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Corporate Social Responsibility Disclosure Quality and Firms' Investment Efficiency: Evidence from Chinese Listed Companies

Xiaomei Guo [1], Rui Xu [2,*], Xin Li [3,*] and Qi Ban [4]

[1] School of Law, Chengdu University of Technology, Chengdu 610059, China; guoxiaomei@cdut.edu.cn
[2] Global Development Institute, University of Manchester, Manchester M13 9PL, UK
[3] Department of Sociology, University of Manchester, Manchester M13 9PL, UK
[4] Postdoctoral Station of Applied Economics, Fudan University, Shanghai 200433, China; 1120190900@mail.nankai.edu.cn
* Correspondence: xurui@ldy.edu.rs (R.X.); xin.li-4@manchester.ac.uk (X.L.)

Abstract: In China, where the corporate social responsibility (CSR) process is relatively underdeveloped, the government has promulgated a series of laws and regulations on CSR disclosure in recent years to promote the sustainable transformation of the economy. Using data from A-share listed Chinese firms from 2009 to 2021, this study empirically examines the relationship between CSR disclosure quality and firm investment efficiency in China. The results indicate that (1) improvements in CSR disclosure quality significantly mitigate firms' underinvestment and overinvestment, thereby enhancing investment efficiency. (2) Further analysis shows that high-quality CSR information also promotes investment efficiency by reducing agency costs and financing constraints and improving media evaluations of firms. (3) A heterogeneity analysis suggests that the positive effect of CSR disclosure on investment efficiency is stronger for firms with lower equity incentives, more severe financing constraints, and higher media attention. Our study extends the understanding of the mechanisms through which CSR disclosure affects firms' investment efficiency, potentially providing insights for research in related fields and guiding future CSR disclosure practices in other developing countries.

Keywords: CSR information; corporate investment; financing constraints; agency costs; media evaluation

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1. Introduction

With increasing global attention on sustainability issues, it has become a trend for countries to require firms to disclose information on their CSR activities, emphasising the need for companies to pursue profits while taking responsibility for investors, consumers, suppliers, employees, communities, ecosystems and other stakeholders in order to maximise the welfare of society. As an economy in transition, China's CSR process is still at an early stage. Especially compared to developed countries, most Chinese companies still treat CSR activities as an operational burden or a means to hide their negative news, which is clearly contrary to sustainable macroeconomic development. At the same time, relying on abundant resources and cheap inputs, many Chinese companies have achieved rapid growth in size and profits over the past decade. However, as the scale of production continues to expand, this single development model that relies on increasing factor inputs has quickly led to stagnation in enterprise productivity and has become a major drag on macroeconomic growth. Against this backdrop, focusing on improving production and investment efficiency and utilising limited resources to achieve greater economic benefits has become one of the Chinese government's key approaches to steering economic development. Therefore, as the main body of economic activities, how to use reasonable policy instruments to guide firms to rationally allocate resources and improve investment

efficiency has also become a key link to help China's economy cross the middle-income trap in the future.

In order to achieve the goal of sustainable economic development, since the beginning of the 21st century, the Chinese authorities have successively implemented a series of measures relating to the disclosure of CSR information, aimed at encouraging enterprises to move from previous extensive development models to more scientific and intensive development paths. The existing literature overwhelmingly recognises the contribution of CSR disclosure to enterprise development in developed countries [1]. However, unlike in Western countries, where voluntary disclosure predominates, the Chinese government not only encourages companies to disclose CSR information voluntarily but has also mandated certain companies to disclose CSR information through relevant policies. Specifically, China introduced mandatory CSR disclosure guidelines at the end of 2008. The policy requires listed firms in the Corporate Governance Sector, firms with foreign shareholdings listed overseas, financial firms and firms in the SZSE 100 Index to disclose annually either qualitative or quantitative information on their relationships with shareholders, creditors, employees and suppliers, as well as their performance in a number of areas, such as environmental protection and charitable endeavours. It is noteworthy that these companies accounted for 20% of the total number of listed A-share companies in China at that time, marking the formal initiation of CSR in China [2]. To date, approximately 4000 listed companies have issued CSR reports, including both voluntary and mandatory disclosures.

In order to further promote the sustainable development of the economy, the Chinese government has introduced a series of CSR disclosure policies in recent years to encourage firms to shift to a more scientific development model. In the existing literature, the vast majority of studies agree on the contribution of CSR disclosure to developed economies [1]. However, it should be noted that, unlike the voluntary disclosure-based approach of Western countries, the Chinese government not only encourages voluntary CSR disclosure by firms but also requires CSR disclosure by some representative firms. Specifically, the Chinese government issued a mandatory CSR disclosure policy at the end of 2008, which required listed companies in the governance sector, overseas-listed firms, financial firms, and companies in the SZSE 100 Index to disclose annually their performance in relation to the firm's relationships with shareholders, creditors, employees, and suppliers, as well as in various areas such as environmental protection and philanthropy. These firms accounted for 20% of the total number of A-share listed firms in China at that time, so the implementation of this policy is considered to be the official start of CSR disclosure activities in China [2]. To date, including voluntary and mandatory disclosures, about 4000 listed companies have published CSR reports.

However, a long-standing controversy remains as to whether full CSR disclosure is really beneficial to improving the efficiency of productive investment for firms in developing countries undergoing economic transition. Scholars hold diametrically opposed views on this issue. On the one hand, from the perspective of enterprise transformation and operating costs, some scholars argue that CSR disclosure may impose numerous costs unrelated to operations, thereby disrupting the enterprise's original investment decisions and leading to resource allocation inefficiency and overall value decline [2,3]. On the other hand, other scholars approach the issue from the perspective of corporate governance and financing efficiency, suggesting that CSR disclosure can effectively mitigate information asymmetry problems and significantly improve corporate governance and financing efficiency, thereby promoting the long-term development prospects of enterprises [4–6].

Based on the summary of existing studies, we find that most of the early studies on CSR disclosure are based on data from enterprises in developed countries; however, the same CSR policies that have been found to be implemented in developing countries are likely to bring about economic consequences that are diametrically opposed to those in developed countries [7]. Therefore, investigating the mechanism of CSR disclosure's impact on firms in developing countries can further explore the role it plays in firms' operations at different stages of economic development and in different cultural contexts [6]. In

addition, we also find that the literature in recent years mainly focuses on examining the impact of short-term shocks brought by CSR policies on firms [6,8] and spares quantitative evaluations of the quality of information on CSR, thus making it difficult to provide a more intuitive evaluation of the role of CSR disclosure on the long-term development of firms. Based on this, this paper takes the perspective of the quality of CSR disclosure, as it can better quantify the role of CSR information transparency on the sustainable development of enterprises. In particular, considering the important role of firms' investment efficiency in the transformation of China's sustainable economic development, this paper utilises the data of China's A-share listed companies from 2009 to 2021 to conduct a study specifically on the relationship between CSR disclosure quality and firms' investment efficiency.

Our study may contribute in several ways. First, it is true that many scholars have taken advantage of the mandatory CSR disclosure policy in China to study the exogenous effects of CSR on firm activities; this approach provides a purer impact effect but lacks an effective quantification of the relationship between CSR disclosure quality and various development indicators of enterprises. This study uses content analysis to evaluate the quality of CSR information, which enables more precise quantification of the impact of CSR information quality on enterprises, thereby addressing the above research shortcomings. Second, China's economic system is significantly different from that of Western countries, which affects the development trajectory of the world's second-largest economy [9]. Therefore, our research can complement the understanding of the economic consequences of mandatory CSR disclosure in transition economies and potentially provide insights for other emerging economies. Third, while external media evaluations of firms are often referenced in CSR research, there are few studies that quantitatively analyse the mechanism of changes in media evaluations of firms. In this paper, we not only examine the common mechanisms associated with CSR disclosure but also further analyse the role of reputation changes in promoting the investment efficiency of firms, thereby broadening the channels through which CSR disclosure influences firm transformation.

2. Literature Review and Theoretical Hypotheses

2.1. Factors and Pathways Influencing Corporate Investment Efficiency

2.1.1. Principal–Agent Conflict

In the process of corporate operations, principal–agent conflicts arising from asymmetric information are widely recognised as one of the most common frictions between firms and the external environment. These frictions not only reduce the managerial efficiency of firms but also hinder their ability to attract external support [1], thereby affecting their operational efficiency and long-term value [8,10]. According to principal–agent theory, when internal controls within firms are lax, they fail to effectively constrain senior management, who may engage in adverse selection and moral hazard behaviour. As a result, during periods of business instability, senior management often attributes deteriorating conditions to prevailing environmental factors and adopts conservative operational strategies to maintain the status quo or protect personal reputations [11]. For example, research by Liu and Tian. Ref. [8] suggests that adverse selection due to information asymmetry may force firms to forgo projects with positive net present value (NPV), leading to a decline in overall investment levels and resource allocation efficiency. Moreover, when managers have informational advantages, self-interest motivations may lead them to prioritise personal gains over maximising firm interests in investment strategies [10]. Therefore, the means used to improve principal–agent conflicts, such as enhancing equity incentives for managers and employing independent third-party organisations to certify information disclosure, are considered effective ways to improve the efficiency of corporate capital allocation and investment [1].

2.1.2. External Financing Constraints

In the field of corporate finance, financing constraints are a critical issue that every enterprise must face during its development process. On the one hand, alleviating financing

constraints not only helps to optimise the strategic deployment of enterprises [12] but also promotes investment activities in technological transformation [13], which undoubtedly benefits the efficiency of enterprise investment [6]. For example, research has found that firms' innovative investment activities often have an inverse relationship with their financial constraints. In situations in which financing constraints are not an obstacle, firms can effectively expand their investment project matrix, thereby improving the efficiency of their capital allocation [14]. Moreover, adequate financing also ensures better timeliness and effectiveness of management's investment decisions. As a result, compared with enterprises facing financial difficulties, enterprises with less funding constraints are generally better able to seize fleeting opportunities for good investment projects [15] and promptly expand their production scale to match higher production investment efficiency. Therefore, the alleviation of external financing constraints is also one of the important ways to enhance the efficiency of capital allocation and investment in enterprises.

2.1.3. Evaluation of the Media

With the advent of the information age, the influence of media commentary on corporate operations and investment decisions has become increasingly important. As an important channel for governments, the public and investors to understand corporate operating conditions, media assessments directly shape a company's external reputation. Moreover, they can influence corporate investment decisions through stakeholder pressure [1]. Specifically, the media not only improves corporate governance by providing oversight but its biased coverage can also directly affect the external image of the company, thereby attracting the attention of governments and investors and influencing management's investment decisions through pressure [16,17]. For example, research suggests that improved media evaluations can gain the favour of stakeholders and consumers, which subsequently increases corporate confidence and facilitates the implementation of innovative activities [5]. Moreover, positive media evaluations can enhance corporate soft power, which is manifested in increased investor confidence and access to substantial external resources, allowing firms to mitigate investment concerns and efficiently pursue value-enhancing investment activities [18]. Thus, it is clear that the impact of corporate media evaluations on investment efficiency cannot be overlooked.

2.2. CSR Disclosure Quality and Corporate Investment Efficiency

Research in the field related to the disclosure of CSR information usually considers CSR reports as an important channel for stakeholders to gather information about firms [4]. Thus, based on agency theory and signalling theory, scholars point out that higher-quality CSR information disclosure reduces information friction between firms and external stakeholders, which is undoubtedly important for corporate investment activities. Specifically, high-quality CSR information not only mitigates agency conflict [19] but also externally communicates a firm's commitment to social responsibility, thereby generating social trust capital for the firm [5]. For example, research by Wang et al. [4] shows that CSR information, being an effective complement to accounting information, is useful for investors to better assess the accuracy of the firm's financial statements, thereby effectively mitigating corporate agency conflicts. In addition, environmental emissions and charitable donations disclosed in CSR reports also communicate the company's CSR development philosophy to the outside world, which is crucial for gaining support from governments, banks and investors [1]. For example, Liu and Tian et al. [8] found that CSR information disclosure facilitates smoother communication between Chinese listed companies and external stakeholders, thereby reducing investment ideology friction. Therefore, given its role in reducing agency costs and information frictions, we argue that improving the quality of CSR information disclosure can effectively enhance corporate investment efficiency.

In addition, moral hazard and adverse selection problems caused by information asymmetry are usually considered the main influences on bank lending risk [20]. In contrast, studies have shown that the disclosure of high-quality CSR information by firms

can reduce banks' risk concerns about corporate lending [5], enable firms to obtain more bank credit lines at lower interest rates, and thus, effectively alleviate firms' external financing constraints [14]. Similarly, other studies have found that by disclosing high-quality CSR information, firms can send friendly and green signals to the public, which can help expand firms' external financing channels and reduce their financing costs [21]. Therefore, based on the signalling theory and the perspective of easing firms' financing constraints, we argue that the disclosure of high-quality CSR information can effectively promote firms' investment efficiency.

The media, as an important disseminator of CSR information, is able to convey the image of corporate social responsibility to society, in addition to playing the role of monitoring and governance of enterprises [14]. According to stakeholder theory, firms should pursue the overall interests of stakeholders and accept their constraints [19]. Therefore, in order to avoid being suspected or mistrusted by stakeholders, firms have incentives to send green and healthy signals to the outside world in order to gain better development opportunities. Studies have shown that the strong public demand for corporate CSR information has significantly increased the frequency of the media coverage of CSR activities as people's awareness of environmental protection and social welfare has increased [1]. In this context, using the signalling function of the media, high-quality firms are able to differentiate themselves from less socially responsible firms by disclosing high-quality CSR information, thereby enhancing their market reputation [22]. As for the less reputable firms, in order to cope with stakeholder pressure, they also have an incentive to restore their reputation by disclosing high-quality CSR information [22]. Thus, based on the signalling theory and stakeholder theory, we expect that under the pressure of stakeholders and the reputation mechanism, releasing high-quality CSR information can enable enterprises to obtain a better reputation, which can help to win the favour of stakeholders and consumers and accumulate more resources and assistance for the enterprise's investment activities [5], which in turn, can help to improve the enterprise's investment efficiency.

In conclusion, we argue that improving the quality of CSR information can promote investment efficiency by improving firms' agency costs, external financing constraints, and media evaluations. Therefore, we propose hypothesis H1, as follows:

H1: *Improving the quality of CSR disclosure can significantly increases firms' investment efficiency*.

3. Methods

3.1. Sample Selection and Data Sources

Given that China's mandatory CSR disclosure policy was issued in late 2008, the sample of this study consists of all nonfinancial firms listed on the Chinese A-share market from 2009 to 2021. In addition, to increase the reliability of the sample [23], we excluded firms under potential delisting warnings (ST and ST*), firms awaiting delisting (PT), firms with missing key variables, and firms that did not disclose CSR information. In the end, we obtained 12,908 firm year observations after applying a 1% Winsorisation to all continuous variables. CSR-related data were obtained from annual reports and independent CSR reports that are accessible through the RSK and Hexun databases. All other company-level data were available in the CSMAR and CNRDS databases.

3.2. Variable Design

3.2.1. Corporate Investment Efficiency

Corporate investment efficiency is the key dependent variable in this study. Following the approach of Chen et al. [24], we estimate the investment efficiency of firm i in year t by constructing the following model:

$$Invest_{i,t} = \beta_0 + \beta_1 NEG_{i,t-1} + \beta_2 SalesGrowth_{i,t-1} + \beta_3 NEG \times SalesGrowth_{i,t-1} + Control_{i,t} + \varepsilon_{i,t} \quad (1)$$

In Equation (1), the explanatory variable $Invest_{i,t}$ represents the ratio of the total new investment of firm i in year t to total assets. Here, new investment is defined as the sum of cash outflows for fixed assets, intangible assets, and other long-term assets, minus cash inflows from asset sales. $NEG_{i,t-1}$ is a dummy variable that takes the value 1 if the sales growth rate of the firm was negative in year $t-1$; otherwise, it is 0. $SalesGrowth_{i,t-1}$ denotes the sales growth rate of the firm in year $t-1$. Control variables, $Control_{i,t}$, include firm size, leverage ratio, years listed, operating cash flow, Tobin's Q, and return on assets.

Under the precondition that each industry year observation has a minimum count of at least 20, we conduct industry year panel regressions based on Equation (1). Finally, the residuals from the regression estimation are used to measure corporate investment efficiency. Residuals greater than 0 indicate overinvestment, while residuals less than 0 indicate underinvestment. Residuals closer to 0 indicate lower non-investment efficiency. For clarity, this study uses the absolute value of the residuals (*InvEff*1) as a proxy variable for corporate investment efficiency. *InvEff* is an inverse indicator where values closer to 0 indicate higher investment efficiency. *HInvest*1 and *LInvest*1 respectively represent overinvestment and underinvestment.

Additionally, we adopt the approach by Biddle et al. [25], which is similar to Equation (1), and the specific model is as follows:

$$Invest_{i,t} = \beta_0 + +\beta_1 SalesGrowth_{i,t-1} + Control_{i,t} + \varepsilon_{i,t} \quad (2)$$

Regressing Equation (2) yields residuals, denoted as *InvEff*2, where the absolute value represents corporate investment efficiency. *HInvest*2 and *LInvest*2 respectively signify overinvestment and underinvestment.

3.2.2. Quality of CSR Disclosure

As mentioned above, in order to better quantify the relationship between CSR disclosure and firms' investment efficiency, the construction of the quality indicator of CSR disclosure is a focus of this study. Following the approach of Katmon et al. [26], we conducted a quantitative assessment of the CSR disclosure quality of the study sample based on the disclosure requirements of China's mandatory CSR disclosure policy. Specifically, the construction of this explanatory variable was based on the content analysis of the CSR disclosure content of the sample companies categorised in the CSMAR database. The categorisation specifically covers ten aspects of a firm's relationships with shareholders, creditors, employees, suppliers and customers, as well as the firm's performance in environmental protection, public relations and philanthropy, employee working conditions and CSR underperformance.

Following the methodology of Ban et al. [14], this study measured the quality of CSR disclosure based on whether companies disclosed information related to any of the above categories. A score of 1 was assigned if any category was disclosed, with a maximum score of 10. Therefore, the CSR disclosure quality (CSRs) is a numerical value ranging from 1 to 10.

In addition, Hexun, an authoritative third-party organisation, established weighted scoring criteria of 30% for shareholder responsibility, 15% for employee responsibility, 15% for supplier responsibility, 20% for environmental responsibility and 20% for social contribution responsibility to construct a CSR index. This index is commonly used to characterise the quality of CSR disclosure [27]. Therefore, we used the Hexun CSR index (HXCSRs) for robustness testing.

3.2.3. Other Variables

In the subsequent mechanism testing section, we examine firm agency costs (*Ac*), external financing constraints (*Cost*), and media valuation (*Slant*). Here, Ac is the sum of administrative and selling expenses divided by operating income [14]. External financing constraints are measured by the cost of debt (*Cost*), where *Cost* equals the sum of interest expense divided by the sum of the firm's short-term and long-term debt [6]. Media assessment of the firm (*Slant*) is the difference between the number of positive and negative

media reports about the company, divided by the total number of total media reports [14]. A higher *Slant* indicates a better media reputation for the firm.

Furthermore, following existing research [8], this study selects the following control variables: growth (*Growth*), firm size (*Size*), leverage ratio (*Lev*), age of listing (*Age*), cash holdings (*Cash*), profitability (*Roa*), top shareholder ownership ratio (*Top*1), and Tobin's Q (*TQ*). Studies suggest that firm size is generally inversely correlated with financing constraints, which directly affects its investment activities [5]. Age of listing is generally associated with a firm's investment in innovation and is a commonly used control variable [5]. In addition, higher levels of profitability, as indicated by *Roa*, suggest greater competitiveness for the firm, which may place more stringent demands on investment efficiency. Higher market values benefit firms in terms of equity financing, which is likely to have a positive impact on their investment activities. In addition, variables such as earnings growth rate, ownership by top shareholders and Tobin's Q are associated with company growth, management performance and asset restructuring costs, which, to some extent, influence firms' investment activities. Table 1 shows the symbols and definitions of the key variables.

Table 1. Description of variables used in this study.

Variable	Symbol	Definition
Investment efficiency	InvEff1	Calculations based on Equation (1)
Investment efficiency	InvEff2	Calculations based on Equation (2)
Overinvestment indicators	HInvEff	Investment efficiency when residuals are greater than 0
Underinvestment indicators	LInvEff	Investment efficiency when residuals are less than 0
CSR Disclosure Quality	CSRs	CSR disclosure scores based on aggregation of disclosures from CSMAR database
Firm scale	Size	The logarithm of total assets
Listed age	Age	The logarithm of the firm's listing years
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

In order to investigate the relationship between CSR disclosure quality and the investment efficiency of firms, we conducted a regression analysis using the following models:

$$InvEff_{i,t} = \beta_0 + \beta_1 CSRs_{i,t} + \theta' X_{i,t} + \alpha + \gamma + \varepsilon_{i,t} \quad (3)$$

$$HInvEff_{i,t} = \beta_0 + \beta_1 CSRs_{i,t} + \theta' X_{i,t} + \alpha + \gamma + \varepsilon_{i,t} \quad (4)$$

$$LInvEff_{i,t} = \beta_0 + \beta_1 CSRs_{i,t} + \theta' X_{i,t} + \alpha + \gamma + \varepsilon_{i,t} \quad (5)$$

In the above equations, the dependent variables, $InvEff_{i,t}$, $HInvEff_{i,t}$ and $LInvEff_{i,t}$, respectively represent the investment efficiency, overinvestment and underinvestment of the firm i in year t. $X_{i,t}$ is a series of control variables related to the investment efficiency of firms. α denotes individual fixed effects that control for unobserved firm-specific characteristics that do not vary over time. γ denotes time-fixed effects, controlling for time trends and macroeconomic shocks. $\varepsilon_{i,t}$ denotes the error term.

In Equations (3)–(5), our main focus is on the coefficient β_1 of the $CSRs_{i,t}$. This coefficient measures how the improved quality of CSR information affects the investment efficiency of companies. A significantly negative β_1 indicates that improvements in CSR disclosure quality effectively improve firm investment efficiency.

4. Test Results

4.1. Descriptive Statistics

Table 2 shows the results of the descriptive statistics. Among the 12,908 firm year observations, the mean, median and minimum values of investment efficiency calculated based on Equations (1) and (2) are identical at 0.040, 0.030 and 0.000, respectively. The maximum values are 0.396 and 0.400, respectively, indicating a minimal difference in investment efficiency between the two methods. The mean (median) of the independent variable CSRs is 5.887 (7.000), with a maximum and minimum of 10.000 and 1.000, respectively, and a standard deviation of 2.347. This suggests that the quality of CSR information is generally low for most companies, and there is significant variation in the quality of CSR information across companies.

Table 2. Summary statistics.

Variable	Obs	Mean	Min	Median	Max	SD
InvEff1	12,908	0.040	0.000	0.030	0.396	0.043
InvEff2	12,908	0.040	0.000	0.030	0.400	0.043
CSRs	12,908	5.887	1.000	7.000	10.000	2.347
Size	12,908	22.146	19.102	22.142	25.916	1.036
Age	12,908	1.451	0.000	1.589	2.992	0.931
Roa	12,908	0.032	−0.242	0.032	0.231	0.067
Growth	12,908	0.161	−0.580	0.099	2.411	0.393
Lev	12,908	0.432	0.057	0.422	0.891	0.192
Top1	12,908	0.326	0.091	0.305	0.761	0.141
Cash	12,908	0.132	0.001	0.110	0.798	0.102
TQ	12,908	1.981	0.872	1.626	8.141	1.167

Among the control variables, Size has a mean and median of 22.146 and 22.142, which suggests that the majority of the sampled companies are medium to large in size. Growth has a mean and median of 0.161 and 0.099, respectively, with a standard deviation of 0.393, indicating insufficient overall growth among the sampled enterprises and significant variability in growth rates across enterprises. Other variables fall within reasonable ranges and are not discussed further.

4.2. Correlation Analysis

It is important to examine the correlations between variables before running the primary regression analysis in an attempt to reduce the influence of multicollinearity on the results of this study. In Table 3, the Pearson correlation coefficients between the variables in regression Equation (3) are presented. It is observed that CSRs have significant negative correlations with InvEff1 and InvEff2 at the 1% significance level, indicating significant negative associations between the explanatory and dependent variables. Furthermore, the control variables included in the regression show significant correlations with the dependent variables, suggesting the effectiveness of the selected control variables.

Table 3. Correlation matrix.

Variable	InvEff1	InvEff2	CSRs	Size	Age	Roa	Growth	Lev	Top1	Cash	TQ
InvEff1	1										
InvEff2	0.986 ***	1									
CSRs	−0.013 ***	−0.014 ***	1								
Size	−0.017 **	−0.019 **	0.044 ***	1							
Age	−0.037 ***	−0.041 ***	0.074 ***	−0.071 ***	1						
Roa	0.086 ***	0.074 ***	0.064 ***	0.020 **	−0.008	1					
Growth	0.183 ***	0.179 ***	−0.019 **	0.056 ***	−0.002	0.293 ***	1				
Lev	0.033 ***	0.034 ***	−0.040	0.447 ***	−0.137 ***	−0.361 ***	−0.012	1			
Top1	0.058 ***	0.058 ***	0.011	0.169 ***	−0.104 ***	0.138 ***	0.020 **	0.052 ***	1		
Cash	−0.024 ***	−0.026 ***	0.001	−0.164 ***	−0.018 *	0.251 ***	0.033 ***	−0.342 ***	0.051 ***	1	
TQ	0.017 ***	0.022 ***	0.004	−0.412 ***	0.048 ***	0.159 ***	0.030 ***	−0.261 ***	−0.056 ***	0.196 ***	1

Note: Numbers in () are t-values; *, ** and *** denote the significance at the 10%, 5% and 1% levels.

In addition, the absolute values of the coefficient of correlation between the control variables are all less than 0.5, indicating the non-existence of serious multicollinearity problems associated with the regression specified by Equation (3).

4.3. Preliminary Regression Results

Table 4 reports the regression results of Equations (3)–(5). In the first three columns, the dependent variables are calculated on the basis of Equation (1). In the first column, the coefficient of the regression of CSRs is −0.00076, which shows significance at the 1% level, implying that improvements in CSRs significantly increase firms' investment efficiency. In the second and third columns, we estimate the effects of CSRs on overinvestment and underinvestment, respectively. We find that the coefficients of CSRs are −0.0081 and −0.0016, significant at the 1% and 10% levels, respectively. This suggests that an increase in CSR significantly mitigates both overinvestment and underinvestment tendencies. Further comparison using the bootstrap method shows a statistically significant difference between the two regression coefficients at the 1% level (−0.0081 and −0.0016, *p*-value = 0.000). The statistical difference suggests that improvements in the quality of CSR information have a stronger inhibitory effect on overinvestment than on underinvestment. Similar results are obtained in the last three columns but are not repeated here.

Table 4. Benchmark regression results.

Variable	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
	InvEff1	**HInvEff1**	**LInvEff1**	**InvEff2**	**HInvEff2**	**LInvEff2**
CSRs (% for β_1)	−0.076 *** (−2.74)	−0.081 *** (−2.05)	−0.016 * (−1.87)	−0.075 *** (−2.68)	−0.080 ** (−2.05)	−0.016 * (−1.87)
Size	0.003 * (1.92)	−0.002 * (−1.89)	−0.002 *** (−5.82)	0.002 (1.32)	−0.002 * (−1.89)	−0.002 *** (−5.82)
Age	−0.009 *** (−3.55)	0.038 *** (5.48)	0.007 *** (5.19)	−0.008 *** (−3.48)	0.038 *** (5.48)	0.007 *** (5.19)
Roa	0.028 *** (3.61)	−0.000 (−0.36)	−0.001 *** (−5.50)	0.023 *** (2.98)	−0.000 (−0.36)	−0.001 *** (−5.50)
Growth	0.014 *** (8.16)	0.083 *** (4.97)	−0.020 *** (−5.76)	0.014 *** (8.15)	0.083 *** (4.97)	−0.020 *** (−5.76)
Lev	0.022 *** (4.06)	0.031 *** (10.36)	−0.001 * (−1.68)	0.022 *** (4.07)	0.031 *** (10.36)	−0.001 * (−1.68)
Top1	0.002 ** (2.24)	0.001 *** (3.11)	0.001 ** (2.30)	0.002 ** (2.01)	0.000 *** (3.11)	0.000 ** (2.30)
Cash	0.006 (0.98)	−0.021 ** (−2.00)	0.001 (0.50)	0.008 (1.30)	−0.021 ** (−2.00)	0.001 (0.50)
TQ	−0.021 (−0.70)	−0.000 (−0.33)	0.001 *** (4.14)	−0.000 (−0.72)	−0.000 (−0.33)	0.001 *** (4.14)
Constant	−0.120 *** (−15.31)	0.081 *** (3.21)	0.061 *** (10.57)	−0.114 *** (−11.36)	0.081 *** (3.21)	0.061 *** (10.57)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
N	12,908	4801	8103	12,908	4801	8103
R^2	0.422	0.322	0.323	0.417	0.317	0.321
p-value		0.000 ***			0.000 ***	

Note: Numbers in () are t-values; *, ** and *** denote the significance at the 10%, 5% and 1% levels. "*p*-values" by group were used to test for between-group differences in CSRs coefficients derived by bootstrap sampling 1000 times.

Overall, based on the regression results of Equations (3)–(5), we conclude that improving CSR disclosure quality effectively inhibits both overinvestment and underinvestment tendencies, thereby improving firms' investment efficiency. These results confirm hypothesis H1.

4.4. Endogenous Test

4.4.1. Instrumental Variable Two-Stage Regression (IV-2SLS)

This study uses the instrumental variable (IV) approach to address potential endogeneity issues that may arise from reverse causality. Specifically, following Li et al. [28], this study uses the T − 1 period CSRs (CSRs_t − 1) and the industry average CSRs of peer firms (CSRs_ind) as instruments for the IV-2SLS regression. The validity of the instruments is examined as follows: the Kleibergen–Paap rk LM statistic is significant at the 1% level of significance (p = 0.000), indicating that the instruments are not weak; moreover, the Kleibergen–Paap rk Wald F statistic (F = 1120.17) significantly exceeds the Stock–Yogo critical value at the 10% level, indicating a strong relevance between the instruments and the endogenous explanatory variables. The detailed results are shown in Table 5.

Table 5. Endogeneity test.

Variable	(1)	(2)	(3)	(4)	(5)
		IV-2SLS		PSM	
	CSRs	InvEff1	InvEff2	InvEff1	InvEff2
CSRs (% for β_1)		−0.039 *** (−2.67)	−0.036 *** (−2.52)	−0.051 *** (−2.87)	−0.049 *** (−3.13)
CSRs_ind	0.223 *** (5.47)				
CSRs_t-1	0.559 *** (103.08)				
Size	0.073 *** (3.92)	−0.001 *** (−2.79)	−0.002 *** (−3.18)	−0.001 (−0.33)	−0.002 (−0.38)
Age	0.091 *** (5.33)	−0.000 (−0.80)	−0.000 (−1.18)	0.002 * (1.90)	0.001 * (1.66)
Roa	0.713 *** (2.70)	0.031 *** (4.85)	0.023 *** (3.50)	0.037 *** (2.93)	0.026 ** (2.09)
Growth	0.083 ** (2.11)	0.019 *** (19.34)	0.019 *** (19.37)	0.016 *** (4.56)	0.016 *** (4.58)
Lev	−0.219 ** (−2.13)	0.019 *** (7.58)	0.019 *** (7.45)	0.026 *** (4.79)	0.026 *** (4.74)
Top1	−0.001 (−1.01)	0.001 *** (5.04)	0.000 *** (5.30)	0.000 *** (3.15)	0.000 *** (2.95)
Cash	0.055 (0.35)	−0.012 *** (−2.93)	−0.012 *** (−2.93)	−0.008 (−1.05)	−0.008 (−1.01)
TQ	0.021 (1.47)	0.001 (0.77)	0.001 (1.46)	0.001 (0.69)	0.001 (0.96)
Constant				−0.014 *** (−10.36)	−0.012 *** (−9.36)
Chi-sq (1) P	0.000				
F-value	1120.17				
Industry FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
N	12,908	12,908	12,908	3351	3351
R^2	0.411	0.153	0.171	0.749	0.835

Note: Numbers in () are t-values; *, ** and *** denote the significance at the 10%, 5% and 1% levels.

Table 5, column (1) reports the results of the first stage regression, where CSRs_ind and LCSRs have coefficients of 0.223 and 0.559, respectively, which are significant at the

1% level, indicating a significant positive correlation between our chosen instruments and CSRs. In columns (2) and (3) of the second stage regression, the coefficients of CSRs are −0.008 and −0.011, respectively, both significant at the 1% level, suggesting that after addressing potential endogeneity issues, improvements in CSRs still positively influence firms' investment efficiency. In addition, the results of the regressions for the control variables are very close to the results of the baseline regression and will not be repeated here. In summary, the results of columns (1) to (3) of Table 5 indicate that the results of this study remain robust to IV-2SLS tests.

4.4.2. Propensity Score Matching (PSM)

To control for the potential confounding effects of individual disclosure motives on the results of this study, we use propensity score matching (PSM). This method ensures that firms with CSRs above the median are matched with those below the median within the same industry, region and financial condition, thereby mitigating the impact of endogenous disclosure driven by financial or other specific reasons on the study results. Using a sample of firms from the same industry and region, we divide the sample into treatment and control groups based on median CSRs and apply 1:1 nearest neighbour matching with replacement using firm size (*Size*), leverage ratio (*Lev*), age since listing (*Age*), profitability (*Roa*), revenue growth rate (*Growth*), cash holdings (*Cash*), analyst coverage (*Analyst*), and media coverage (*Media*) as covariates, with a calliper set at 0.2.

After performing the PSM matching, we obtained a total of 3351 matched samples, and the regression results based on these samples are shown in the last two columns of Table 5. In both regression columns, the coefficient for CSRs is −0.00051 and −0.00049 respectively, significant at the 1% level. This indicates that our regression results remain robust even after controlling for endogeneity using PSM.

4.5. Robustness Test

In order to enhance the robustness of our findings, we used the following approach to perform a series of robustness checks on our regression results: (1) Temporal effects: considering that improvements in CSRs may have temporal effects on firms' investment efficiency, we regress investment efficiency in the T + 1 period as the dependent variable. (2) Alternative explanatory variables: as mentioned above, we also use the CSR index (HXCSRs) as an alternative explanatory variable for robustness testing.

The results of the robustness checks are shown in Table 6. In the first and second columns, we observe that when using T + 1 investment efficiency as the dependent variable, the coefficient for CSRs remains significantly negative ($\beta = -0.00079$, $p < 1\%$; $\beta = -0.00078$, $p < 1\%$), indicating that improvements in CSRs continue to positively influence firms' investment efficiency over the next two years. In the third and fourth columns, the coefficients for HXCSRs are −0.00031 and −0.00030, respectively, both significant, showing that our results remain robust even when we replace the proxy for the quality of CSR disclosure.

Table 6. Robustness tests.

Variable	(1)	(2)	(3)	(4)
	InvEff1 (T + 1)	**InvEff2 (T + 1)**	**InvEff1**	**InvEff2**
CSRs (% for β_1)	−0.079 *** (−2.86)	−0.078 *** (−2.83)		
HXCSRs (% for β_1)			−0.031 *** (−3.59)	−0.030 *** (−3.58)

Table 6. *Cont.*

Variable	(1)	(2)	(3)	(4)
	InvEff1 (T + 1)	**InvEff2 (T + 1)**	**InvEff1**	**InvEff2**
Size	−0.001 (−0.18)	−0.001 (−0.39)	−0.001 *** (−2.60)	−0.002 *** (−2.92)
Age	0.029 *** (5.53)	0.029 *** (5.48)	0.021 *** (7.46)	0.020 *** (7.28)
Roa	−0.013 *** (−7.00)	−0.013 *** (−6.88)	−0.000 (−0.97)	−0.001 (−1.37)
Growth	0.034 *** (4.48)	0.029 *** (3.81)	0.057 *** (5.32)	0.049 *** (4.53)
Lev	0.014 *** (8.08)	0.013 *** (8.11)	0.019 *** (10.29)	0.019 *** (10.39)
Top1	0.001 ** (2.51)	0.001 ** (2.27)	0.001 *** (5.24)	0.000 *** (5.50)
Cash	0.012 ** (1.99)	0.014 ** (2.30)	−0.010 ** (−2.37)	−0.010 ** (−2.36)
TQ	−0.001 (−1.12)	−0.001 (−1.04)	−0.001 (−0.06)	−0.001 (−0.05)
Constant	−0.012 *** (−9.36)	−0.011 *** (−8.89)	−0.062 *** (−5.29)	−0.066 *** (−5.63)
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
N	12,908	12,908	12,908	12,908
R^2	0.496	0.484	0.412	0.446

Note: Numbers in () are t-values ** and *** denote the significance at the 5% and 1% levels.

4.6. Mechanism Test

Building on the previous theoretical analysis, we further investigate the underlying mechanisms through which CSRs affects firms' investment efficiency. Specifically, we hypothesise that improvements in CSR information quality enhance investment efficiency by reducing agency costs, easing external financing constraints and improving media reputation. To test these hypotheses, we construct Equations (6)–(8) as follows:

$$AC_{i,t} = \beta_0 + \beta_1 CSRs_{i,t} + \theta' X_{i,t} + \alpha + \gamma + \varepsilon_{i,t} \quad (6)$$

$$Cost_{i,t} = \beta_0 + \beta_1 CSRs_{i,t} + \theta' X_{i,t} + \alpha + \gamma + \varepsilon_{i,t} \quad (7)$$

$$Slant_{i,t} = \beta_0 + \beta_1 CSRs_{i,t} + \theta' X_{i,t} + \alpha + \gamma + \varepsilon_{i,t} \quad (8)$$

Table 7 shows the regression results of the above equations. It can be observed that when Ac is used as the dependent variable, the regression coefficient of CSRs is −0.008, which is significant at the 1% level. This indicates that as CSRs improve, firms' agency costs decrease significantly. When cost is used as the dependent variable, the regression coefficient of CSRs is −0.013, significant at the 5% level, suggesting that improvements in CSRs effectively reduce firms' debt costs and improve their ability to raise external finance. Using Slant as the dependent variable, the regression coefficient of CSRs is 0.011, which is significant below the 1% level, indicating that higher CSRs significantly improve corporate media reputation.

Table 7. Mechanism tests.

Variable	(1)	(2)	(3)
	Ac	**Cost**	**Slant**
CSRs	−0.008 *** (−2.87)	−0.013 ** (−1.97)	0.011 *** (2.96)
Size	−0.020 *** (−3.94)	−0.007 *** (−4.56)	0.008 (1.17)
Age	−0.028 *** (−5.10)	0.008 *** (3.56)	−0.086 *** (−7.38)
Roa	−0.347 *** (−6.36)	−0.030 *** (−3.09)	0.830 *** (19.19)
Growth	−0.030 *** (−4.49)	0.006 *** (4.72)	0.034 *** (5.94)
Lev	0.014 (0.29)	0.005 (0.77)	−0.016 (−0.64)
Top1	−0.000 * (−1.91)	0.001 (0.62)	0.000 (0.51)
Cash	−0.004 (−0.19)	−0.029 *** (−3.73)	−0.009 (−0.28)
TQ	0.007 *** (2.97)	−0.001 (−0.32)	−0.001 (−0.17)
Constant	0.662 *** (6.10)	0.196 *** (6.15)	0.083 (0.56)
Firm FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
N	12,908	12,908	12,908
R^2	0.665	0.428	0.407

Note: Numbers in () are t-values; *, ** and *** denote the significance at the 10%, 5% and 1% levels.

Based on agency cost theory, signalling theory and stakeholder theory, numerous studies have demonstrated that mitigating agency conflicts, alleviating financing constraints and improving media reputation can promote corporate investment efficiency [1,8,18]. Therefore, the results in Table 7 tentatively confirm the impact mechanisms through which CSR disclosure quality promotes corporate investment efficiency. In the heterogeneity analysis, we will further investigate these impact mechanisms.

4.7. Heterogeneity Analysis

4.7.1. Equity Incentives

Based on the theory of optimal contracting, Jensen and Meckling [29] consider that equity incentives can effectively mitigate agency problems between shareholders and managers, aligning their long-term interests and helping to curb financial restatements and other forms of accounting manipulation. Therefore, in the field of corporate finance, equity incentives are generally regarded as an important means of mitigating principal–agent conflicts [30]. Building on previous analyses, we expect that the marginal effect of improving CSR practices in mitigating agency conflicts will be more pronounced in firms with lower levels of executive ownership. Consequently, the promotion of corporate investment efficiency is expected to be stronger.

To check this assumption, we divided our sample by median executive shareholding (Mshare) into high (HMshare) and low (LMshare) subgroups and performed a comparative regression analysis.

The regression results for the grouped regressions are shown in the following table. Columns (1) and (2) show that with InvEff1 as the dependent variable, the regression coefficients of CSRs are −0.00102 and −0.00031, respectively. While the first is significant at the 5% level, the second is not. A further analysis shows the difference in the regression coefficients to be statistically significantly at the 1% level (p-value = 0.000). This demonstrates that the improvement in CSR has a stronger marginal effect on InvEff1 in companies with lower executive shareholdings. The results in columns (3) and (4) are similar when InvEff2 is taken as the dependent variable. Column (3) shows that the coefficient of CSRs is significantly negative, while column (4) shows that the regression coefficient of CSRs is not significant and the statistical difference between the two remains significant (p-value = 0.00). This result again underlines that improving CSR disclosure quality tends to have a stronger impact on investment efficiency in companies with lower executive shareholdings. Therefore, the results in Table 8 further substantiate that the mitigation of principal–agent conflicts is a crucial factor that enables CSR improvements to enhance corporate investment efficiency.

Table 8. Heterogeneity analysis of equity incentives.

Variable	**(1)**	**(2)**	**(3)**	**(4)**
	LMshare	**HMshare**	**LMshare**	**HMshare**
	InvEff1	**InvEff1**	**InvEff2**	**InvEff2**
CSRs (% for β_1)	−0.102 ** (−2.26)	−0.031 (−0.83)	−0.096 ** (−2.10)	−0.036 (−0.95)
Size	0.007 ** (2.30)	0.003 (1.07)	0.006 * (1.79)	0.002 (0.77)
Age	−0.015 *** (−3.35)	−0.004 (−1.16)	−0.016 *** (−3.56)	−0.004 (−1.07)
Roa	0.036 *** (3.14)	0.020 * (1.67)	0.032 *** (2.74)	0.015 (1.34)
Growth	0.011 *** (4.60)	0.017 *** (6.44)	0.012 *** (4.99)	0.016 *** (6.16)
Lev	0.015 * (1.69)	0.022 *** (2.75)	0.016 * (1.78)	0.022 *** (2.71)
Top1	0.001 (0.32)	0.001 * (1.82)	0.000 (0.08)	0.001 (1.64)
Cash	−0.002 (−0.17)	0.009 (0.98)	0.000 (0.00)	0.011 (1.28)
TQ	−0.000 (−0.06)	−0.001 (−1.06)	−0.001 (−0.14)	−0.001 (−1.15)
Constant	−0.172 *** (−13.31)	−0.120 *** (−10.31)	−0.157 *** (−7.91)	−0.143 *** (−8.37)
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
N	6248	6114	6248	6114
R^2	0.458	0.411	0.466	0.436
p-value	0.000 ***		0.000 ***	

Note: Numbers in () are t-values; *, ** and *** denote the significance at the 10%, 5% and 1% levels. "p-values" by group were used to test for between-group differences in CSRs coefficients derived by bootstrap sampling 1000 times.

4.7.2. Financial Constraints

In the theoretical analysis, we postulate that the improvement in firms' investment efficiency may also be due to the alleviation of financial constraints through improved CSR practices. In order to further test the validity of this mechanism, we divided the sample into high financial constraint (HFC) and low financial constraint (LFC) subgroups based on the median of the FC index and conducted a comparative regression analysis. The KZ index, calculated by Kaplan and Zingales [31] using internal financial data such as operating cash flows, cash holdings, dividend levels, debt levels and Tobin's Q ratio, is a widely recognised indicator of corporate financial constraints. A higher value of the KZ index indicates greater financial constraints on the firm.

Based on previous analyses, we expect that the marginal effect of CSRs in promoting firm investment efficiency will be more pronounced in firms with higher KZ index values.

The grouped regression results are presented in the following table. Columns (1) and (2) show that with InvEff1 as the dependent variable, the coefficients of the regression of CSRs are −0.00114 and −0.00039, where the first is significant at the 1% level and the second is not. A further comparison shows the difference in the regression coefficients to be statistically significant at the 1% level (p-value = 0.000), indicating that the improvement in CSRs has a better marginal effect on InvEff1 in firms with higher financial constraints. Similar results are found in columns (3) and (4) when InvEff2 is taken as the dependent variable. Column (3) shows that the coefficient of CSRs is significantly negative, while the regression coefficient of CSRs in column (4) is not significant and the statistical difference between the two remains significant (p-value = 0.00). This result again underlines that for firms with higher financial constraints, improving the quality of CSR disclosure has a stronger impact on investment efficiency. Therefore, the results in Table 9 further substantiate that the alleviation of financial constraints is a crucial factor enabling CSR improvements to increase firms' investment efficiency.

Table 9. Analysis of the heterogeneity of the KZ index.

Variable	(1)	(2)	(3)	(4)
	HKZ	**LKZ**	**HKZ**	**LKZ**
	InvEff1	**InvEff1**	**InvEff2**	**InvEff2**
CSRs (% for β_1)	−0.114 *** (−2.89)	−0.039 (−0.98)	−0.105 *** (−2.67)	−0.043 (−1.08)
Size	0.005 * (1.78)	0.005 (1.61)	0.004 (1.33)	0.004 (1.42)
Age	−0.012 *** (−3.42)	−0.012 *** (−3.25)	−0.013 *** (−3.46)	−0.012 *** (−3.19)
Roa	0.050 *** (5.81)	0.008 (0.54)	0.045 *** (5.22)	0.003 (0.24)
Growth	0.004 ** (2.11)	0.021 *** (7.88)	0.004 ** (2.29)	0.021 *** (7.69)
Lev	0.026 *** (3.67)	0.018 * (1.76)	0.027 *** (3.75)	0.018 * (1.74)
Top1	0.000 (1.40)	0.000 (0.64)	0.000 (1.04)	0.000 (0.36)
Cash	0.009 (1.02)	0.017 (1.64)	0.013 (1.40)	0.018 * (1.74)
TQ	−0.001 (−1.08)	−0.000 (−0.41)	−0.001 (−1.03)	−0.001 (−0.63)
Constant	−0.152 *** (−11.21)	−0.131 *** (−9.32)	−0.147 *** (−9.92)	−0.123 *** (−8.31)

Table 9. *Cont.*

Variable	(1)	(2)	(3)	(4)
	HKZ	**LKZ**	**HKZ**	**LKZ**
	InvEff1	**InvEff1**	**InvEff2**	**InvEff2**
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
N	5890	5975	5890	5975
R^2	0.481	0.471	0.486	0.477
p-value	0.000 ***		0.000 ***	

Note: Numbers in () are t-values; *, ** and *** denote the significance at the 10%, 5% and 1% levels. "*p*-values" by group were used to test for between-group differences in CSRs coefficients derived by bootstrap sampling 1000 times.

4.7.3. Media Attention

In the theoretical analysis, we argue that the improvement in firms' investment efficiency may also result from the improvement in CSR practices, which leads to an improvement in firms' media reputation. Under the reputation mechanism, firms that disclose CSR information are subject to the pressure of media scrutiny. Therefore, it is reasonable to assume that firms with higher visibility face greater media scrutiny, which in turn, forces them to strengthen their investment management practices. Consequently, we expect that firms with higher media coverage will experience a stronger effect of CSR improvements in promoting corporate investment efficiency.

To further test this hypothesis, we divided the sample into high media coverage (HMedia) and low media coverage (LMedia) subgroups based on the median of the firm's media coverage media and conducted a paired regression analysis. Media represents the number of media reports about the company.

The group regression results are reported in the following table. Columns (1) and (2) show that when InvEff1 is taken as the dependent variable, the regression coefficients of CSRs are −0.00095 and −0.00028. While the first is significant at the 1% level, the second is insignificant. A further analysis shows that the difference in the coefficients is statistically significant by 1% (*p*-value = 0.000). Thus, the increase in CSRs has a stronger marginal effect on InvEff1 for firms with higher media attention. The results in columns (3) and (4) are similar using InvEff2 as the dependent variable. The coefficient of CSRs is significantly negative in column (3), whereas the coefficient of CSRs fails to reach significance in column (4) and the statistical difference between the two remains significant (*p*-value = 0.00). These results again support the view that a higher quality of CSRs has a stronger impact on investment efficiency for firms with higher media attention. Therefore, the results in Table 10 indirectly underline that the improvement of media reputation is a crucial factor that enables CSR improvements to increase firms' investment efficiency.

Table 10. Heterogeneity of media coverage.

Variable	(1)	(2)	(3)	(4)
	HMedia	**LMedia**	**HMedia**	**LMedia**
	InvEff1	**InvEff1**	**InvEff2**	**InvEff2**
CSRs (% for β_1)	−0.095 *** (−2.98)	−0.028 (−0.56)	−0.097 ** (−2.12)	−0.022 (−0.52)
Size	0.005 (1.61)	0.003 (1.33)	0.005 (1.44)	0.002 (0.71)
Age	−0.012 *** (−3.25)	−0.008 ** (−2.19)	−0.013 *** (−3.07)	−0.007 ** (−1.99)

Table 10. *Cont.*

Variable	(1)	(2)	(3)	(4)
	HMedia	**LMedia**	**HMedia**	**LMedia**
	InvEff1	**InvEff1**	**InvEff2**	**InvEff2**
Roa	0.008 (0.54)	0.024 ** (2.47)	0.024 (1.39)	0.019 ** (1.98)
Growth	0.021 *** (7.88)	0.011 *** (4.57)	0.013 *** (4.24)	0.012 *** (4.78)
Lev	0.018 * (1.76)	0.017 ** (2.31)	0.025 ** (2.49)	0.019 ** (2.53)
Top1	0.000 (0.64)	0.000 (0.83)	0.000 (0.96)	0.000 (0.75)
Cash	0.017 (1.64)	−0.000 (−0.02)	0.008 (0.72)	0.005 (0.53)
TQ	−0.000 (−0.41)	−0.001 (−1.08)	−0.000 (−0.23)	−0.001 (−0.96)
Constant	−0.132 *** (−10.13)	−0.129 *** (−9.39)	−0.127 *** (−9.23)	−0.117 *** (−8.33)
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
N	5975	5476	5975	5476
R^2	0.472	0.446	0.951	0.448
p-value	0.000 ***		0.000 ***	

Note: Numbers in () are t-values; *, ** and *** denote the significance at the 10%, 5% and 1% levels. "*p*-values" by group were used to test for between-group differences in CSRs coefficients derived by bootstrap sampling 1000 times.

5. Discussion

Many scholars have examined the role of CSR disclosure in promoting sustainable development among companies in developing countries. However, their conclusions can vary significantly depending on different economic indicators. On the one hand, the majority of studies have found that CSR disclosure policies play a facilitating role in the growth of Chinese enterprises, especially contributing to management efficiency and R&D innovation [4,5]. On the other hand, some scholars have found that in the short term, CSR disclosure may increase the cost of enterprises, which may undermine their overall value [2,32,33]. Thus, there may be a trade-off between benefits and drawbacks for long-term development. In addition, researchers have examined India's mandatory CSR disclosure policy and found negative economic outcomes, such as the crowding-out effect on productive operating costs and the negative impact on company stock prices due to forced CSR activities [7,9].

Unlike previous studies that have focused on examining political shocks [8], this paper focuses on the quality of CSR disclosure, as it can better quantify the impact of increased CSR transparency on firms' sustainable development. In addition, considering that changes in the quality of CSR information content can directly attract the attention of external stakeholders, especially in the context of increasing attention to environmental and social issues, firms have to withstand greater public pressure due to environmental and governance events, and therefore, we use media sentiment as one of the test mechanisms to complement the reliability of our findings. This is an area that is difficult to address in the literature on short-term political shocks, as changes in the quality of CSR information and the emotional responses of external groups to firms take a much longer time horizon to manifest themselves. Clearly, our research asserts that CSR disclosure has a positive impact on firm development, as improved investment efficiency implies enhanced management

capabilities and forward-looking, effective investment decisions, which has significant implications for long-term firm development [34].

In addition, we also identified limitations to this study during the writing process. First, the investment efficiency of enterprises is not only influenced by internal factors, such as management efficiency and specific policies but also by macroeconomic conditions and industry development [12]. Occasionally, enterprises may adjust their investment structures to temporarily mitigate political risks or respond to industry downturns, which means that enterprises do not always pursue optimal investment efficiency. Therefore, our measurement methods may not always be appropriate and accurate. Second, with regard to endogeneity, we have not found a perfect instrumental variable to comprehensively address this issue. Our method of mitigating endogeneity may only be locally effective. Future research may consider exploring more appropriate instrumental variables to achieve cleaner research results. Third, in measuring the quality of CSR disclosure, we evaluate the information quality of firms only on the basis of whether the contents of certain classified items are disclosed or not, but in fact, the information transmission effect of each part of the contents to external stakeholders may be different, so this method lacks a certain degree of reasonableness, and future research may consider going to a more detailed quantification of such differences. Finally, China officially launched its ESG policy in May 2024, which means that related CSR research may need to undergo certain changes. Of course, our current study is, to some extent, only applicable to policy analysis in 2024. Subsequent research could consider complementary and extended approaches based on longer time horizons while ensuring that the impact of other policies on research results is taken into account.

6. Conclusions and Implications

Our study shows that improving CSR information quality enhances firm investment efficiency, mainly by reducing agency costs and financing constraints and by improving media evaluations. Further investigation reveals that improving CSR information quality has a stronger positive impact on firm investment efficiency in firms with lower equity incentives, tighter financing constraints and greater media attention.

The conclusions of this study can provide the following insights: First, considering the improved utilisation of resource elements as a critical aspect of China's current economic development transformation, the government should further refine the policy of nonfinancial information disclosure for enterprises. This would facilitate eliminating obsolete capacity and unsustainable enterprises, although it may have a short-term negative impact on employment rates and local fiscal revenues. However, this approach undoubtedly contributes to sustainable economic development in the long run. Second, while some scholars have pointed to potential adverse effects of CSR policies in developing countries that focus solely on information quality, disclosing more comprehensive CSR information undoubtedly has significant importance in promoting sustainable business development. Therefore, future policies should focus on improving the authenticity and effectiveness of CSR information disclosed by companies. Third, with the advent of the information age, corporate reputation has become increasingly important for corporate development. Our research shows that reputation mechanisms enhance firms' investment efficiency through CSR disclosure. Thus, governments can effectively exploit the synergy between CSR activities and media platforms to improve the effectiveness of CSR-related policies and promote sustainable development concepts to the public.

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