA1	19970	2.558	0.000	2.708	6.999	1.771
PA2	19970	2.409	0.000	2.565	6.655	1.682
CSRscore	19970	5.941	1.000	7.000	10.000	2.316
Ac	19969	0.090	0.009	0.073	0.535	0.074
Dc	17066	0.054	0.000	0.051	0.308	0.034
Analyst	14460	2.047	0.693	2.079	4.331	0.909
Media	19541	5.340	1.609	5.263	10.958	1.069
Size	19970	22.261	19.315	22.088	25.946	1.298
Age	19970	1.154	0.000	1.099	2.944	1.011
Roa	19970	0.043	−0.247	0.040	0.229	0.064
Growth	19970	0.167	−0.580	0.107	2.412	0.381
Lev	19970	0.430	0.0570	0.421	0.892	0.206
Top1	19970	0.352	0.090	0.333	0.753	0.150
Cash	19970	0.156	0.000	0.121	0.960	0.123
TQ	19970	1.974	0.875	1.587	8.136	1.201

The remaining control variables are within reasonable limits. The mean and median of Size are 22.261 and 22.088, respectively, indicating that the sample observations are predominantly large firms. The mean of Roa is 0.043, indicating a return on assets of roughly 4%. The mean of the Top1 variable is 0.352, indicating that most firms have a high proportion of large shareholders. The mean score and median of Lev median are 0.430 and 0.421, respectively, implying that the majority of firms had total debt of approximately 40% of total assets. The mean value of Growth is 0.167, indicating a high level of growth for the sample firms. The mean and median Tobin's Q are 1.974 and 1.587, respectively, indicating that the market value of most firms is greater than their replacement cost of capital. All of the above control variables are within reasonable ranges of values.

4.2. Correlation Analysis

Before conducting the regression analysis, I first tested the correlations of the variables to exclude the interference of multicollinearity between variables on the results of this paper. Table 3 shows that there is no serious problem of multicollinearity in this paper's models, as none of the coefficients has an absolute value greater than 0.9, except for the correlation coefficients of the dependent variables PA1 and PA2.

Table 3. The correlation matrix.

Variable	PA1	PA2	Ac	Dc	Analyst	Media	CSRscore	Size	Age	Roa
PA1	1									
PA2	0.915 ***	1								
Ac	0.133 ***	0.138 ***	1							
Dc	−0.071 ***	−0.087 ***	−0.084 ***	1						
Analyst	0.002	0.009	−0.024 ***	−0.002	1					
Media	0.198 ***	0.199 ***	0.130 ***	−0.095 ***	−0.050 ***	1				
CSRscore	0.114 ***	0.119 ***	0.114 ***	−0.048 ***	-0.009	0.363 ***	1			
Size	0.271 ***	0.277 ***	0.163 ***	−0.336 ***	−0.041 ***	0.323 ***	0.490 ***	1		
Age	0.180 ***	0.171 ***	0.082 ***	−0.006	0.003	0.086 ***	-0.069 ***	0.031 ***	1	
Roa	0.064 ***	0.068 ***	0.046 ***	−0.151 ***	−0.119 ***	0.352 ***	0.071 ***	−0.035 ***	−0.062 ***	1
Growth	0.035 ***	0.035 ***	−0.014 *	−0.134 ***	0.020 ***	0.101 ***	0.031 ***	0.051 ***	0.015 **	0.242 ***
Lev	0.055 ***	0.066 ***	0.040 ***	−0.252 ***	0.069 ***	0.015 *	0.240 ***	0.527 ***	−0.061 ***	−0.382 ***
Top1	0.003	0.020 ***	0.027 ***	−0.154 ***	−0.079 ***	0.048 ***	0.114 ***	0.221 ***	−0.070 ***	0.131 ***
Cash	−0.055 ***	−0.063 ***	−0.036 ***	0.141 ***	−0.125 ***	0.072 ***	−0.013 *	−0.229 ***	−0.085 ***	0.293 ***
TQ	−0.112 ***	−0.110 ***	−0.031 ***	0.363 ***	0.029 ***	0.098 ***	0.048 ***	−0.424 ***	0.048 ***	0.144 ***
	Growth	Lev	Top1	Cash	TQ					

Table 3. *Cont.*

Variable	PA1	PA2	Ac	Dc	Analyst	Media	CSRscore	Size	Age	Roa
Growth	1									
Lev	0.030 ***	1								
Top1	−0.005	0.056 ***	1							
Cash	0.012 *	−0.373 ***	0.041 ***	1						
TQ	−0.002	−0.285 ***	−0.120 ***	0.184 ***	1					

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

4.3. Preliminary Regression Results

To verify Hypothesis 1, this study adopts least square regression models with fixed effects. The regression results are shown in Table 4. In columns (1) and (2), the dependent variable is PA1, while in columns (3) and (4), the dependent variable is PA2. In these models, I include industry or year fixed effects to control for the effects of time-invariant industry characteristics and time effects on firm innovation. Specifically, in columns (1) and (3) of Table 4, the regression coefficients of CSRscore are both significantly positive with the inclusion of industry fixed effects only ($\beta = 0.023$, $p < 1\%$; $\beta = 0.017$, $p < 1\%$). In columns (2) and (4) of Table 4, the regression coefficients of CSRscore are still significantly positive with the inclusion of both industry and year fixed effects ($\beta = 0.031$, $p < 1\%$; $\beta = 0.027$, $p < 1\%$). Thus, the results in Table 4 support hypothesis H1, indicating that the quality of CSR disclosure is positively related to firms' innovation performance.

Table 4. Benchmark regression results.

Variable	(1)	(2)	(3)	(4)
	PA1	PA1	PA2	PA2
CSRscore	0.023 *** (5.67)	0.031 *** (7.67)	0.017 *** (4.49)	0.027 *** (6.92)
Size	0.629 *** (60.50)	0.618 *** (59.27)	0.603 *** (62.24)	0.589 *** (60.09)
Age	0.069 *** (6.99)	0.066 *** (6.87)	0.093 *** (10.21)	0.067 *** (7.37)
Roa	2.516 *** (14.13)	2.629 *** (14.94)	1.662 *** (9.91)	1.828 *** (10.97)
Growth	0.042 (1.51)	−0.016 (−0.56)	−0.027 (−1.08)	−0.015 (−0.59)
Lev	−0.207 *** (−3.21)	−0.081 (−1.25)	−0.242 *** (−4.00)	−0.075 (−1.23)
Top1	−0.046 (−0.68)	−0.011 (−0.16)	−0.045 (−0.71)	0.060 (0.95)
Cash	−0.016 (−0.19)	0.110 (1.30)	−0.166 ** (−2.13)	0.005 (0.06)
TQ	0.036 *** (4.10)	0.031 *** (3.23)	0.008 (0.98)	0.026 *** (2.94)
Constant	−11.740 *** (−53.09)	−11.610 *** (−52.31)	−11.154 *** (−54.13)	−11.050 *** (−52.87)
Industry FE	Yes	Yes	Yes	Yes
Year FE		Yes		Yes
N	19,970	19,970	19,970	19,970
R^2	0.463	0.489	0.498	0.508

Note: figures in () are t value; *** and ** indicate significance at the 1% and 5%, levels, respectively.

The regression results for the control variables show that firm size, age at IPO, and profitability play a positive role in a firm's innovation performance, which is consistent with the results of the analysis when the control variables were selected for this paper. The remaining control variables, on the other hand, have no significant effect on the innovation performance of the firms.

4.4. Mechanism Analysis

Based on the results of the empirical analysis in the previous section, we have demonstrated that improvements in the quality of CSR information can effectively enhance the innovation performance of firms. Next, based on the theoretical analysis in the previous section, this paper further discusses the internal mechanism of this positive effect, i.e., to verify H1a–H1d. Specifically, this study empirically tests whether improvements in the quality of CSR information disclosure are effective in reducing firms' agency costs (Ac) and firms' debt financing costs (Dc) while significantly increasing firms' analyst coverage (Analyst) and media (Media), and ultimately drive firms' innovation performance through these channels.

The results of the mechanical tests are presented in Table 5. Column (1) of Table 5 presents the results of the test of regression Equation (3). the CSRscore coefficient is significantly negative at the 1% level ($\beta = -0.001$, $p < 1\%$), which implies that the agency cost of the firm decreases significantly as the quality of CSR disclosure increases. Column (2) of Table 5 shows the test results of Equation (4), which is also significantly negative ($\beta = -0.023$, $p < 5\%$), indicating that an increase in CSR disclosure score can effectively reduce the cost of debt and improve the financing ability of the firm. Column (3) presents the results of the test of Equation (5), which shows that the coefficient of CSRscore is 0.013 and is significantly positive below the 1% level, indicating that an increase in CSRscore can significantly increase analyst attention. Column (4) shows the results of Equation (6), and it can be seen that the coefficient of CSRscore is also significantly positive ($\beta = 0.008$, $p < 5\%$), which means that an improvement in the quality of CSR disclosure can effectively attract media attention and increase the exposure of the company.

Table 5. Mechanism tests.

Variable	(1)	(2)	(3)	(4)
	Ac	**Dc (%)**	**Analyst**	**Media**
CSRscore	−0.001 *** (−2.61)	−0.023 ** (−1.97)	0.013 *** (4.63)	0.008 ** (2.30)
Size	−0.005 *** (−11.02)	−0.062 ** (−2.10)	0.394 *** (59.73)	0.591 *** (66.18)
Age	−0.002 *** (−5.05)	−0.012 (−0.44)	0.083 *** (13.20)	−0.084 *** (−10.09)
Roa	−0.300 *** (−23.97)	−4.846 *** (−8.26)	5.094 *** (35.13)	1.521 *** (10.58)
Growth	−0.017 *** (−11.82)	0.512 *** (5.82)	0.041 ** (2.19)	−0.101 *** (−4.76)
Lev	−0.067 *** (−16.23)	0.826 *** (3.75)	−0.253 *** (−5.52)	0.247 *** (4.62)
Top1	−0.023 *** (−7.77)	−1.219 *** (−6.57)	−0.365 *** (−8.44)	−0.109 * (−1.94)
Cash	0.020 *** (3.83)	−3.054 *** (−9.11)	0.136 ** (2.39)	0.356 *** (4.85)
TQ	0.015 *** (19.58)	0.203 *** (5.05)	0.145 *** (21.78)	0.166 *** (20.78)

Table 5. *Cont.*

Variable	(1)	(2)	(3)	(4)
	Ac	**Dc (%)**	**Analyst**	**Media**
Constant	0.235 *** (23.10)	7.131 *** (11.18)	−7.315 *** (−52.82)	−10.229 *** (−53.48)
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
N	19,969	17,066	14,460	19,541
R^2	0.369	0.078	0.391	0.407

Note: figures in () are t value; ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Based on information asymmetry theory, agency cost theory, signal transmission theory, and stakeholder theory, a large number of studies have already proved that the reduction of agency costs, the improvement of financing capacity, and the increase in analyst and media attention to firms can effectively drive innovation activities [14,26,31]. Thus, by verifying hypotheses H1a–H1d, this paper initially tests the mechanisms and channels through which improvements in the quality of CSR information disclosure can contribute to firms' innovation performance. These channels are further tested in the Heterogeneity Analysis section.

4.5. Endogenous Test

Firstly, there may be reverse causality in the study, as firms with better innovation performance may tend to disclose higher quality CSR information; secondly, firms' motivation to disclose CSR information may also lead to endogeneity. For example, firms with poorer innovation performance may have to disclose detailed CSR information due to shocks from the industry and region they belong to, while firms with better innovation performance may disclose less CSR information due to their individual financial situation, for example (Chen et al., 2018).

With respect to the first problem, I adopt the method of instrumental variables to alleviate endogeneity. Referring to the research of El Ghoul et al. and Li et al. [47,48], this paper uses the quality of CSR disclosure in the previous period (LCSRscore) and the mean of the quality of CSR disclosure of the remaining firms in the same industry (CSRscore_ind) as the instrumental variables (IV) and performs a two-stage OLS (2SLS) regression to test the baseline robustness of the results. After testing the rationality of the instrumental variables, it was found that: the Kleibergen–Paap rk LM statistic was significant at the 1% level (p = 0.000), indicating that the instrumental variables were not unidentifiable; the Kleibergen–Paap rk Wald F value (F = 6871.91) was much larger than the 10% level of the Stock–Yogo test, indicating that the instrumental variables are strongly correlated with the endogenous explanatory variables. The results of the IV-2SLS test are shown in columns (1), (2), and (3) of Table 6. Column (1) reports the results of the first-stage regressions, where the coefficients on both CSRscor_ind and LCSRscore are significantly positive (β = 0.543, p < 1%; β = 0.524, p < 1%), indicating a significant correlation between the instrumental variables and endogenous explanatory variable The coefficients on CSRscore in the second-stage regressions in columns (2) and (3) are both significantly positive at the 1% level (β = 0.041, p < 1%; β = 0.032, p < 1%), indicating that after the potential endogeneity problem is mitigated, the improvement in the quality of CSR disclosure still has a significant driving effect on firms' innovation performance. The regression results for the control variables are also similar to those in columns (2) and (4) of Table 4. Thus, the results remain robust in the IV-2sls test.

Table 6. Endogeneity test.

Variable	(1)	(2)	(3)	(4)	(5)
		IV-2SLS		PSM	
	CSRscore	PA1	PA2	PA1	PA2
CSRscore		0.041 *** (6.30)	0.032 *** (5.30)	0.038 *** (5.14)	0.033 *** (4.75)
CSRscore_ind	0.543 *** (16.44)				
LCSRscore	0.524 *** (113.85)				
Size	0.118 *** (8.42)	0.621 *** (57.52)	0.591 *** (57.93)	0.601 *** (33.20)	0.563 *** (33.11)
Age	0.080 *** (6.09)	0.073 *** (7.33)	0.071 *** (7.50)	0.058 *** (3.42)	0.049 *** (3.06)
Roa	0.811 *** (3.48)	2.571 *** (14.56)	1.781 *** (10.67)	2.420 *** (7.22)	1.673 *** (5.21)
Growth	0.052 (1.57)	−0.016 (−0.63)	−0.016 (−0.67)	−0.091 * (−1.78)	−0.105 ** (−2.30)
Lev	−0.216 ** (−2.52)	−0.100 (−1.54)	−0.098 (−1.59)	0.187 (1.51)	0.196 * (1.69)
Top1	−0.173 * (−1.95)	−0.006 (−0.08)	0.069 (1.09)	0.114 (0.98)	0.160 (1.45)
Cash	0.131 (1.08)	0.096 (1.05)	−0.034 (−0.39)	0.081 (0.52)	−0.125 (−0.85)
TQ	0.029 ** (2.30)	0.036 *** (3.74)	0.029 *** (3.20)	0.022 (1.26)	0.011 (0.68)
Constant				−11.311 *** (−29.38)	−10.541 *** (−29.14)
Chi-sq (1) P	0.000				
F-value	6871.91				
Industry FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
N	19,969	19,969	16,593	6638	6638
R^2	0.454	0.255	0.499	0.512	0.525

Note: figures in () are t value; ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

In order to solve the second problem, this paper adopted the propensity score matching (PSM) method to make firms with higher CSRscore similar to firms with lower CSRscore in terms of industry, region, and financial status. Specifically, this paper divided the sample into an experimental group and a control group using the median CSRscore of sample firms in the same industry and region and matched the two groups of firms through the propensity score method (PSM). Referring to existing studies [4,7], this paper adopted Size, Lev, Age, Roa, Growth, Cash, Analyst, and Media as covariates for a 1:1 neighbor matching with caliper = 0.25. After PSM, I obtained a total of 6638 samples, in which the experimental and control groups have more than 95% similarity in the means of the covariates, thus effectively mitigating the effect of differences in the financial status of the enterprises on the results of this paper. The regression results based on these samples are presented in columns (4) and (5) of Table 6. The coefficient of CSRscore remains significantly positive at the 1% level in columns (4) and (5) ($\beta = 0.038$, $p < 1\%$; $\beta = 0.033$, $p < 1\%$), indicating that the

results of this study remain robust after mitigating the differences in industry, region and individual financial status of firms in the experimental and control groups.

4.6. Robustness Test

In order to improve the reliability of the study results, three approaches were adopted in this study to conduct robustness tests of the regression results. In the basic regression, since it generally takes time for innovation processes to generate observable outputs due to the fact that innovation represents a long-term investment in intangible assets [40], I chose to focus on the innovation application (PA1) and innovation authorization (PA2) of enterprises in t + 1 year. In fact, it is difficult to precisely estimate the specific time required for the output and authorization of enterprise patents. Therefore, in the robustness test, I adopted the R&D investment intensity of enterprises as the proxy variable of enterprise innovation. The R&D investment intensity is equal to the natural logarithm of the total R&D project investment of the enterprise in the current year, which can immediately reflect the enterprise's innovation intention. Second, to further examine the lagged effect of CSR disclosure quality on innovation performance, I also adopted PA1 and PA2 in t + 2 year. However, this will lead to the loss of sample observations in 2020. Third, as previously mentioned, I replaced the independent variable with Hexun's CSR index (HXCSRscore) for robustness testing [42].

The results of the robustness tests are shown in Table 7. In column (1), where the dependent variable is R&D investment intensity (RD), we can see that the coefficient of CSRscore is still significantly positive ($\beta = 0.026$, $p < 1\%$), indicating that the improvement in the quality of CSR information disclosure can effectively promote firms' R&D investment. In columns (2) and (3), I find that the coefficient of CSRscore is still positive and significant ($\beta = 0.032$, $p < 1\%$; $\beta = 0.028$, $p < 1\%$), indicating that the improvement in the quality of CSR disclosure can contribute to the innovation performance of firms in the next two years. In columns (4) and (5), the coefficients of HXCSRscore are both significantly positive ($\beta = 0.064$, $p < 1\%$; $\beta = 0.033$, $p < 10\%$), indicating that the results remain robust after replacing the indicator of CSR disclosure quality.

Table 7. Robustness tests.

Variable	(1)	(2)	(3)	(4)	(5)
	RD	**PA1 (T + 2)**	**PA2 (T + 2)**	**PA1**	**PA2**
CSRscore	0.026 *** (6.41)	0.032 *** (6.89)	0.028 *** (6.31)		
HXCSRscore				0.064 *** (3.04)	0.033 * (1.65)
Size	0.889 *** (72.48)	0.611 *** (53.00)	0.578 *** (53.20)	0.628 *** (57.37)	0.599 *** (57.65)
Age	−0.388 *** (−5.49)	−0.102 (−1.42)	−0.048 (−0.71)	−0.075 (−1.09)	−0.035 (−0.53)
Roa	0.121 *** (10.28)	0.066 *** (6.14)	0.066 *** (6.52)	0.079 *** (7.86)	0.079 *** (8.30)
Growth	2.326 *** (10.10)	3.331 *** (15.84)	2.800 *** (14.18)	2.331 *** (9.17)	1.751 *** (7.45)
Lev	0.001 (0.04)	−0.040 (−1.34)	−0.010 (−0.35)	−0.020 (−0.69)	−0.025 (−0.96)
Top1	0.135 ** (2.05)	0.007 (0.09)	0.069 (0.99)	−0.043 (−0.61)	0.047 (0.71)
Cash	0.279 ** (2.26)	0.145 (1.57)	0.054 (0.62)	0.100 (1.14)	0.004 (0.05)

Table 7. *Cont.*

Variable	(1)	(2)	(3)	(4)	(5)
	RD	**PA1 (T + 2)**	**PA2 (T + 2)**	**PA1**	**PA2**
TQ	0.006 (0.41)	0.028 *** (2.70)	0.021 ** (2.18)	0.030 *** (3.03)	0.023 ** (2.52)
Constant	−2.340 *** (−8.81)	−11.457 *** (−46.68)	−10.813 *** (−46.74)	−11.823 *** (−50.85)	−11.199 *** (−50.76)
Industry FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
N	16,730	16,593	16,593	18,124	18,124
R^2	0.524	0.485	0.499	0.485	0.501

Note: figures in () are t value; ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

5. Heterogeneity Analysis

5.1. Mandatory CSR Disclosure and Voluntary CSR Disclosure

Studies have shown that, compared to voluntary CSR information disclosure, mandatory CSR information disclosure is subject to detailed disclosure norms set by the government and is therefore more helpful in enhancing the transparency of corporate information, which in turn can better curb managers' self-interested behavior [4]. Therefore, I expect that CSR information that is mandated to be disclosed is likely to be more effective in mitigating the principal-agent problem of firms than CSR information that is voluntarily disclosed. Thus, improvements in the quality of mandatorily disclosed CSR information could also be more effective in improving firms' innovation performance. To test this hypothesis, this study conducts separate regression tests for firms with mandatory CSR information disclosure and firms with voluntary CSR information disclosure.

The results of the sub-group regressions are shown in Table 7. In the sample regression of firms with mandatory disclosure of CSR information in column (1), the coefficient of CSRscore is significantly positive, while in the sample regression of firms with voluntary disclosure of CSR information in column (2), the coefficient of CSRscore is not significant. The difference between the coefficients of these two columns is statistically significant at the 1% level (0.027 significantly greater than 0.006, *p*-value = 0.000). This suggests that the enhancement effect of improvements in the quality of CSR information on PA1 is stronger among firms that mandated disclosure of CSR information. Columns (3) and (4) of Table 8 have similar results when the dependent variable is PA2. The coefficient of CSRscore in column (3) is significantly positive and statistically significantly larger than the coefficient on CSRscore in column (4) (0.024 significantly larger than −0.005, *p*-value = 0.000). Thus, the findings in Table 8 suggest that improvements in the quality of CSR information disclosures can drive firms' innovation performance by effectively mitigating principal-agent problems.

Table 8. Mandatory CSR disclosure and voluntary CSR disclosure.

Variable	(1)	(2)	(3)	(4)
	Mandatory	**Voluntary**	**Mandatory**	**Voluntary**
	PA1	**PA1**	**PA2**	**PA2**
CSRscore	0.027 *** (6.24)	0.006 (0.36)	0.024 *** (5.93)	−0.005 (−0.32)
Size	0.526 *** (38.93)	0.682 *** (29.31)	0.509 *** (40.20)	0.645 *** (29.17)
Age	0.060 (0.87)	−0.390 ** (−2.18)	0.066 (1.01)	−0.408 ** (−2.33)

Table 8. *Cont.*

Variable	(1)	(2)	(3)	(4)
	Mandatory	Voluntary	Mandatory	Voluntary
	PA1	PA1	PA2	PA2
Roa	0.090 *** (7.94)	0.004 (0.22)	0.092 *** (8.63)	0.002 (0.09)
Growth	2.724 *** (14.57)	3.037 *** (6.04)	1.912 *** (10.82)	2.070 *** (4.07)
Lev	0.002 (0.08)	−0.044 (−0.57)	−0.003 (−0.13)	−0.024 (−0.34)
Top1	−0.047 (−0.63)	0.234 (1.48)	0.019 (0.27)	0.268 * (1.75)
Cash	0.047 (0.52)	0.053 (0.22)	−0.025 (−0.30)	−0.197 (−0.86)
TQ	0.004 (0.36)	0.033 (1.21)	-0.002 (-0.19)	0.037 (1.41)
Constant	−9.522 *** (−32.86)	−13.110 *** (−24.70)	−9.224 *** (−33.95)	−12.320 *** (−24.44)
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
N	16,302	3661	16,302	3661
R^2	0.443	0.638	0.467	0.639
p-value	0.000 ***		0.000 ***	

Note: figures in () are t value; ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively. "*p*-values" were used to test for differences in CSRscore coefficients between groups and were obtained by bootstrap sampling 500 times.

5.2. Corporate Financing Constraints

The financing constraint has always been an important factor affecting the innovation performance of firms, as their innovation activities usually require a large number of resources to ensure that R&D capital can be continuously invested [22,23]. In the previous analysis, I found that improvements in the quality of CSR disclosure can effectively reduce firms' cost of debt and, in doing so, improve their financing conditions. Therefore, I expect that the improved quality of CSR disclosure would have a better effect on innovation performance in firms with more severe financing constraints. In order to prove this conjecture, I take the KZ index (KZ) as a proxy variable for a firm's financing constraint and partition the sample into a high financing constraint group and a low financing constraint group based on its median. The KZ index is calculated by Kaplan and Zingales [49] based on the internal financial data of enterprises, such as operating cash flow, cash holdings, cash dividend level, debt level, and Tobin Q value. This indicator is recognized as a relatively reliable indicator of corporate financing constraints. The larger the KZ index, the higher the corporate financing constraints.

The results of the sub-group regressions are shown in Table 9. In the regression for the sample of firms with more severe financing constraints in column (1), the coefficient on the CSRscore is 0.036, which is significantly positive at the 1% level, while in the regression for the sample of firms with less financing constraints in column (2), the coefficient on the CSRscore is 0.029, which is also significantly positive. However, the difference between the coefficients of the two columns is statistically significant at the 10% level (0.036 is significantly greater than 0.029, *p*-value = 0.08). This suggests that the contribution of improved CSR disclosure quality to PA1 is better among firms with severer financing constraints. Columns (3) and (4) of Table 9 also have similar results when the dependent variable is

PA2. The coefficient of CSRscore in column (3) is significantly positive and statistically significantly larger than the coefficient on CSRscore in column (4) (0.031 significantly larger than 0.022, *p*-value = 0.01). Thus, the results in Table 9 provide evidence that improvements in the quality of CSR information disclosure can drive firms' innovation performance by effectively alleviating financing constraints.

Table 9. Heterogeneity of financing constraints.

Variable	(1)	(2)	(3)	(4)
	High Financing Constraint Group	**Low Financing Constraint Group**	**High Financing Constraint Group**	**Low Financing Constraint Group**
	PA1	**PA1**	**PA2**	**PA2**
CSRscore	0.036 *** (5.86)	0.029 *** (4.90)	0.031 *** (5.42)	0.022 *** (3.92)
Size	0.605 *** (37.70)	0.634 *** (41.31)	0.577 *** (38.08)	0.603 *** (41.54)
Age	0.064 *** (4.03)	0.073 *** (5.44)	0.047 *** (3.15)	0.080 *** (6.22)
Roa	2.206 *** (7.03)	2.622 *** (10.90)	1.406 *** (4.76)	1.823 *** (7.98)
Growth	−0.099 *** (−2.63)	0.047 (1.08)	−0.071 ** (−1.99)	0.017 (0.46)
Lev	0.404 *** (3.59)	−0.407 *** (−4.12)	0.347 *** (3.23)	−0.325 *** (−3.50)
Top1	−0.006 (−0.06)	−0.070 (−0.69)	0.157 * (1.69)	−0.062 (−0.65)
Cash	−0.095 (−0.83)	1.204 *** (5.88)	−0.167 (−1.56)	0.826 *** (4.35)
TQ	0.060 *** (3.65)	0.017 (1.26)	0.058 *** (3.71)	0.011 (0.85)
Constant	−11.528 *** (−33.88)	−11.901 *** (−35.74)	−10.973 *** (−34.14)	−11.270 *** (−35.73)
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
N	9122	9122	9122	9122
R^2	0.497	0.508	0.506	0.523
p-value	0.080 *		0.010 **	

Note: figures in () are t value; ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively. "*p*-values" were used to test for differences in CSRscore coefficients between groups and were obtained by bootstrap sampling 500 times.

5.3. Corporate Financing Constraints

Research has shown that in China, state-owned banks have a higher share of assets in the overall banking system and therefore inevitably have ownership preferences when lending to firms, making it typically more difficult for non-SOEs to obtain financing from banks than SOEs [50]. As a result, non-SOEs generally suffer from more severe financing constraints than SOEs [51]. Therefore, I expect that improvements in the quality of CSR disclosure would be more effective in alleviating the financing constraints of non-SOEs than SOEs and thus would have a stronger driving effect on their innovation performance.

To test this conjecture, I divided the sample firms into state-owned and non-state-owned enterprise groups and ran separate regressions. The results of the regressions on the sub-groups are shown in Table 10. The coefficient of CSRscore is 0.015 in the regression on

the non-SOE sample in column (1), which is significant and positive at the 5% level, while the coefficient of CSRscore is insignificant in the regression on the SOE sample in column (2). The coefficient on CSRscore in the two regressions is statistically significantly different at the 1% level (0.015 is significantly greater than 0.009, *p*-value = 0.000). Columns (3) and (4) of Table 10 also have similar results when the dependent variable is PA2. The coefficient of CSRscore in column (3) is significantly positive and statistically significantly greater than the coefficient on CSRscore in column (4) (0.013 significantly greater than 0.009, *p*-value = 0.01). The results in Table 10 indicate that the driving effect of improved quality of CSR disclosure on innovation performance is stronger among non-SOE firms relative to SOEs, which again demonstrates that the improvement of CSR disclosure on firms' financing constraints is an important mechanism to enhance their innovation performance.

Table 10. Heterogeneity of state-owned and non-state-owned enterprises.

Variable	(1)	(2)	(3)	(4)
	nSOE	**SOE**	**nSOE**	**SOE**
	PA1	**PA1**	**PA2**	**PA2**
CSRscore	0.015 **	0.009	0.013 **	0.009
	(2.45)	(1.09)	(2.19)	(1.29)
Size	0.397 ***	0.399 ***	0.405 ***	0.407 ***
	(11.71)	(8.77)	(12.97)	(9.95)
Age	−0.004	0.005	0.028	0.103 **
	(−0.10)	(0.10)	(0.83)	(2.35)
Roa	1.178 ***	0.226	0.345 *	−0.029
	(5.80)	(0.72)	(1.83)	(−0.10)
Growth	−0.017	0.063 *	0.008	0.041
	(−0.62)	(1.90)	(0.34)	(1.35)
Lev	−0.407 ***	−0.449 ***	−0.166	−0.466 ***
	(−3.54)	(−2.87)	(−1.57)	(−3.35)
Top1	0.327	−0.379	0.383 *	−0.413 *
	(1.51)	(−1.62)	(1.91)	(−1.94)
Cash	−0.057	0.236	−0.172	−0.063
	(−0.50)	(1.38)	(−1.63)	(−0.40)
TQ	0.038 ***	0.029	0.030 **	0.016
	(2.86)	(1.60)	(2.50)	(1.01)
Constant	−6.271 ***	−6.401 ***	−6.655 ***	−6.752 ***
	(−8.55)	(−6.25)	(−9.82)	(−7.31)
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
N	11,994	7627	11,994	7627
R^2	0.739	0.825	0.814	0.838
p-value	0.000 ***		0.000 ***	

Note: figures in () are t value; ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively. "*p*-values" were used to test for differences in CSRscore coefficients between groups and were obtained by bootstrap sampling 500 times.

5.4. Reputational Pressure on Companies

In addition to its monitoring and governance role, the media, as an effective disseminator of CSR information, can also convey the image of corporate social responsibility to the outside world [33]. Therefore, for companies with a poor reputation, publishing high-quality CSR information is an important means to enhance the image of the firm and alleviate the pressure on its reputation [35]. With the reputation mechanism in place, the

stakeholder and consumer favor won by an improved corporate reputation can in turn drive corporate innovation activities [5]. Therefore, I expect that improvements in the quality of CSR information may be more effective in improving firm innovation performance among firms with poorer reputations.

To test this conjecture, this study constructed a proxy variable for a firm's media reputation (Slant) based on media sentiment, which is equal to the difference between the number of positive media reports minus the number of negative reports divided by the total number of media reports about the company. The larger the Slant, the better the company's media reputation. The median Slant was then used to divide the sample into a sub-sample group of companies with a good reputation and a sub-sample group of companies with a poor reputation. The results of the subgroup regressions are shown in Table 11. The coefficient of CSRscore is significantly positive in the regression of the sample of firms with a poor reputation in column (1), while the coefficient of CSRscore is not significant in the regression of the sample of firms with a good reputation in column (2). The difference between the coefficients of the two columns is statistically significant at the 5% level (0.018 significantly greater than 0.008, *p*-value = 0.000). Columns (3) and (4) of Table 11 have similar results when the dependent variable is PA2. The coefficient of CSRscore is significantly positive in the group with a poor reputation in column (3) and is statistically significantly greater than the coefficient of CSRscore in the group with a good reputation in column (4) (0.018 significantly greater than 0.009, *p*-value = 0.000). Thus, the results in Table 11 demonstrate that improvements in the quality of CSR disclosure can drive innovation performance by enhancing a firm's media reputation.

Table 11. Heterogeneity of corporate reputation.

Variable	(1)	(2)	(3)	(4)
	Poor Reputation	Good Reputation	Poor Reputation	Good Reputation
	PA1	PA1	PA2	PA2
CSRscore	0.018 ** (2.24)	0.008 (1.04)	0.018 ** (2.52)	0.009 (1.24)
Size	0.356 *** (8.09)	0.387 *** (8.96)	0.380 *** (9.27)	0.361 *** (9.32)
Age	−0.057 (−1.27)	−0.077 (−1.61)	0.026 (0.64)	−0.056 (−1.30)
Roa	0.774 *** (3.20)	0.990 *** (3.09)	0.309 (1.43)	0.078 (0.26)
Growth	0.015 (0.43)	0.006 (0.17)	0.028 (0.90)	0.019 (0.62)
Lev	−0.472 *** (−3.29)	−0.146 (−0.95)	−0.346 *** (−2.62)	−0.124 (−0.91)
Top1	−0.033 (−0.13)	−0.064 (-0.25)	−0.187 (−0.80)	−0.019 (−0.08)
Cash	0.059 (0.38)	0.196 (1.31)	−0.009 (−0.07)	−0.104 (−0.76)
TQ	0.023 (1.40)	0.053 *** (3.21)	0.021 (1.38)	0.029 ** (2.00)
Constant	−5.427 *** (−5.65)	−5.979 *** (−6.24)	−6.152 *** (−6.86)	−5.493 *** (−6.37)
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes

Table 11. *Cont.*

Variable	(1)	(2)	(3)	(4)
	Poor Reputation	Good Reputation	Poor Reputation	Good Reputation
	PA1	PA1	PA2	PA2
N	8942	8923	8942	8923
R^2	0.756	0.803	0.779	0.824
p-value	0.000 *		0.000 **	

Note: figures in () are t value; ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively. "*p*-values" were used to test for differences in CSRscore coefficients between groups and were obtained by bootstrap sampling 500 times.

6. Conclusions and Policy Implications

The Chinese government has pursued a number of CSR-related policies in recent years with the aim of achieving high-quality economic development and transformation. Innovation is the fundamental support and key driver of economic development, and for China, improving the innovation performance of enterprises is an important means for the future Chinese economy to overcome the middle-income trap. In this context, this study empirically explores the relationship between the quality of CSR disclosure and corporate innovation performance using data from A-share listed companies in Shanghai and Shenzhen, China, from 2009 to 2020. The findings of this paper are as follows: (1) improvements in CSR information quality can improve firms' innovation performance by reducing their agency costs and improving their financing conditions; (2) improvements in CSR information quality can also effectively attract analysts' attention, which not only helps investors and stakeholders to fully understand the future value of firms' innovation activities [25] but also improves the efficiency of the allocation of a firm's innovation funding [27], which in turn drives corporate innovation performance; (3) by disclosing high-quality CSR information, firms can effectively attract media attention and coverage, which not only enhances the effectiveness of external monitoring by the media but also improves the market reputation pressure of firms through the signaling function of the media [35], which in turn promotes firms to increase their innovation activities [5]. In a heterogeneity analysis, this paper also finds that the driving effect of improved CSR information quality on firms' innovation performance is more pronounced among firms that are subject to mandatory CSR information disclosure and have higher financing constraints. In addition, this driving effect is stronger among non-SOEs and firms with high media reputation pressure. Based on the findings of this paper, I draw the following insights:

(1) Considering the current situation of insufficient innovation drive in the development of the Chinese economy, the government should further strengthen the enforcement of an innovation-driven development strategy. At the current stage of development, by further improving the CSR information disclosure policy, it will help to promote the innovative performance of enterprises and thus achieve a win–win situation in terms of economic and social benefits.

(2) Companies should actively engage in social responsibility and disclose detailed CSR-related information to alleviate information asymmetries with the outside world. This will help to enhance the understanding of investors and stakeholders about the company's innovation projects and reduce impediments to the company's innovation activities. In addition, in order to achieve sustainable and high-quality growth, companies should also increase their willingness to innovate and reward investors and stakeholders with tangible innovation performance, which is beneficial to both the firm's market reputation and the enhancement of its long-term value.

(3) Media monitoring and public pressure are important channels for CSR information disclosure to promote corporate innovation. The government should actively play the role of the official media to give appropriate recognition and publicity to enterprises that actively fulfill their social responsibility activities and make relevant information disclosure, which

helps to increase the motivation of enterprises to innovate. In addition, as the main channel for the public to obtain information on corporate activities, the public media should monitor the authenticity of CSR information and promptly expose false information disclosed by companies, as well as strengthen the exposure of companies with poor CSR performance.

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References

1. Dhaliwal, D.S.; Radhakrishnan, S.; Tsang, A.; Yang, Y.G. Nonfinancial Disclosure and Analyst Forecast Accuracy: International Evidence on Corporate Social Responsibility Disclosure. *Account. Rev.* **2012**, *87*, 723–759. [CrossRef]
2. Al-Tuwaijri, S.A.; Christensen, T.E.; Hughes, K.E. The relations among environmental disclosure, environmental performance, and economic performance: A simultaneous equations approach. *Account. Organ. Soc.* **2004**, *29*, 447–471. [CrossRef]
3. Kim, Y.; Park, M.S.; Wier, B. Is earnings quality associated with corporate social responsibility? *Account. Rev.* **2012**, *87*, 761–796. [CrossRef]
4. Chen, Y.C.; Hung, M.; Wang, Y. The effect of mandatory CSR disclosure on firm profitability and social externalities: Evidence from China. *Account. Econ.* **2018**, *65*, 169–190. [CrossRef]
5. Zhang, H. Mandatory corporate social responsibility disclosure and firm innovation: Evidence from a quasi-natural experiment. *Financ. Res. Lett.* **2022**, *47*, 102819. [CrossRef]
6. Wang, X.; Cao, F.; Ye, K. Mandatory corporate social responsibility (CSR) reporting and financial reporting quality: Evidence from a quasi-natural experiment. *J. Bus. Ethics* **2018**, *152*, 253–274. [CrossRef]
7. Liu, L.; Tian, G.G. Mandatory CSR disclosure, monitoring and investment efficiency: Evidence from China. *Account. Financ.* **2021**, *61*, 595–644. [CrossRef]
8. Rajgopal, S.; Tantri, P. Does a Government Mandate Crowd Out Voluntary Corporate Social Responsibility? Evidence from India. *J. Account. Res.* **2022**. [CrossRef]
9. Hu, D.; Huang, Y.; Zhong, C. Does Environmental Information Disclosure Affect the Sustainable Development of Enterprises: The Role of Green Innovation. *Sustainability* **2021**, *13*, 11064. [CrossRef]
10. Yu, F.; Shi, Y.; Wang, T. R&D Investment and Chinese Manufacturing SMEs Corporate Social Responsibility: The Moderating Role of Regional Innovative Milieu. *J. Clean. Prod.* **2020**, *258*, 120840.
11. Panda, S.; D'Souza, D.E.; Blankson, C. Corporate social responsibility in emerging economies: Investigating firm behavior in the Indian context. *Thunderbird Int. Bus. Rev.* **2019**, *61*, 267–276. [CrossRef]
12. Cooper, S.M.; Owen, D.L. Corporate social reporting and stakeholder accountability: The missing link. *Account. Organ. Soc.* **2007**, *32*, 649–667. [CrossRef]
13. Gormley, T.A.; Matsa, D.A. Playing it safe? Managerial preferences, risk, and agency conflicts. *J. Financ. Econ.* **2016**, *122*, 431–455. [CrossRef]
14. Flammer, C.; Kacperczyk, A. The impact of stakeholder orientation on innovation: Evidence from a natural experiment. *J. Manag. Sci.* **2016**, *62*, 1982–2001. [CrossRef]
15. John, K.; Litov, L.; Yeung, B. Corporate governance and risk-taking. *J. Financ.* **2008**, *63*, 1679–1728. [CrossRef]
16. Mishra, D.R. Multiple large shareholders and corporate risk taking: Evidence from East Asia. *Corp. Gov. Int. Rev.* **2011**, *19*, 507–528. [CrossRef]
17. Costa, C.; Lages, L.F.; Hortinha, P. The bright and dark side of CSR in export markets: Its impact on innovation and performance. *J. Int. Bus. Rev.* **2015**, *24*, 749–757. [CrossRef]
18. Bhandari, A.; Javakhadze, D. Corporate social responsibility and capital allocation efficiency. *J. Corp. Financ.* **2017**, *43*, 354–377. [CrossRef]
19. Dhaliwal, D.S.; Li, O.Z.; Tsang, A.; Yang, Y.G. Voluntary Nonfinancial Disclosure and the Cost of Equity Capital: The Initiation of Corporate Social Responsibility Reporting. *J. Account. Rev.* **2011**, *86*, 59–100. [CrossRef]
20. Hu, W.; Du, J.; Zhang, W. Corporate social responsibility information disclosure and innovation sustainability: Evidence fromChina. *Sustainability* **2020**, *12*, 409. [CrossRef]
21. Goss, A.; Roberts, G.S. The impact of corporate social responsibility on the cost of bank loans. *J. Bank. Financ.* **2011**, *35*, 1794–1810. [CrossRef]
22. Hall, B.H.; Lerner, J. The financing of R&D and innovation. *Handb. Econ. Innov.* **2010**, *1*, 609–639.
23. Hsu, D.H.; Ziedonis, R.H. Resources as dual sources of advantage: Implications for valuing entrepreneurial-firm patents. *Strateg. Manag. J.* **2013**, *34*, 761–781. [CrossRef]

24. Barth, M.; Kasznik, R.; McNichols, M. Analyst Coverage and Intangible Assets. *J. Account. Res.* **2001**, *39*, 1–34. [CrossRef]
25. Derrien, F.; Kecskes, A. The Real Effects of Financial Shocks: Evidence from Exogenous Changes in Analyst Coverage. *J. Financ.* **2012**, *68*, 1407–1440. [CrossRef]
26. Manso, G. Motivating Innovation. *J. Financ.* **2011**, *66*, 1823–1860. [CrossRef]
27. Healy, P.M.; Palepu, K.G. Information Asymmetry, Corporate Disclosure, and the Capital Markets: A Review of the Empirical Disclosure Literature. *J. Account. Econ.* **2001**, *31*, 405–440. [CrossRef]
28. Dyck, A.; Volchkova, N.; Zingales, L. The corporate governance role of the media: Evidence from Russia. *J. Financ.* **2008**, *63*, 1093–1135. [CrossRef]
29. Joe, J.R.; Louis, H.; Robinson, D. Managers' and investors' responses to media exposure of board ineffectiveness. *J. Financ. Quant. Anal.* **2009**, *44*, 579–605. [CrossRef]
30. Dyck, A.; Moss, D.; Zingales, L. Media versus special interests. *J. Law Econ.* **2013**, *56*, 521–553. [CrossRef]
31. Zhou, K.; Ying, Q.; Chang, Z. Can media coverage improve corporate governance? Evidence from fraud by listed firms in China. *J. Financ. Res.* **2016**, *6*, 193–206.
32. Christensen, H.B.; Floyd, E.; Liu, L.Y.; Maffett, M. The real effects of mandated information on social responsibility in financial reports: Evidence from mine-safety records. *J. Account. Econ.* **2017**, *64*, 284–304. [CrossRef]
33. Hayes, R.A.; Carr, C.T. Getting called out: Effects of feedback to social media corporate social responsibility statements. *J. PublicRelat. Rev.* **2021**, *47*, 101962. [CrossRef]
34. Xu, L.; Xin, Y.; Zhu, J. Media attention and the fulfillment of social responsibilities of listed companies: An empirical study based on donations from the Wenchuan earthquake. *Manag. World* **2011**, *3*, 135–143.
35. Wang, D.; Li, X.; Tian, S.; He, L.; Xu, Y.; Wang, X. Quantifying the dynamics between environmental information disclosure and firms' financial performance using functional data analysis. *Sustain. Prod. Consum.* **2021**, *28*, 192–205. [CrossRef]
36. Mullainathan, S.; Shleifer, A. The Market for News. *Am. Econ. Rev.* **2005**, *95*, 1031–1053. [CrossRef]
37. Cheng, B.; Ioannou, I.; Serafeim, G. Corporate social responsibility and access to finance. *Strateg. Manag. J.* **2014**, *35*, 1–23. [CrossRef]
38. Jin, X.; Yu, J. Government governance, executive networks and corporate investment efficiency. *China Financ. Rev. Int.* **2018**, *8*, 122–139. [CrossRef]
39. Lindman, A.; Söderholm, P. Wind energy and green economy in Europe: Measuring policy-induced innovation using patent data. *J. Appl. Energy* **2016**, *179*, 1351–1359. [CrossRef]
40. Tan, Y.; Tian, X.; Zhang, X.; Zhao, H. The real effect of partial privatization on corporate innovation: Evidence from China's split share structure reform. *J. Corp. Financ.* **2020**, *64*, 101661. [CrossRef]
41. Katmon, N.; Mohamad, Z.Z.; Norwani, N.M.; Farooque, O.A. Comprehensive Board Diversity and Quality of Corporate Social Responsibility Disclosure: Evidence from an Emerging Market. *J. Bus. Ethics* **2019**, *157*, 447–481. [CrossRef]
42. Wu, S.; Zhang, H.; Wei, T. Corporate social responsibility disclosure, media reports, and enterprise innovation: Evidence from Chinese listed companies. *Sustainability* **2021**, *13*, 8466. [CrossRef]
43. Ang, J.S.; Cole, R.A.; Lin, J.W. Agency costs and ownership structure. *J. Financ.* **2000**, *55*, 81–106. [CrossRef]
44. Orlitzky, M. Does Firm Size Comfound the Relationship between Corporate Social Performance and Firm Financial Performance? *J. Bus. Ethics* **2001**, *33*, 167–180. [CrossRef]
45. Zhang, J.; Chen, Z.; Yang, L.; Xin, F. On Evaluating China's Innovation Subsidy Policy: Theory and Evidence. *Econ. Res. J.* **2015**, *50*, 4–17. (In Chinese)
46. Barron, D.N.; West, E.; Hannan, M.T. A Time to Grow and a Time to Die: Growth and Mortality of Credit Unions in New York City, 1914–1990. *Am. J. Sociol.* **1994**, *100*, 381–421. [CrossRef]
47. El-Ghoul, S.; Guedhami, O.; Kwok, C.C.; Mishra, D.R. Does corporate social responsibility affect the cost of capital? *J. Bank. Financ.* **2011**, *35*, 2388–2406. [CrossRef]
48. Li, Q.; Wang, J.; Bao, L. Media tone, bias, and stock price crash risk: Evidence from China. *Asia-Pac. J. Account. Econ.* **2022**, *29*, 1–35. [CrossRef]
49. Kaplan, S.N.; Zingales, L. Do Investment-Cash Flow Sensitivities Provide Useful Measures of Financing Constraints? *Q. J. Econ.* **1997**, *29*, 169–215. [CrossRef]
50. Chen, J.J. Determinants of capital structure of Chinese-listed companies. *J. Bus. Res.* **2004**, *57*, 1341–1351. [CrossRef]
51. Bai, C.E.; Lu, J.; Tao, Z. The multitask theory of state enterprise reform: Empirical evidence from China. *Am. Econ. Rev.* **2006**, *96*, 353–357. [CrossRef]