CSR Performance and Firm Idiosyncratic Risk in a Data-Rich Environment: The Role of Retail Investor Attention *

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JEL codes: M14; G32; G14

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Abstract: In the Chinese stock market, there are many retail investors who focus on short-term profits and may consider corporate social responsibility (CSR) differently from institutional investors. We find that CSR significantly reduces firms' idiosyncratic risk in the Chinese financial market. This result still holds after a series of robustness checks with potential endogeneity concerns. We further test the role of CSR as a nonfinancial informational supplement, the interplay of CSR with stock analyst forecasts and the effect of heterogeneity in corporate governance characteristics. Finally, we find that retail investors' attention mediates the relationship between CSR and firms' idiosyncratic risk. Our results have general implications for understanding the impact of CSR on retail investors.

Keywords: CSR; idiosyncratic risk; retail investor attention; Chinese financial market

JEL code: M14; G32; G14

1. Introduction

With the rapid development of the economy, enterprise activities have brought about negative consequences such as environmental pollution and resource scarcity, and these negative externalities also affect the sustainable development of the enterprises themselves and the world economy as a whole. As a microscopic subject of economic development, corporate social responsibility (CSR) is an important driving force in achieving sustainable socioeconomic development. Given current economic globalization, countries are gradually realizing that social responsibility is necessary for sustainable corporate and socioeconomic development. Accordingly, the sustainable development of the social economy is also the cornerstone of the long-term development of enterprises.

In 2003, the Chinese State Grid disclosed its first CSR report in China. As an important supplement to companies' financial information, CSR provides additional information to the public and to investors to understand corporate risk and has received increasing attention. The number of CSR reports disclosed by Chinese companies has rapidly increased over recent years, and with the inclusion of A-shares in the MSCI index system in 2018, the influence of ESG (environmental, social, and governance) investment has become stronger. An increasing number of Chinese companies have begun to focus on CSR issues and to disclose CSR information to the public. Since 2008, the Chinese government has forced numerous listed companies to disclose their CSR engagement and encouraged other companies to voluntarily disclose CSR. Active guidance by the central government has led an increasing number of firms to disclose CSR reports and has triggered greater public attention. During the 2009–2019 period, the number of firms disclosing a CSR report increased from the initial 371 to 851, an increase of 129%, and the average score rose from 29.5 to 43.4, which shows that Chinese enterprises' CSR has become stronger year by year and that the quality of disclosure has also gradually improved.

Regarding agency problems, many studies have verified that CSR engagement provides firms with good corporate publicity, which enhances their reputation (Xia et al., 2019) and sends positive signals to the market (Becchetti et al., 2015; Zhang et al., 2020), boosting investor confidence. In addition, CSR engagement could be considered a powerful intangible asset that not only provides insurance-like protection for firms when

they face a crisis[2] (Godfrey, 2005) but can also mediate the relationship between firms and the government by providing mutual benefits (Fan et al., 2013). Therefore, commitment to social responsibility is conducive to the long-term development of firms and benefits multiple stakeholders in terms of affecting corporate risk. In contrast, CSR has also been discovered to be a self-interest tool for management to cover up its corrupt behavior and pursue personal reputation (Jiraporn and Chintrakarn, 2013). Despite their CSR image, some Chinese companies are still plagued by various negative events, such as the bankruptcy of Tianjin Xinhang Fortune, which had previously won an award for being a "compassionate enterprise". Changsheng Biological, which donated 7.4 million worth of drugs following the Wenchuan earthquake, was also seriously negatively affected during the recent pandemic due to its involvement in the "fake vaccine" incident. The management of these firms leverages social responsibility as a self-interest tool to cover up its own corrupt behavior and pursue personal reputation, wasting corporate resources to maximize self-interest and resulting in greater firm risk.

Another stream of literature explores the benefit of CSR through signaling theory. CSR is an important corporate strategy that can send signals to the public that firms' performance is stable (Hassan, 2021), enabling stakeholder communication to construct reputational capital to increase firms' competitive advantage, such as attracting competitive institutional investors (Aguinis and Glavas, 2012), increasing customer loyalty (Luo et al., 2023), providing "insurance-like" protection for companies in the event of disruptive events (Christensen, 2016), and reducing cash flow risk. In addition, CSR reports, as an important source of nonfinancial information, broaden public access to information and reduce the risk of heterogeneous beliefs of investors due to information asymmetry.

Therefore, does management in China consider CSR information a risk management tool for companies to reduce their idiosyncratic risk, or is it a self-interest tool to cover up unethical behavior and shift risks to the company?

This paper examines the influence of CSR engagement on the idiosyncratic risk of publicly listed companies in China. We take the idiosyncratic volatility of stock prices as a proxy for a firm's idiosyncratic risk and find that CSR reduces this risk. Existing research has explored the impact of CSR on firm risk

[2] The following extreme case may illustrate the value of ESG engagement in China. In July 2021, the sudden flooding in Henan Province deeply affected everyone in China. Many enterprises actively practiced social responsibility through donations or practical actions to support the disaster area. Hongxing Erke, a Chinese-based sports brand that had typically kept a low profile, donated 50 million RMB worth of materials to the disaster area. Consumers quickly purchased many of the brand's various products to support the company for its donation, which gave a second chance to this firm on the verge of bankruptcy. It at least illustrates that the active practice of social responsibility built a good reputation for the firm and improved its ability to overcome risk.

according to the motivations of firms for practicing social responsibility. Some research has argued that managers are incentivized to practice CSR to cover up misconduct, thus increasing firm risk (Hemingway and Maclagan, 2004). In contrast, other studies argue that firms that are willing to practice social responsibility are less likely to hide negative news (Kim et al. 2014). Given the conflicting conclusions for firms in other markets, we empirically address this problem with firms' idiosyncratic risk in the Chinese financial market and find support for the view that CSR reduces corporate risk. We find that idiosyncratic risk is lower among firms that disclose CSR engagement information than among those without CSR reports, and the better the CSR performance is, the lower the idiosyncratic risk.

In addition, we perform a series of robustness checks to verify our baseline result, including accounting for omitted variables, using an alternative estimation method, addressing sample selection bias, using an alternative CSR measure, and estimating an instrumental variable (IV) regression. All results consistently prove the robustness of our baseline regression.

Furthermore, we perform some additional tests. (1) We test for complementarity between CSR information and non-CSR information. When non-CSR information is highly transparent, the complementary role of CSR information in reducing corporate risk is weaker. (2) We test the interplay between CSR and external supervision and find that CSR has a stronger effect on firms with more analyst attention, more analyst reports, and more media attention. This finding suggests that it is more credible that CSR is being practiced for social welfare than to cover up misconduct for firms with a better supervision environment. (3) We test for the effect of heterogeneity in corporate governance characteristics, including the concentration of ownership, the independent director ratio, and the share of institutional investors, on the impact of CSR practices. We show that the impact of CSR on idiosyncratic risk is stronger in firms with better corporate governance characteristics. (4) We find that retail investor attention mediates the relationship between CSR and idiosyncratic risk. CSR could result in an increase in investor attention, reducing the heterogeneity in investor beliefs and thus reducing a firm's idiosyncratic risk.

Our study contributes to the literature in three ways. First, this paper enriches and develops the theory of the determinants of firm idiosyncratic risk. Existing studies have explored investor sentiment (Chang and Dong, 2006), social media coverage (Zhou et al., 2019), trading mechanism constraints (Stambaugh et al., 2015), CSR performance beyond that in China (Mishra and Modi, 2013) and other factors on firm idiosyncratic risk. Our paper provides the impact of CSR performance on firm idiosyncratic risk in the Chinese stock market with many individual investors and thus could also shed light on individual investors'

behaviors worldwide.

Second, we provide an empirical basis for the economic consequences of CSR performance. Although the relationship has been studied in the extant literature, no uniform conclusion has been obtained (Luo and Bhattacharya, 2009; Mishra and Modi, 2013). With individual investors' limited attention theory and corporate governance theory, we explore the mechanism of CSR performance on idiosyncratic risk. We incorporate information transparency, the number of announcements, the percentage of independent directors, the shareholding of institutional investors, equity concentration, analyst and media attention, and investor attention into the research framework to reveal the channel through which CSR performance has an impact and provide clear causality identification for CSR performance and its economic consequences.

Finally, this paper elucidates the importance of corporate governance for sustainable development in an emerging financial market with many retail investors. Compared to developed capital markets, the Chinese financial market is notably different in the transparency of its financial information and in its marketization processes. Our paper provides empirical evidence that retail investors in China care about corporate CSR engagement; therefore, CSR could improve the efficiency of market information and reduce corporate risk.

Therefore, our research provides a unique perspective on testing the economic consequences of CSR in China considering the role of retail investors. Previous studies have demonstrated the information disclosure effect of CSR (He, Qin, Liu, & Wu, 2022) on a firm's idiosyncratic risk, and we further test the impact of CSR performance, which is measured by the CSR report rating. The Chinese stock market with many retail investors provides us with a good sample to study the role of retail investors in determining idiosyncratic risk in a data-rich environment.

The rest of the paper is organized as follows: Section 2 reviews the relevant literature and proposes our hypotheses. Section 3 introduces the research design. Section 4 presents the empirical results and robustness tests. We provide a further discussion in Section 5 with heterogeneity and mediation tests, and we conclude the paper in Section 6.

2. Theoretical analysis and hypotheses

2.1 Factors that affect firms' idiosyncratic risk

Idiosyncratic risk, which is measured by idiosyncratic volatility, has received considerable attention in finance research since it was introduced by Campbell (2001). Exploring the causes of idiosyncratic volatility (Stambaugh et al., 2015; Gu et al., 2018; Campbell et al., 2022), the external factors affecting idiosyncratic volatility (Jiang et al., 2009; Abdoh and Varela, 2017; Caglayan et al., 2020; Hao and Xiong, 2021; Li et al.,

2021) and the economic outcomes of idiosyncratic volatility (Ang et al., 2006; Berrada et al., 2013; Cao and Han, 2013; Cao et al., 2022) all have important theoretical and practical implications for managing portfolio risk and stabilizing financial markets.

Numerous scholars have considered idiosyncratic volatility (Dong et al., 2011; Durnev and Morck, 2003; Engle et al., 2022) to study the efficiency of market information. Berrada and Hugonnier (2013) suggest that when market information is incomplete, idiosyncratic volatility arises from firm-level idiosyncratic information and from errors in investor forecasts, which has led to two main theories: idiosyncratic information theory (Durnev and Morck, 2003; Yang et al., 2020) and noise trading theory (Kelly, 2014; Aabo et al.,2016).

Proponents of idiosyncratic information theory argue that the volatility of a firm's stock price, i.e., the part that cannot be explained by the market, is caused by the incorporation of firm-level idiosyncratic information into the stock price (Durnev and Morck, 2003), which reduces stock price synchronization and increases idiosyncratic volatility (Morck et al., 2000; Yang et al., 2020). Idiosyncratic volatility is caused by the incorporation of private information into asset prices. Based on the informed trading hypothesis, Jin and Myers (2006) argue that idiosyncratic volatility is negatively correlated with mispricing. In general, supporters of idiosyncratic information theory believe that the lower the information content in a stock price is, the higher the level of stock price synchronization and the lower the level of idiosyncratic volatility. That is, higher idiosyncratic volatility implies the incorporation of more firm-specific information.

Proponents of noise trading theory attribute idiosyncratic volatility to investor sentiment unrelated to specific information, which implies that noise trading weakens the link between stock prices and firm-specific information (Aabo et al., 2016; Caglayan et al., 2020; He et al., 2022). Stambaugh et al. (2015) link idiosyncratic volatility to arbitrage risk, arguing that short sellers face greater obstacles than do buyers; i.e., under short-selling restrictions, investor pessimism is not easily expressed, resulting in the tendency of stock prices to be overvalued, which is one of the causes of idiosyncratic volatility. In line with this view, Aabo et al. (2016) show that stock market overvaluation is more prevalent than undervaluation. They show that idiosyncratic volatility is positively associated with mispricing and is dominated by overpricing. Noise trading theory mainly argues that a high level of idiosyncratic volatility is caused by the dominance of noise traders in financial markets due to low levels of information transparency.

Debates persist between proponents of idiosyncratic information and noise trading theory; however, the differences in conclusions may be caused by the different levels of financial market development and

information transparency among countries. Lee and Liu (2011) argue that the correlation between idiosyncratic volatility and information transparency varies under different levels of market information efficiency. In a low information efficiency market, which has a high proportion of noise trading, idiosyncratic volatility is negatively correlated with information transparency. In a high-information-efficiency market in which stock prices are dominated by information, information transparency is positively correlated with idiosyncratic volatility. Hsin (2010) suggests that idiosyncratic volatility reflects uncertainty about firm-level specific information rather than about firm-specific information. In comparison with that of developed countries, China's financial market is still being developed and improved. Until 2020, investments by retail investors accounted for 52.6% of the total market value and 99.6% of all investors. The heterogeneous beliefs of retail investors can effectively explain stock returns in the Chinese stock market. In this emerging financial market, idiosyncratic firm volatility is mainly dominated by noise traders. Thus, high levels of idiosyncratic volatility are more representative of the uncertainty in firm-level specific information, which represents the heterogeneity in investor beliefs, rather than the incorporation of firm-level specific information into stock prices. Table A1 in the appendix provides a summary of the core literature on the determinants of IVOL.

2.2 Corporate social responsibility

There are currently two competing views on the motivation behind corporate CSR engagement: shareholder benefits vs. stakeholder benefits.

From the shareholder perspective, the fundamental responsibility of corporations is to maximize shareholder wealth or corporate profits, and CSR is practiced to achieve this goal in a reasonable and legitimate manner. CSR engagement must balance the interests of multiple stakeholders (Harjoto and Laksmana, 2016; Mason and Simmons, 2014). However, CSR may serve managers more than it does shareholders (Hemingway and Maclagan, 2004). Managers benefit from the CSR banner, while the risks are borne by stakeholders such as shareholders, employees, and consumers. Becchetti et al. (2015) suggest that practicing social responsibility reduces the flexibility of firms in responding to productivity shocks, which undoubtedly exposes them to unnecessary risks.

Existing studies have discussed the impact of CSR performance in terms of both negative and positive aspects. First, in terms of the positive impact based on the stakeholder perspective, firms should regard CSR engagement as a tool for sustainable development, and managers should view corporate value from a long-term perspective and build a social reputation among stakeholders through CSR engagement (Reber et al., 2022). When firms experience disruptive events, CSR engagement could moderate negative investor

reactions (Christensen, 2016; Afrin et al., 2021). Existing research suggests that CSR can help firms improve their relationships with stakeholders and build reputational capital (Reber et al., 2022), attract customer resources, gain goodwill and trust from government, and thus achieve a greater market share (Baron, 2008). Therefore, social responsibility provides firms with more pricing power, and firms are able to sell corporate social products with CSR features (Hilger et al., 2019). Furthermore, CSR can improve product profitability and reduce corporate systemic risk (Albuquerque et al., 2019), enhance corporate decision-making efficiency and innovation (Cook et al., 2019; Hao & He, 2022), deter management misconduct (He et al., 2022), and reduce the cost of equity capital and debt financing (Gao et al. 2016; Luo et al., 2023). Ultimately, CSR can enhance corporate value and achieve sustainable development.

In contrast, being socially responsible may have negative effects. First, CSR can increase corporate costs, take up a large amount of corporate resources, and thus reduce corporate value. Lu et al. (2021) find that CSR can lead to a decrease in profitability and shareholder value. Second, CSR can be used as a self-interest tool for management. The benefits of CSR are enjoyed by management, but the risks and costs are borne by shareholders (Barnea and Rubin, 2010). Management invests in social responsibility for the purpose of enhancing the firm's social status and personal image and laying the foundation for the future careers of its employees (He et al., 2023). The costs of management's overinvestment in social responsibility for private gain are borne by all shareholders, which in turn undermines the long-term growth of the firm (Chintrakarn et al., 2020).

2.3 Hypothesis development

The proportion of retail investors in China is higher than that in developed countries, and the efficiency of information dissemination is lower. As a result, speculative and irrational trading behavior increases noisy trading in the Chinese stock market. It is proven that idiosyncratic stock volatility is caused mainly by noise trading in China. Therefore, we aim to explore whether CSR engagement could inhibit a firm's idiosyncratic risk by deterring investor information asymmetry and reducing noise trading.

CSR engagement helps mitigate the internal agency problems caused by information asymmetry, such as insider trading (Gao et al., 2014), tax avoidance (Lanis and Richadson, 2015) and other behaviors that infringe on stakeholders' interests, thus reducing corporate risk due to negative information hoarding. Managers are more self-disciplined if their firms are more engaged in CSR (Gao et al., 2014). On the basis of the reputation insurance effect, CSR performance helps reduce corporate risk in myriad ways. Firms use CSR as a strategic tool to sustain their relationships with stakeholders. By alleviating external information

asymmetries, CSR enhances corporate reputation. Chiang (2017) considers CSR a type of strategic investment that enables firms to develop a competitive advantage. Moreover, CSR engagement creates a positive reputation, thereby improving customer loyalty, and such a reputation helps firms develop a competitive advantage, which reduces the uncertainty in cash flow stability and firm idiosyncratic risk (Bhattacharya et al., 2020).

In addition to their reputational insurance effect, CSR reports could also act as informational supplements (Kim et al., 2014). Cui and Na (2018) found that CSR reports help to reduce information asymmetry in the U.S. market. Improving information disclosure provides a way to reduce information asymmetry among stakeholders (Hefin et al., 2005). Therefore, firms should consider the long-term value of the firm and disclose high-quality financial reports to increase their information transparency (Lys et al., 2015; Kim et al., 2014). CSR engagement provides investors with nonfinancial information to supplement their financial information in assessing corporate risk. Investors can further verify their previous judgments with CSR information, which might reduce the heterogeneity in investor beliefs and reduce firm-level idiosyncratic risk. Naughton et al. (2018) discover that CSR disclosures generate positive abnormal stock returns and a lower cost of capital (Ghoul, et al., 2011). Therefore, CSR engagement contributes to the reduction in internal and external information asymmetries, which helps build good relationships and foster trust between companies and their stakeholders (Lins et al., 2017). These factors help firms recover from financial distress (Choi and Wang, 2009) and relax their financing constraints (Ioannou and Serafeim, 2015), both of which reduce firm risk (Bhattacharya et al., 2020). Dong et al. (2016) found that effective CSR disclosures help analysts focus on specific firms and improve the accuracy of their predictions in the Dutch financial market. Reber et al. (2022) also confirm that CSR engagement helps mitigate firms' idiosyncratic risk in the U.S. market. Stuart et al. (2020) also found that CSR disclosures facilitate the communication of information between firms and investors and reduce the risks caused by cash flow instability or negative information shocks.

Based on the above discussion, we propose our first hypothesis:

H1a: CSR reduces a firm's idiosyncratic risk.

Moreover, CSR engagement provides managers with a way to cover up misconduct, which may help them keep their poor operations hidden (Payne and Raiborn, 2018; Col and Patel, 2016). In addition, managers have an incentive to opportunistically overinvest in CSR to enhance their personal reputations for their future careers at the expense of stakeholder interests (Jiraporn and Chintrakarn, 2013). Due to

increasing agency costs, the damaging self-interest of managers leads to increased firm risk. From the shareholder perspective, the primary goal of a firm is to maximize profits rather than to give altruistically. Becchetti et al. (2015) show that firms with better CSR engagement have less flexibility in responding to external shocks because of the need to ensure stakeholder welfare, which in turn increases firm risk. CSR engagement also increases expenses, operating costs and uncertainty, which eventually increases firm risk. The above analysis leads to our hypothesis H1b:

H1b: CSR increases a firm's idiosyncratic risk.

Given the above conflicts regarding the possible impact of CSR, we argue that in the current data-rich world, CSR could play a nonfinancial informational and complementary role, an external supervisory role and an internal governance role in reducing a firm's idiosyncratic risk. Therefore, our ex ante expectation is that hypothesis H1a will be supported, and we further verify this hypothesis and test the possible channels with our empirical results.

3. Data and empirical design

3.1 Data

Our sample includes all Chinese A-share companies listed from 2008 to 2019[3]. The financial indicators, stock information and corporate governance data are obtained from the CSMAR and CNRDS databases. The CSR score comes from Rankins CSR Ratings, which is an authorized third-party rating agency for CSR ratings. We exclude the following firms from the data: (1) companies not listed in the Shanghai and Shenzhen A-share markets, (2) special treatment firms, (3) financial firms, and (4) companies with missing financial data. All the continuous variables are winsorized at the 1st and 99th percentiles. Finally, we obtain a total of 15,790 observations, of which 5,600 disclose social responsibility reports.

3.2 Variables

According to Hao & Xiong (2020), we adopt the Fama-French three-factor (FF-3) model to calculate a firm's idiosyncratic volatility (IVOL), which represents the firm's idiosyncratic risk. The FF-3 model better captures common risk factors at the market level than the simple market model, and we further apply the FF-5 model to calculate IVOL in the robustness check. Following Ang et al. (2006) and Hao & Xiong (2021), we estimate the model and calculate IVOL at the daily level as follows:

[3] The latest CSR rating was issued in January 2021, which evaluated the CSR reports of listed firms reported in April, 2020. 2020 CSR reports reflect the firm's CSR activities in 2019. However, RKS changed the calculation method of CSR report ratings in 2021,so our CSR data are up to the date, which is published by RKS in 2020 and reflect firms' CSR activities in 2018.

$$R_{i,t} - r_{f,t} = \alpha_i + \beta_i^{MKT}(R_{m,t} - r_{f,t}) + \beta_i^{SMB} SMB_t + \beta_i^{HML} HML_t + \varepsilon_{i,t} \quad (1)$$

$$Ivol_{i,m} = \sqrt{Var(\varepsilon_{i,t})}\ \sqrt{N_{i,m}} \quad (2)$$

$$Ivol_{i,T} = \sum_{m=1}^{M} Ivol_{i,m} / M \quad (3)$$

where $R_{i,t}$ is the return of stock i on day t, $R_{m,t}$is the market return on day t, $r_{f,t}$is the risk-free rate on day t, SMB_t is the firm size on day t, and HML_t is the book-to-market ratio on day t. $N_{i,m}$ is the number of trading days for stock i in month m, and we deleted the observations with N <17. M is the number of trading months for stock i in year T. Monthly idiosyncratic risk $Ivol_{i,m}$ is obtained by multiplying the daily standard deviation and the square root of the number of monthly trading days for the stock. Idiosyncratic risk for stock i in year T $IVOL_{i,T}$ is measured as the monthly mean residual standard deviation for stock i.

Following Deng et al. (2013) and Jiao (2010), the CSR rating is used as the proxy variable for the quality of a firm's CSR engagement and is logarithmically transformed.

Following Hutton et al. (2009), we use earnings management to construct an information opacity index. We use the modified Jones model by year and industry (Dechow and Dichev, 2002) to estimate discretionary accruals. The sum of the absolute value of the discretionary accruals in the previous three periods is used to measure firm opacity. The calculation is as follows:

$$\frac{TA_{i,t}}{Asset_{i,t-1}} = \alpha_{i,t}\frac{1}{Asset_{i,t-1}} + \alpha_2\frac{\Delta REV_{i,t} - \Delta REC_{i,t}}{Asset_{i,t-1}} + \alpha_3\frac{PPE_{i,t}}{Asset_{i,t-1}} + \varepsilon_{i,t} \quad (4)$$

where $TA_{i,t}$=$NI_{i,t}$-$CFO_{i,t}$ is the current net profit of the company minus its current cash flow from activities, $Asset_{i,t-1}$ is the total assets at the end of the year with a one-period lag, $\Delta REV_{i,t}$ is the change in sales revenue, $\Delta REC_{i,t}$is the increase in accounts receivable, and $PPE_{i,t}$ is current fixed assets. The residual $\varepsilon_{i,t}$ from Equation (4) denotes the discretionary accrual (DA).

$$Opaque_{i,T} = \text{abs}(DA_{i,T-1}) + \text{abs}(DA_{i,T-2}) + \text{abs}(DA_{i,T-3}) \quad (5)$$

where abs($DA_{i,T-1}$) is the absolute value of discretionary accruals for company i in period T-1. $Opaque_{i,T}$ is the information opacity of company i in year T.

Analyst divergence is calculated as follows:

$$Disp_{i,T} = \frac{std(Feps_{i,T})}{abs(Meps_{i,T})} \quad (6)$$

where $std(Feps_{i,T})$ is the standard deviation of the EPS forecast from all analysts for company i in year T and abs($Meps_{i,T}$) is the company's actual EPS in year T.

The definitions of the other control variables are listed in Table 1.

<Insert Table 1 about here>

3.3 Descriptive statistics

The sample descriptive statistics are presented in Table 2. The average CSR score is 37.78, and the maximum and minimum values are 89.03 and 13.33, respectively, indicating that the quality of the average CSR disclosure in China is not high and that the differences between different companies are large. The mean value of IVOL is 0.071, with a standard deviation of 0.022, and the difference between the minimum value, 0.030, and the maximum value, 0.173, is 0.143, indicating that there are also substantial differences in idiosyncratic volatility among companies. According to the correlations in Table 3, the quality of CSR disclosures is negatively correlated with corporate idiosyncratic risk.

<Insert Table 2 about here >

<Insert Table 3 about here >

3.4 Benchmark model

In this study, Equation (7) is used to identify the relationship between the quality of CSR and the idiosyncratic volatility of firms.

$$Ivol_{i,T+1} = \alpha + \beta_1 csr_{i,T} + \sum_{i=1}^{16} \beta_i Control_{i,T} + year + ind + \varepsilon_{T+1} \quad (7)$$

where α is the intercept, β_i represents the coefficients, and ε is the residual term. We further control for year and industry effects in the model. If β_1 is significantly negative, then CSR could reduce idiosyncratic risk. For the control variables, John et al. (2008) show that the larger the firm size (lnasset) is, the lower the firm's idiosyncratic risk; that leverage (lev) is positively correlated with idiosyncratic risk (Leonardo et al., 2015); and that return on total assets (ROA), book-to-market ratio (BM), firm age (Age), and operating cash flow ratio (cash) are negatively correlated with idiosyncratic risk (Kyaw, 2020; Mishra & Modi, 2013). Zeng (2021) shows that media coverage affects investor behavior and increases investor heterogeneous beliefs. Zhang (2006) and Hao & Xiong (2021) suggest that idiosyncratic risk is positively related to the turnover ratio. Gul et al. (2010) show that high equity concentration hinders information transmission and increases the propensity for opportunistic behavior. Therefore, we also expect these control variables to have a positive

sign. In addition, we expect the firm growth rate (growth) to be positively related to idiosyncratic risk (Cai et al., 2016).

4. Empirical results

4.1 Basic regression

Table 4 reports the results for the effect of CSR disclosure and CSR quality on a firm's idiosyncratic risk. Column (1) shows the effect of the choice to make a CSR disclosure on IVOL. The coefficient on the CSR dummy is -0.0021, which is significant at the 1% level, indicating that corporations with CSR engagement disclosure reduce their idiosyncratic risk. Columns (2)-(4) show the impact of CSR quality on idiosyncratic risk. In Column (4), after controlling for year and industry effects and other control variables, the coefficient on CSR is shown to be significantly negative (-0.0026) at the 1% level. These results suggest that information on corporate CSR engagement could help reduce a firm's idiosyncratic risk.

<Insert Table 4 about here >

From the control variable results, we see that a high turnover rate, high leverage (Lev), a high growth rate (Growth) and a low book-to-market ratio (BM) lead to high levels of idiosyncratic risk and that a large firm size (Size), high cash flow (Cash) and a high rate of return (ROA) lead to lower idiosyncratic risk. These results are consistent with previous research, which proves that CSR can provide investors with additional nonfinancial information, thus reducing information asymmetry and further reducing heterogeneity in investor beliefs, which in turn also reduces a firm's idiosyncratic risk.

4.2 Robustness tests

Although our baseline results show that CSR is negatively correlated with a firm's idiosyncratic risk, omitted variables or self-selection bias may cause incorrect identification. To verify the robustness of our results, the following robustness tests are carried out. (1) We add more control variables (DISP, Analyst, Indp) to Equation (7) to further control for other confounding factors. (2) The Fama-French five-factor (FF-5) model is used to recalculate IVOL, the dependent variable, and an alternative CSR ranking by Hexun is used as the independent variable. (3) We use the Fama-Macbeth two-step regression and firm fixed effects to re-estimate the model. (4) PSM and the Heckman two-step regression are used to overcome sample selection bias. (5) Two-stage least squares (2SLS) is used to resolve endogeneity issues. (6) A difference-in-differences (DID) design considering the introduction of mandatory CSR disclosure regulation is used.

4.2.1 Confounding factors

Since idiosyncratic risk may also be affected by analyst dispersion (DISP) (Hou and Loh, 2016), the share of independent directors on the board of directors (Indp) (Gul et al., 2010) and analyst attention (Hutton et al., 2009), we further control for the above three variables to mitigate the impact of these important confounding factors. Table 6 reports the results after adding the above three control variables. Column (1) reports the impact of CSR disclosures on a firm's idiosyncratic risk, while Column (2) presents the impact of CSR quality on a firm's idiosyncratic risk. In Table 5, after further controlling for other possible confounding factors, the regression results remain consistent with the main results.

<Insert Table 5 about here >

4.2.2 Alternative idiosyncratic risk measure and CSR rating

We recalculate our dependent variable with the FF-5 model instead of the FF-3 model and obtain ivol5 as our new indicator for a firm's idiosyncratic risk. In Table 6, Column (1), our result does not change with the use of an alternative risk measure. Next, we obtain CSR ratings from a different rating agency, Hexun. Table 6, Columns (2)-(3), reports the regression results for the effect of the Hexun CSR rating on the different measures of a firm's idiosyncratic risk. The results are consistent with the baseline regression results, indicating the robustness of our baseline results to the use of different indicators.

<Insert Table 6 about here>

4.2.3 Firm fixed effects and cross-sectional regressions

In our main test, we control for a series of firm-level variables. We further include firm fixed effects to resolve the omitted variable issue. Driscoll and Kraay's (1998) robust standard errors are applied to address heteroskedasticity and autocorrelation. The results in Column (1) of Table 8 show that CSR is significantly negative at the 10% significance level; thus, we have a stronger chance of proving the robustness of our previous results. To address the underestimation of standard errors due to the cross-sectional correlation in the residuals, we use the Fama-Macbeth two-step regression to perform a cross-sectional regression for each year. From this, we obtain the average value of the time series coefficients with Newey–West standard errors. The results shown in Column (2) of Table 7 show a negative correlation between CSR and idiosyncratic risk at the 5% significance level, which is consistent with our baseline regression results.

<Insert Table 7 about here>

4.2.4 Sample selection bias

The above negative correlation between CSR and a firm's idiosyncratic risk may be affected by sample selection bias. For example, the firms that make CSR disclosures may have certain similar characteristics. Therefore, we use the Heckman two-step regression model and PSM to address the endogeneity problems caused by potential sample selection bias. In the first stage, the model for selection into CSR disclosure is constructed, and the probability of making a CSR disclosure is estimated by probit regression. In the PSM regression, the companies in the CSR group are matched one-to-one with firms that did not disclose their CSR practices by nearest-neighbor matching without replacement. The results are presented in Table 8. CSR is still shown to be significantly negative at the 5% level, which also confirms our previous findings.

<Insert Table 8 about here>

4.2.5 Two-stage least squares regression

We conduct a 2SLS estimation using the industry average for CSR as our IV, following Cai et al. (2016). Unfortunately, the most commonly used IV in the U.S. market, whether a state supports Democrats or Republicans, cannot be used in our study. In Table 9, the dependent variable in the first stage (Column (1)) is the quality of CSR reports, the independent variable is the industry average for CSR, the control variables are those used in the main regression, the p value of the F-statistic is 0.000, and the industry average for CSR is significantly positively correlated with the quality of CSR at the 1% significance level. The regression results for the second stage, shown in Table 9, are still significant at the 5% level.

<Insert Table 9 about here>

4.2.6 DID test

Since 2008, the Chinese government has forced numerous listed companies to disclose their CSR engagement and encouraged other companies to voluntarily disclose CSR. Therefore, we consider the regulation in 2008 as an external shock and construct a DID model as Equation (8) to verify the causal relationship between CSR and IVOL.

$$ivol_{i,T+1} = \alpha + \beta_1 \mathrm{Treat2008}_i * time2008 + \beta_2 \mathrm{Treat2008}_i + \beta_3 time2008 + \sum \gamma_i X_{i,T} + \varepsilon_{T+1} \quad (8)$$

where $Treat2008_i$ indicates whether the firms disclosed CSR reports in 2008; it equals 1 if the firm disclosed CSR in 2008 and zero otherwise. $time2008$ is a time dummy that equals one if the current year is after 2008 and zero otherwise. The coefficient of interest is β_1. A significantly negative β_1 indicates that IVOL is reduced after CSR disclosure. From the results in Table 10, we observe negative coefficients for both FF-3 and FF-5 calculated IVOL, which further verifies our baseline conclusions.

<Insert Table 10 about here>

5. Further analysis

5.1 CSR as an informational complement

Stuart et al. (2020) argue that firms disclose their CSR for reputation management. Therefore, when corporate financial performance is poor, CSR might be helpful for building a good reputation through nonfinancial information. Moreover, CSR activities indicate that managers have a higher ethical standard, and companies with better CSR performance are more transparent in their financial reports. Due to the limited attention of individual investors (Hou and Loh, 2016), when financial information is sufficient, the attention that investors give to CSR information declines. In this case, the effect of CSR on information is weakened. In other words, CSR could provide more useful information for companies with more informationally opaque firms than for companies that are highly informationally transparent. Thus, the impact of CSR on a firm's idiosyncratic risk is stronger in firms that are informationally opaque.

In Table 11, Columns (1)-(2), CSR reduces idiosyncratic risk in small firms only, as small firms are normally less transparent than large firms. In Columns (3)-(4), we further measure and compare firm transparency by informational opacity (Hutton et al., 2009) using discretionary accruals, which are estimated with the modified Jones model (Dechow et al., 1995). The results show that CSR impacts only those firms that are informationally opaque and reduces their risk. When the transparency in financial reports is high, the role of CSR as an informational complement is weakened by the provision of incremental information in addition to that in the financial reports. This is because the quality of accounting information is the main type of information with which investors analyze firms (Byard and Shaw, 2003). Therefore, assuming that individual investors have limited attention (Hou and Loh 2016), when financial information is sufficient, the attention that investors give to CSR information declines. Thus, the marginal contribution of social responsibility may not be obvious.

In Columns (5)-(6), the negative relationship between CSR quality and idiosyncratic risk is shown to be more pronounced in the group with fewer company announcements. Company announcements, as the direct information sources of a firm's financial information, could provide investors with more information, thus weakening the role of CSR reports in providing incremental information to reduce information asymmetry. These results suggest that CSR information is an important complement to other company information. When information opacity is high, CSR report disclosure can provide more effective information to investors and effectively improve the market information environment, thus reducing the risk to companies caused by the heterogeneous beliefs of investors due to information asymmetry.

<Insert Table 11 about here>

5.2 Interplay between CSR and external supervision

As professional participants in the stock market, analysts play an important role in the external monitoring and information transmission of companies. Axjonow et al. (2018) find that the reputational effect of the corporate disclosure of CSR reports is not significant for nonprofessional stakeholders but exerts a positive influence on professional stakeholders through reputational channels. Dhaliwal et al. (2012) find that active CSR attracts more analyst attention and reduces analyst forecast errors, improving analyst forecast accuracy (Dong et al., 2016; Muslu et al., 2019). In turn, increased analyst attention plays a supervisory role in firms, constrains management's self-interest, and reduces a firm's information asymmetry, which helps reduce a firm's idiosyncratic risks (Yu, 2008). In addition, analysts also play the role of information transmission by publishing research reports (Bushman et al., 2004), which significantly influence investors' judgments and beliefs. Analysts use their professional knowledge to interpret information and reduce the heterogeneity in investor beliefs. An increasing number of analyst reports help investors make similar judgments. Therefore, we expect CSR to reduce a firm's idiosyncratic risk more for firms with a larger number of analysts and reports.

With the development of online media, investors' access to information is no longer limited to paper media, and online media plays an increasingly important role in information transmission. Fang and Peress (2009) find that media reports can reduce the cost of information searching. In addition, media coverage could reduce management's opportunistic behavior, which plays an external governance role, making firms more active in social responsibility and improving the quality of information disclosure (An et al., 2022) to

reduce information asymmetry (Fang and Peress, 2009), thereby also reducing the risk caused by investors' heterogeneous beliefs. Therefore, we expect CSR to reduce a firm's idiosyncratic risk more for firms with a higher level of media coverage.

Table 12 shows that the coefficient on CSR is significant only for firms with a larger number of analysts and reports and a higher level of media coverage. These results suggest that CSR could reduce a firm's idiosyncratic risk among firms with stronger external supervision pressure.

<Insert Table 12 about here>

5.3 Effect of heterogeneity in corporate governance characteristics

We test the effect of heterogeneity in corporate governance indicators, including shareholder concentration, the independent director ratio and institutional ownership status, on the effect of CSR disclosures on a firm's idiosyncratic risk.

The positive impact of CSR on corporate default risk is mainly due to the existence of management agency costs rather than to the agency costs of large shareholders. For large shareholders with a high equity concentration, the marginal cost of supervising managers is lower, and the ability and willingness of shareholders to supervise managers are higher (Johnston et al., 2019). In contrast, driven by self-interest and opportunism, major shareholders engage in behaviors to encroach on the interests of minority shareholders (Wang and Shailer, 2015). Therefore, we expect the effect of CSR on a firm's idiosyncratic risk to be more significant among firms with less concentrated ownership.

Independent directors play an important role in monitoring managers and controlling shareholders (Davidson et al., 2005). Independent directors are generally thought to protect the interests of minority shareholders and tend to exert pressure on managers to disclose more information, including CSR engagement (Haniffa and Cooke, 2005). Shaukat et al. (2016) show that independent directors have a significantly positive impact on CSR performance, while Beji et al. (2019) also confirm that there is a significantly positive correlation between the number of independent directors and CSR. We argue that independent directors play a role in improving corporate CSR engagement through governance, which reduces the heterogeneity in investor beliefs to reduce a firm's idiosyncratic risk. Therefore, in companies with a large proportion of independent directors, CSR has a more significant inhibitory effect on a firm's idiosyncratic risk.

In addition, institutional investors play the role of external monitors, which could improve the company's information transparency and reduce its information asymmetry. Boone and White (2015) also find that a higher share of institutional investors induces managers to disclose more company information to attract analysts' attention, improve the company's informational transparency, and reduce the company's risk. Therefore, we argue that in firms with many institutional investors, CSR has a more significant inhibitory effect on a firm's idiosyncratic risk.

Table 13 shows that the coefficient on CSR is significant only for firms with less concentrated ownership, a higher share of independent directors, and more institutional investors. These results suggest that CSR could reduce a firm's idiosyncratic risk among firms with better corporate governance. For firms with poorer governance, investors may not trust their CSR information because such firms may be attempting to mask misconduct, so CSR cannot effectively reduce those firms' risk.

<Insert Table 13 about here>

5.4 Exploring Channels: Investor attention

It is necessary for investors to pay attention to corporate CSR engagement for CSR to affect corporate risk. Attig et al. (2014) show that media reports on firms practicing CSR in the U.S. have attracted the attention of an increasing number of investors. Therefore, CSR engagement helps reduce excessive risk-taking by firms, increase attention from investors and reduce the risk of instability in future cash flows. Hao & Xiong (2021) further conclude that investor attention could affect a firm's idiosyncratic risk in the Chinese stock market. Therefore, we propose that CSR could reduce a firm's idiosyncratic risk by attracting attention from investors. We identify this relationship with Equations (9)-(11):

$$Ivol_{i,T+1}=a_0+a_1 csr_{i,T}+\sum_{d=1}^{16} a_{1+d} Control_{i,T} + year + ind + \varepsilon_1 \quad (9)$$

$$BD2_{i,T}=b_0 + b_1 csr_{i,T} + \sum_{d=1}^{16} b_{1+d} Control_{i,T} + year + ind + \varepsilon_2 \quad (10)$$

$$Ivol_{i,T+1}=c_0 + c_1 csr_{i,T} + c_2 BD2_{i,T} + \sum_{d=1}^{16} c_{3+d} Control_{i,T} + year + ind + \varepsilon_3 \quad (11)$$

According to the steps of the mediation effect test, when a_1 is significant and b_1 and c_2 are jointly significant, there is an intermediary effect. When this occurs, if c_1 is not significant, then the intermediary effect is complete. If c_1 is significant and b_1c_2 and c_1 are of the same sign, then there is a partial intermediary effect; if b_1c_2 and c_1 have different signs, then there is a masking effect. According to the results in Table 13,

CSR increases investor attention, and investor attention has a partially mediating effect in reducing corporate risk.

<Insert Table 14 about here>

6. Conclusions

This paper empirically examines the impact of CSR information disclosures on idiosyncratic risk in the Chinese stock market, which is dominated by retail investors. Unlike institutional investors, retail investors may have different attitudes toward corporate CSR engagement. We conclude that CSR information disclosures can reduce a firm's idiosyncratic risk in China, and the higher the CSR quality is, the greater the decrease in idiosyncratic risk. The attention of individual investors partially mediates this effect; i.e., attention from individual investors accelerates the dissemination of information in the financial market. In addition, we find that CSR information disclosures complement the firm's non-CSR information disclosures. The effects of CSR reports are much stronger in firms that are more informationally opaque or have better corporate governance and external supervision. In general, CSR information disclosures enhance the informational efficiency of the stock market and reduce a firm's idiosyncratic risk.

On the basis of our results, we argue that regulators should increase supervision to introduce a governance-oriented CSR rating system, formulate more reasonable and detailed CSR disclosure rules and rating standards to further improve the influence and credibility of CSR reports, and prevent enterprises from using CSR in self-interested ways, such as using it as a tool to protect their reputation. In addition, analysts and institutional investors should take responsibility for corporate governance, reduce the proportion of noise traders and improve the informational efficiency of the Chinese stock market by focusing on CSR information disclosures. Furthermore, corporate information should be released through multiple channels so that nonfinancial corporate information such as CSR reports can be easily accessed by the public. Individual investors and analysts view the decline in corporate value caused by poor CSR information in the same way. Improving insincere or low-quality CSR should be a long-term corporate development strategy.

The government should establish a more perfect social responsibility information disclosure mechanism and strengthen the management of CSR report quality. Third-party supervisory rating agencies should be encouraged to strengthen the supervision of CSR disclosure quality and try to build a governance-oriented CSR rating system to formulate more reasonable and detailed CSR disclosure rules and rating standards.

Further preventing enterprises from using CSR as a self-interest tool to protect their reputation to improve the influence and credibility of CSR reports enables investors to obtain more effective information from corporate reports and improves the information environment of China's capital market.

This paper provides an important addition to the existing related studies, but there are still shortcomings that need to be further explored. The measurement of CSR performance might be inaccurate. Although there are many rating agencies providing CSR scores, accurately assessing CSR performance remains a challenging task. CSR information involves multiple dimensions, such as holistic (M), content (C), and technical (T) dimensions. This paper investigates how the quality of CSR information affects the idiosyncratic risk of the company, and there is no breakdown for the quality dimensions of CSR disclosure. In future research, the quality of social responsibility information disclosure can be divided into multiple dimensions to obtain a clearer understanding of the role of the quality of disclosure of each dimension of CSR information on idiosyncratic risk.

Our paper aims to understand the impact of the quality of CSR report, which is measured by the RKS ratings. Most of the recent research focus on the CSR performance using Hexun or Huazheng rating, which mainly measures the quality of the ESG activity. Therefore, our research provide important policy recommendations on the improvement of CSR report disclosure quality based on the corporate ESG activities.

Data Availability Statement

The datasets analyzed during the current study are available in the Harvard Dataverse repository.

https://doi.org/10.7910/DVN/QADOH3

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Table 1 Variable definitions

Variable type	Variable name	Definition
Dependent variable	Ivol	The idiosyncratic risk of firm i in period T. See Equation (1) for details.
Independent variables	Csr_dum	Dummy variable for corporate social responsibility (from Rankins). If a disclosure is made, its value is one; otherwise, its value is zero.
	Csr	Log of Rankins CSR Ratings score in period T, using data from Rankins.
Control variables	Media	Log of one plus the annual number of news coverage events about the security (from CSMAR) in period T.
	Size	Log of the firm's total market value as of the end of the fiscal year.
	Tover	Log of the volume of shares traded divided by the total number of shares, used to measure stock activity.
	Lev	The debt-to-assets ratio for company I in period T.
	BM	The book-to-market assets ratio, measured as of the end of the fiscal year.
	Analyst	Log of one plus the number of analysts who track and analyze company i in year T.
	ROA	The firm's total profit divided by the average balance of shareholder'' equity as of the end of the fiscal year.
	STDROA	Variance of corporate return on total assets over the past five years.
	HH5	The shareholding ratio of the top five shareholders as of the end of the fiscal year.
	Tbq	The firm's market value divided by its total assets as of the end of the fiscal year.
	Cash	The net cash flow from operating activities in year T divided by total assets.
	Opaque	The transparency of firm i's financial information. See Equation (5) for details.
	Indp	The ratio of independent directors to the total number of directors as of the end of the fiscal year.
	DISP	The average deviation between each analyst's most recent earnings forecast and actual earnings divided by the absolute value of the stock's actual earnings per share for the current period, as shown in Equation (6).
	Growth	The firm's revenue growth for the current period divided by previous year's revenue.
	Age	Log of one plus the current year minus the year in which company i was listed.
	SOE	The nature of the company's property rights at the end of year. For state-owned enterprises, it equals one; otherwise, it is zero.
Grouping variables	Report	Log of one plus the quantity of research reports published by company i in period T. If the number of reports is higher than the median for the group, the variable equals one; otherwise, it is zero.
	Account	Logarithm of one plus the number of company announcements (from CSMAR) in period T. If the number of announcements is higher than the median for the group, the variable equals one; otherwise, it is zero.
	INI	The ratio of institutional investors to all shareholders for firm i in period T. If institutional investors hold more stocks than are held by such investors for the median firm in the group, the variable equals one; otherwise, it is zero.
Mediating variable	Attention	Log of the sum of the number of internet searches for the firm i's stock symbol, company abbreviation, or full name in period T.

Table 2 Descriptive statistics

Variable	N	Mean	S.D.	Min.	P25	P50	P75	Max.
Ivol	5,600	0.071	0.022	0.030	0.054	0.068	0.085	0.173
CSR	5,600	3.632	0.304	2.590	3.430	3.614	3.828	4.489
Tbq	5,600	1.840	1.185	0.906	1.119	1.444	2.074	9.714
BM	5,600	0.473	0.276	0.001	0.263	0.413	0.627	1.243
Lev	5,600	0.503	0.193	0.048	0.362	0.515	0.648	1.088
ROA	5,600	0.042	0.054	-0.290	0.016	0.035	0.065	0.207
Cash	5,600	0.053	0.071	-0.213	0.013	0.051	0.094	0.255
STDROA	5,600	0.022	0.031	0.001	0.006	0.013	0.026	0.501
Size	5,600	23.140	1.350	19.080	22.130	23.020	24.040	26.000
Growth	5,600	0.169	0.441	-0.653	-0.016	0.106	0.254	4.124
HH5	5,600	53.770	16.520	7.286	41.940	54.060	64.640	98.780
Tover	5,600	5.524	0.801	3.430	5.004	5.560	6.119	7.168
Media	5,600	3.957	0.938	0.000	3.584	4.234	4.466	6.810
Age	5,600	2.549	0.445	1.099	2.197	2.639	2.890	3.367
Opaque	5,600	0.199	0.228	0.006	0.087	0.142	0.236	5.467

Table 3 Correlation table

(obs=5600)	Ivol	Csr	Tbq	BM	Lev	ROA	Cash	STDROA	Size	Growth	HH5	Tover	Media	Age
Ivol	1													
Csr	-0.157***	1												
Tbq	0.157***	-0.134***	1											
BM	-0.278***	0.138***	-0.617***	1										
Lev	-0.009	0.098***	-0.431***	0.192***	1									
ROA	-0.076***	0.0150	0.303***	-0.218***	-0.399***	1								
Cash	-0.071***	0.055***	0.182***	-0.112***	-0.263***	0.422***	1							
STDROA	0.051***	-0.069***	0.105***	-0.136***	-0.100***	0.046***	0.069***	1						
Size	-0.300***	0.434***	-0.473***	0.464***	0.505***	-0.060***	-0.054***	-0.130***	1					
Growth	0.024*	-0.007	0.0100	-0.081***	0.043***	0.163***	0.054***	0.067***	0.041***	1				
HH5	-0.080***	0.262***	-0.130***	0.135***	0.091***	0.090***	0.124***	0.026*	0.364***	0.030**	1			
Tover	0.207***	-0.238***	0.255***	-0.393***	-0.069***	-0.121***	-0.095***	0.0140	-0.428***	-0.00500	-0.548***	1		
Media	0.120***	-0.068***	0.063***	-0.165***	0.126***	0.090***	0.044***	0.0200	0.087***	0.0180	0.029**	0.122***	1	
Age	-0.105***	0.070***	-0.143***	0.146***	0.159***	-0.108***	-0.090***	0.0150	0.192***	-0.031**	-0.150***	0.010	-0.203***	1
Opaque	0.084***	-0.100***	-0.00700	-0.064***	0.129***	0.00700	-0.162***	0.300***	0.022*	0.064***	0.00700	0.009	0.073***	0.066***

Note: ***, **, and * denote significance at 1%, 5%, and 10%, respectively.

Table 4 Baseline regression results

	(1)	(2)	(3)	(4)
VARIABLES	Ivol	Ivol	Ivol	Ivol
Csr_dum	-0.0021***			
	(-6.34)			
Csr		-0.0118***	-0.0091***	-0.0026***
		(-12.44)	(-10.00)	(-2.88)
Tbq	-0.0002			0.0005*
	(-1.07)			(1.71)
BM	-0.0155***			-0.0149***
	(-17.81)			(-11.57)
Lev	0.0051***			0.0118***
	(5.35)			(6.57)
ROA	-0.0279***			-0.0394***
	(-8.82)			(-6.07)
Cash	-0.0113***			-0.0113***
	(-5.53)			(-2.91)
STDROA	-0.0062*			-0.0094
	(-1.85)			(-1.01)
Size	-0.0029***			-0.0035***
	(-13.82)			(-10.74)
Growth	0.0015***			0.0023***
	(5.90)			(3.95)
HH5	0.0002***			0.0002***
	(17.35)			(9.65)
Tover	0.0040***			0.0041***
	(14.25)			(8.73)
Media	0.0032***			0.0023***
	(9.69)			(4.59)
Age	-0.0009**			-0.0004
	(-2.46)			(-0.64)
Opaque	0.0024***			0.0036**
	(4.36)			(2.53)
SOE	-0.0010***			-0.0022***
	(-3.11)			(-3.86)
Constant	0.1207***	0.1133***	0.1250***	0.1398***
	(25.14)	(32.95)	(32.83)	(18.00)
YEAR FE	YES	NO	YES	YES
IND FE	YES	NO	YES	YES
Observations	18,173	5,600	5,600	5,600
Adjusted R^2	0.387	0.025	0.329	0.442

Note: This table shows the regression results of the impact of corporate social responsibility (CSR) disclosure (Column 1) and its quality (Columns 2-4) on corporate idiosyncratic risk. Column (2) shows the pooled regression univariate analysis result. Column (3) further controls for year and industry fixed effects; we add other control variables in Column 4. ***, **, and * denote significance at 1%, 5%, and 10%, respectively.

Table 5 Excluding confounding factors

	(1)	(2)	(3)
VARIABLES	IVOL	IVOL	IVOL
csr	-0.0036***	-0.0035***	-0.0035***
	(-3.31)	(-3.30)	(-3.26)
Indp	0.0006	0.0006	0.0004
	(0.13)	(0.11)	(0.09)
Analyst		-0.0001	-0.0001
		(-0.32)	(-0.35)
DISP			0.0000***
			(3.31)
Tbq	0.0002	0.0002	0.0002
	(0.63)	(0.66)	(0.65)
BM	-0.0153***	-0.0154***	-0.0154***
	(-9.86)	(-9.71)	(-9.69)
Lev	0.0126***	0.0125***	0.0126***
	(5.57)	(5.54)	(5.57)
ROA	-0.0346***	-0.0339***	-0.0331***
	(-4.10)	(-3.86)	(-3.76)
Cash	-0.0140***	-0.0140***	-0.0143***
	(-3.05)	(-3.04)	(-3.10)
STDROA	-0.0009	-0.0010	-0.0012
	(-0.08)	(-0.09)	(-0.11)
Size	-0.0036***	-0.0036***	-0.0036***
	(-8.91)	(-8.26)	(-8.27)
Growth	0.0023***	0.0023***	0.0023***
	(3.24)	(3.22)	(3.23)
HH5	0.0002***	0.0002***	0.0002***
	(8.37)	(8.33)	(8.32)
Tover	0.0027***	0.0028***	0.0028***
	(3.69)	(3.69)	(3.65)
Media	0.0043***	0.0043***	0.0043***
	(7.22)	(7.23)	(7.21)
Age	-0.0007	-0.0007	-0.0007
	(-0.89)	(-0.93)	(-0.94)
Opaque	0.0023	0.0023	0.0023
	(1.51)	(1.51)	(1.52)
SOE	-0.0016**	-0.0016**	-0.0016**
	(-2.48)	(-2.48)	(-2.50)
Constant	0.1404***	0.1395***	0.1397***
	(14.66)	(14.14)	(14.17)
Observations	3,840	3,840	3,840
Adjusted R^2	0.463	0.463	0.463
YEAR FE	YES	YES	YES
IND FE	YES	YES	YES

Note: On the basis of benchmark regression to add analyst dispersion (DISP), proportion of independent directors (Indp) and analyst forecast divergence (Analyst), Column (1) shows the relationship between whether corporate social responsibility reports are disclosed and corporate idiosyncratic risk, and Column (2) shows the relationship between the quality of corporate social responsibility reports and corporate idiosyncratic risk. Robust t-statistics are in parentheses. ***, **, and * denote significance at 1%, 5%, and 10%, respectively.

Table 6 Alternative CSR measure

	(1)	(2)	(3)
	Rankins CSR score	Hexun CSR score	Hexun CSR score
VARIABLES	Ivol5	Ivol	Ivol5
Csr	-0.0018**	-0.0009***	-0.0008***
	(-2.29)	(-3.61)	(-4.26)
Tbq	0.0005**	-0.0003*	-0.0000
	(2.48)	(-1.83)	(-0.10)
BM	-0.0153***	-0.0184***	-0.0196***
	(-11.90)	(-19.17)	(-20.07)
Lev	0.0124***	0.0048***	0.0063***
	(6.96)	(4.66)	(6.07)
ROA	-0.0431***	-0.0275***	-0.0273***
	(-6.70)	(-7.59)	(-6.96)
Cash	-0.0066*	-0.0089***	-0.0085***
	(-1.82)	(-4.06)	(-4.10)
STDROA	-0.0080	-0.0059*	-0.0069**
	(-0.88)	(-1.67)	(-2.13)
Size	-0.0039***	-0.0028***	-0.0033***
	(-11.93)	(-13.41)	(-15.42)
Growth	0.0028***	0.0017***	0.0020***
	(5.25)	(6.36)	(7.95)
HH5	0.0002***	0.0002***	0.0002***
	(8.33)	(16.13)	(14.95)
Tover	0.0027***	0.0040***	0.0028***
	(5.59)	(13.29)	(9.12)
Media	0.0028***	0.0028***	0.0031***
	(5.03)	(8.20)	(7.89)
Age	-0.0003	-0.0009**	-0.0004
	(-0.55)	(-2.36)	(-1.26)
Opaque	0.0024**	0.0022***	0.0018***
	(2.11)	(3.82)	(3.67)
SOE	-0.0013**	-0.0009***	-0.0011***
	(-2.44)	(-2.65)	(-3.22)
Constant	0.1460***	0.1064***	0.1151***
	(18.30)	(20.91)	(21.70)
YEAR FE	YES	YES	YES
IND FE	YES	YES	YES
Observations	5,600	16,205	16,205
Adjusted R^2	0.396	0.375	0.356

Note: Column (1) reports the regression results of idiosyncratic risk calculated by the Fama-French five-factor model and Rankins CSR scores; Column (2) reports the regression results of idiosyncratic risk calculated by the Fama-French three-factor model and Hexun CSR scores; and Column (3) reports the regression results of idiosyncratic risk calculated by the Fama-French five-factor model and Hexun CSR scores. Robust t-statistics are in parentheses. ***, **, and * denote significance at 1%, 5%, and 10%, respectively.

Table 7 Alternative regression model

	(1)	(2)
	Firm fixed	Fama-Macbeth
VARIABLES	IVOL	IVOL
Csr	-0.0030***	-0.0022**
	(-3.82)	(-2.85)
Tbq	-0.0005	0.0001
	(-0.63)	(0.25)
BM	-0.0033	-0.0188***
	(-1.03)	(-3.86)
Lev	0.0204***	0.0095***
	(4.34)	(4.05)
ROA	-0.0264	-0.0401***
	(-1.61)	(-5.55)
Cash	-0.0060	-0.0149**
	(-1.09)	(-2.96)
STDROA	-0.0295**	0.0003
	(-3.07)	(0.02)
Size	-0.0086***	-0.0038***
	(-4.18)	(-5.51)
Growth	0.0012*	0.0025***
	(1.82)	(4.13)
HH5	0.0003***	0.0002***
	(5.29)	(7.19)
Tover	0.0019**	0.0026*
	(2.41)	(2.05)
Media	0.0000	0.0045***
	(0.02)	(4.51)
Age	0.0081***	0.0000
	(3.35)	(0.03)
Opaque	0.0015	0.0053**
	(1.56)	(2.93)
SOE	0.0000	-0.0026***
	(.)	(-3.49)
Constant	0.2453***	0.1260***
	(5.80)	(6.06)
YEAR FE	YES	NO
FIRM FE	YES	NO
Observations	5,600	5,600
Number of groups	862	11
Adjusted R^2	0.419	0.298

Note: Column (1) shows the result of using the method proposed by Driscoll and Kraay (1998) to obtain the heteroscedasticity—sequence correlation—cross-sectional correlation robustness standard error for fixed effect regression. Column (2) shows the result of using the two-step regression proposed by Fama and Macbeth (1973). Robust t-statistics are in parentheses. ***, **, and * denote significance at 1%, 5%, and 10%, respectively.

Table 8 Sample selection bias

	Heckman 2-step		PSM regression	
	(1)	(2)	(3)	(4)
VARIABLES	Treat	IVOL	Treat	IVOL
Csr		-0.0024**		-0.0025***
		(-2.54)		(-2.73)
Tbq	-0.0684***	0.0013***	0.0903***	0.0005*
	(-6.17)	(3.24)	(7.67)	(1.67)
BM	-0.103	-0.0138***	-0.4357***	-0.0151***
	(-1.63)	(-9.54)	(-6.59)	(-11.66)
Lev	-0.0535	0.0118***	-0.1546***	0.0113***
	(-0.77)	(6.41)	(-13.58)	(6.26)
ROA	2.221***	-0.0639***	0.5688**	-0.0406***
	(9.59)	(-6.34)	(2.36)	(-6.21)
Cash	0.577***	-0.0162***	0.6024**	-0.0108***
	(3.66)	(-3.77)	(3.63)	(-2.77)
STDROA	-2.465***	0.0172	-0.8602***	-0.0099
	(-8.15)	(1.41)	(-2.77)	(-1.07)
Size	0.156***	-0.0050***	0.6957***	-0.0034***
	(17.01)	(-8.44)	(42.00)	(-10.45)
Growth	-0.142***	0.0037***	-0.1929***	0.0023***
	(-6.79)	(5.05)	(-8.66)	(3.95)
HH5	-0.0115***	0.0003***	-0.0028***	0.0002***
	(-13.63)	(6.89)	(-3.09)	(9.71)
Tover	0.0355	0.0021***	-0.0322	0.0024***
	(1.53)	(3.96)	(-1.31)	(4.76)
Media	-0.558***	0.0094***	0.0317	0.0040***
	(-33.79)	(5.09)	(1.44)	(8.56)
Age	-0.0157	-0.0004	0.0485*	-0.0005
	(-0.59)	(-0.95)	(1.74)	(-0.77)
Opaque	-0.2130***	0.0058***	0.2639***	0.0035**
	(-4.72)	(4.17)	(-5.38)	(2.53)
SOE	0.4020***	-0.0062***	0.2639***	-0.0022***
	(16.14)	(-4.22)	(10.07)	(-3.82)
IND FE	Yes	Yes	Yes	Yes
YEAR FE	Yes	Yes	Yes	Yes
Observations	18,177	5,600	18,174	5,579
R^2	0.228	0.411	0.027	0.436

Note: Treat is a dummy variable for whether the corporate social responsibility report is disclosed. Column (1) estimates the tendency of the corporate disclosure of social responsibility reports and uses the results to calculate the inverse Mills ratio. Column (2) estimates the corporate social responsibility report quality and corporate risk model to obtain the estimated value. Robust t-statistics are in parentheses. ***, **, and * denote significance at 1%, 5%, and 10%, respectively.

Table 9 2SLS regression

	(1)	(2)
	First stage	Second stage
	Csr_ind	IVOL
Csr		-0.0333***
		(-3.65)
Csr_ind	0.8691***	
	(7.91)	
Tbq	-0.0135***	0.0001
	(-3.63)	(0.32)
BM	-0.1111***	-0.0184***
	(-6.06)	(-10.41)
Lev	-0.1199***	0.0082***
	(-4.89)	(3.75)
ROA	0.0240	-0.0381***
	(0.29)	(-5.44)
Cash	0.1389**	-0.0071
	(2.62)	(-1.63)
STDROA	-0.1123	-0.0126
	(-0.77)	(-1.45)
Size	0.0749***	-0.0012
	(16.59)	(-1.55)
Growth	-0.0072	0.0021***
	(-0.92)	(3.55)
HH5	0.0011***	0.0002***
	(3.91)	(9.43)
Tover	0.0525***	0.0039***
	(7.57)	(5.53)
Media	-0.0162*	0.0036***
	(-2.49)	(6.94)
Age	-0.0358***	-0.0015*
	(-4.22)	(-2.00)
Opaque	-0.0847**	0.0009
	(-3.10)	(0.57)
SOE	0.0493***	-0.0007
	(6.25)	(-0.87)
Constant	-1.2919***	0.1854***
	(-3.54)	(11.82)
IND FE	YES	YES
YEAR FE	YES	YES
Observations	5,600	5,600
1st stage F	69.62	

Note: Column (1) reports that in the first stage, we regress the institutional stability variables of CSR on the above instruments inclusive of industry and year fixed effect controls. Column (2) reports that in the second stage, we re-estimate the regressions in our main analyses after replacing CSR with its fitted values from the first-stage regression. The results for the first-stage regressions show that the adjusted R2 and F statistics are reasonably high (>10), suggesting that the model does not suffer from the issue of weak instruments. Robust t-statistics are in parentheses. ***, **, and * denote significance at 1%, 5%, and 10%, respectively.

Table 10 Mandatory CSR disclosure shock

	(1)	(2)
	IVOL3	IVOL5
Treat2008*time2008	-0.0026***	-0.0025***
	(-2.79)	(-2.91)
time2008	-0.0119***	-0.0118***
	(-8.18)	(-8.92)
treat2008	0.0036***	0.0034***
	(4.16)	(4.36)
Tbq	0.0000	-0.0001
	(0.07)	(-0.57)
BM	-0.0179***	-0.0162***
	(-18.85)	(-18.50)
Lev	0.0060***	0.0062***
	(6.27)	(6.92)
ROA	-0.0267***	-0.0243***
	(-8.56)	(-8.31)
Cash	-0.0130***	-0.0120***
	(-6.30)	(-6.31)
STDROA	-0.0097***	-0.0098***
	(-3.18)	(-3.46)
Size	-0.0039***	-0.0039***
	(-18.69)	(-20.22)
Growth	0.0022***	0.0020***
	(8.66)	(8.53)
HH5	0.0002***	0.0002***
	(16.31)	(15.99)
Tover	0.0030***	0.0027***
	(9.87)	(9.62)
Media	0.0035***	0.0033***
	(8.60)	(8.90)
Age	-0.0009**	-0.0004
	(-2.38)	(-1.19)
Opaque	0.0020***	0.0019***
	(3.74)	(3.88)
SOE	-0.0011***	-0.0010***
	(-3.44)	(-3.33)
Constant	0.1471***	0.1431***
	(28.09)	(29.56)
IND FE	YES	YES
YEAR FE	YES	YES
Observations	15790	15790
Adjusted R^2	0.487	0.495

Note: This table shows the DID regression results considering the mandatory CSR disclosure regulation in 2008. ***, **, and * denote significance at 1%, 5%, and 10%, respectively.

Table 11 Information complementary role of CSR

	(1)	(2)	(3)	(4)	(5)	(6)
	Firm size		Firm transparency		Firm announcements	
	Small	Big	Low	High	Less	More
VARIABLES	IVOL	IVOL	IVOL	IVOL	IVOL	IVOL
csr	-0.0072***	-0.0013	-0.0047***	-0.0009	-0.0028**	-0.0026
	(-3.24)	(-1.25)	(-3.24)	(-0.81)	(-2.55)	(-1.63)
Tbq	0.0003	0.0002	-0.0003	0.0013***	0.0007**	0.0002
	(0.70)	(0.41)	(-0.84)	(3.32)	(2.07)	(0.44)
BM	-0.0200***	-0.0138***	-0.0138***	-0.0151***	-0.0142***	-0.0153***
	(-5.86)	(-9.63)	(-6.82)	(-9.02)	(-8.60)	(-7.41)
Lev	0.0097***	0.0136***	0.0125***	0.0120***	0.0111***	0.0133***
	(2.81)	(6.21)	(4.37)	(5.13)	(5.04)	(4.29)
ROA	-0.0356***	-0.0383***	-0.0302***	-0.0460***	-0.0427***	-0.0343***
	(-3.18)	(-4.67)	(-3.03)	(-5.21)	(-5.42)	(-3.12)
Cash	-0.0186**	-0.0080*	-0.0063	-0.0187***	-0.0127***	-0.0046
	(-2.23)	(-1.84)	(-1.22)	(-3.23)	(-2.67)	(-0.68)
STDROA	-0.0196	0.0003	-0.0205*	0.0294*	0.0015	-0.0257*
	(-1.48)	(0.02)	(-1.87)	(1.93)	(0.13)	(-1.72)
Size	-0.0040***	-0.0041***	-0.0038***	-0.0034***	-0.0036***	-0.0037***
	(-4.58)	(-10.39)	(-7.56)	(-7.81)	(-8.68)	(-6.70)
Growth	0.0017	0.0022***	0.0013	0.0033***	0.0019**	0.0025***
	(1.32)	(3.40)	(1.46)	(4.71)	(2.56)	(3.03)
HH5	0.0002***	0.0002***	0.0002***	0.0002***	0.0002***	0.0002***
	(4.74)	(8.71)	(6.20)	(7.47)	(8.07)	(5.83)
Tover	0.0012	0.0030***	0.0024***	0.0022***	0.0015**	0.0029***
	(1.06)	(5.28)	(3.15)	(3.44)	(2.33)	(3.36)
Media	0.0032***	0.0041***	0.0032***	0.0048***	0.0045***	0.0032***
	(3.32)	(7.81)	(4.36)	(7.77)	(7.56)	(4.32)
Age	-0.0004	-0.0009	-0.0013	0.0002	0.0015*	-0.0021**
	(-0.34)	(-1.26)	(-1.33)	(0.21)	(1.80)	(-2.21)
Opaque	-0.0014	0.0035**	0.0044**	-0.0032	0.0049***	0.0028
	(-0.34)	(2.29)	(2.46)	(-0.61)	(2.64)	(1.51)
SOE	-0.0015	-0.0022***	-0.0011	-0.0028***	-0.0013*	-0.0032***
	(-1.28)	(-3.41)	(-1.34)	(-3.74)	(-1.80)	(-3.35)
Constant	0.1816***	0.1429***	0.1538***	0.1297***	0.1401***	0.1196***
	(9.43)	(15.64)	(13.04)	(12.37)	(14.00)	(9.26)
YEAR FE	YES	YES	YES	YES	YES	YES
IND FE	YES	YES	YES	YES	YES	YES
Observations	1,449	4,151	2,384	3,216	3,513	2,087
Adjusted R^2	0.415	0.461	0.429	0.459	0.439	0.463

Note: Columns (1) and (2) present the estimation results with small and large companies; Columns (3) and (4) present the estimation results with high firm transparency and low firm transparency; and Columns (5) and (6) present the estimation results with fewer company announcements and more company announcements. Robust t-statistics are in parentheses. ***, **, and * denote significance at 1%, 5%, and 10%, respectively.

Table 12 Interplay between CSR and external supervision

	(1)	(2)	(3)	(4)
	Analyst report		Media Coverage	
Group	Less	More	Less	More
VARIABLES	IVOL	IVOL	IVOL	IVOL
csr	-0.0018	-0.0034**	-0.0011	-0.0034***
	(-1.50)	(-2.45)	(-0.74)	(-2.98)
Tbq	0.0006	0.0003	0.0004	0.0005
	(1.62)	(0.79)	(0.78)	(1.40)
BM	-0.0167***	-0.0129***	-0.0171***	-0.0130***
	(-9.60)	(-6.64)	(-8.82)	(-7.47)
Lev	0.0133***	0.0093***	0.0096***	0.0135***
	(5.57)	(3.30)	(3.43)	(5.69)
ROA	-0.0410***	-0.0406***	-0.0339***	-0.0448***
	(-4.86)	(-3.92)	(-3.41)	(-5.11)
Cash	-0.0109**	-0.0118**	-0.0158**	-0.0066
	(-2.12)	(-2.00)	(-2.51)	(-1.36)
STDROA	-0.0006	-0.0179	-0.0164	0.0052
	(-0.05)	(-1.28)	(-1.42)	(0.33)
Size	-0.0034***	-0.0036***	-0.0039***	-0.0036***
	(-7.80)	(-7.10)	(-7.68)	(-8.07)
Growth	0.0018**	0.0029***	0.0020**	0.0024***
	(2.37)	(3.24)	(2.19)	(3.19)
HH5	0.0002***	0.0002***	0.0002***	0.0002***
	(7.27)	(6.39)	(6.80)	(7.17)
Tover	0.0020***	0.0026***	0.0018**	0.0025***
	(3.16)	(3.27)	(2.17)	(4.15)
Media	0.0045***	0.0036***	0.0030***	0.0049***
	(7.29)	(4.93)	(4.33)	(7.46)
Age	-0.0005	-0.0004	0.0021**	-0.0020**
	(-0.65)	(-0.38)	(2.22)	(-2.42)
Opaque	0.0046**	0.0032*	0.0015	0.0062***
	(2.38)	(1.73)	(0.88)	(3.47)
SOE	-0.0017**	-0.0026***	-0.0017*	-0.0027***
	(-2.34)	(-3.00)	(-1.91)	(-3.78)
Constant	0.1344***	0.1444***	0.1483***	0.1382***
	(12.99)	(11.97)	(12.62)	(13.17)
Observations	3,195	2,405	2,410	3,190
Adjusted R^2	0.443	0.446	0.462	0.439
YEAR FE	YES	YES	YES	YES
IND FE	YES	YES	YES	YES

Note: Columns (1) and (2) present the estimation results with fewer analyst reports and more analyst reports; Columns (3) and (4) present the estimation results with less media attention and more media attention. Robust t-statistics are in parentheses. ***, **, and * denote significance at 1%, 5%, and 10%, respectively.

Table 13 Heterogeneous effect with different corporate governance characteristics

	(1)	(2)	(3)	(4)	(5)	(6)
	Shareholder concentration		Independent directors' ratio		Institutional investors proportion	
	Less	More	Lower	Higher	Lower	Higher
VARIABLES	IVOL	IVOL	IVOL	IVOL	IVOL	IVOL
csr	-0.0024	-0.0024**	-0.0020	-0.0037***	-0.0018	-0.0026**
	(-1.45)	(-2.16)	(-1.54)	(-2.92)	(-1.38)	(-2.50)
Tbq	-0.0003	0.0007**	0.0007*	0.0001	0.0002	0.0004
	(-0.54)	(2.04)	(1.86)	(0.34)	(0.43)	(1.18)
BM	-0.0155***	-0.0143***	-0.0142***	-0.0158***	-0.0169***	-0.0130***
	(-7.24)	(-8.60)	(-7.19)	(-8.97)	(-7.71)	(-7.99)
Lev	0.0083***	0.0137***	0.0130***	0.0094***	0.0097***	0.0131***
	(2.89)	(5.95)	(5.43)	(3.44)	(3.50)	(5.45)
ROA	-0.0478***	-0.0398***	-0.0359***	-0.0417***	-0.0543***	-0.0323***
	(-4.31)	(-4.57)	(-4.12)	(-3.93)	(-4.71)	(-4.05)
Cash	-0.0122*	-0.0093**	-0.0094*	-0.0128**	-0.0121*	-0.0100**
	(-1.80)	(-2.01)	(-1.74)	(-2.28)	(-1.91)	(-2.00)
STDROA	-0.0007***	-0.0010***	-0.0180	0.0005	-0.0194	-0.0020
	(-5.51)	(-8.05)	(-1.31)	(0.04)	(-1.20)	(-0.17)
Size	-0.0036***	-0.0037***	-0.0039***	-0.0030***	-0.0032***	-0.0041***
	(-5.75)	(-9.29)	(-7.89)	(-6.57)	(-5.46)	(-9.41)
Growth	0.0024***	0.0023***	0.0023***	0.0020**	0.0017*	0.0026***
	(3.08)	(2.90)	(3.14)	(2.17)	(1.94)	(3.49)
HH5	0.0002***	0.0002***	0.0002***	0.0002***	0.0002***	0.0002***
	(5.97)	(7.56)	(6.37)	(7.21)	(6.89)	(6.70)
Tover	0.0025***	0.0019***	0.0012	0.0026***	0.0004	0.0025***
	(2.88)	(3.14)	(1.33)	(4.30)	(0.42)	(2.89)
Media	0.0044***	0.0038***	0.0041***	0.0042***	0.0037***	0.0041***
	(5.15)	(6.85)	(5.73)	(6.57)	(4.74)	(7.05)
Age	0.0013	-0.0011	0.0010	-0.0014*	0.0017	-0.0017**
	(1.13)	(-1.48)	(0.99)	(-1.70)	(1.64)	(-2.16)
Opaque	0.0073***	0.0040***	0.0088***	0.0014	0.0047**	0.0026
	(3.50)	(2.66)	(4.23)	(0.83)	(1.98)	(1.38)
SOE	-0.0016*	-0.0025***	-0.0010	-0.0033***	-0.0018*	-0.0022***
	(-1.69)	(-3.51)	(-1.15)	(-4.24)	(-1.92)	(-3.10)
Constant	0.1374***	0.1453***	0.1478***	0.1070***	0.1398***	0.1522***
	(9.03)	(15.71)	(11.94)	(9.83)	(9.69)	(14.92)
Observations	2,045	3,555	2,561	3,039	2,405	3,195
Adjusted R^2	0.445	0.453	0.465	0.428	0.413	0.476
YEAR FE	YES	YES	YES	YES	YES	YES
IND FE	YES	YES	YES	YES	YES	YES

Note: Columns (1) and (2) present the estimation result with lower ownership concentration and higher ownership concentration; Columns (3) and (4) present the estimation result with lower independent director ratio and higher independent director ratio; and Columns (5) and (6) present the estimation result with lower institutional proportion and higher institutional proportion. Robust t-statistics are in parentheses. ***, **, and * denote significance at 1%, 5%, and 10%, respectively.

Table 14 Chanel test: Investor attention

	(1)	(2)	(3)
VARIABLES	IVOL	Attention	IVOL
csr	-0.0026**	0.1213***	-0.0021**
	(-2.40)	(4.40)	(-2.01)
Attention			-0.0034***
			(-5.08)
Tbq	0.0003	0.1046***	0.0007**
	(0.97)	(12.47)	(1.99)
BM	-0.0156***	-0.4362***	-0.0171***
	(-10.75)	(-11.40)	(-11.64)
Lev	0.0105***	-0.7310***	0.0079***
	(5.06)	(-15.79)	(3.73)
ROA	-0.0388***	-1.0430***	-0.0424***
	(-5.40)	(-6.52)	(-5.85)
Cash	-0.0125***	0.2334**	-0.0117**
	(-2.68)	(2.05)	(-2.52)
STDROA	-0.0121	-0.0920	-0.0125
	(-1.16)	(-0.37)	(-1.20)
Size	-0.0033***	0.4961***	-0.0016***
	(-8.88)	(52.33)	(-3.18)
Growth	0.0025***	-0.0729***	0.0022***
	(3.51)	(-3.96)	(3.16)
HH5	0.0002***	-0.0048***	0.0002***
	(8.35)	(-8.84)	(7.54)
Tover	0.0038***	0.3365***	0.0049***
	(7.25)	(24.94)	(8.78)
Media	0.0023***	0.1655***	0.0029***
	(4.46)	(10.39)	(5.43)
Age	-0.0003	-0.0123	-0.0003
	(-0.41)	(-0.71)	(-0.48)
Opaque	0.0034**	-0.0137	0.0034**
	(2.16)	(-0.32)	(2.10)
SOE	-0.0026***	-0.0184	-0.0027***
	(-4.02)	(-1.23)	(-4.13)
Constant	0.1110***	-0.3110	0.1099***
	(12.53)	(-1.38)	(12.45)
YEAR FE	YES	YES	YES
IND FE	YES	YES	YES
Observations	4,550	4,550	4,550
Adjusted R^2	0.431	0.671	0.436

Note: Column (1) presents the estimation result of our benchmark regression; Column (2) presents the estimation result of CSR on investors' attention; and we add investors' attention to the benchmark regression in Column (3). Robust t-statistics are in parentheses. ***, **, and * denote significance at 1%, 5%, and 10%, respectively.

Table A1 Summary of core Literatures

Reference	Country	Period	Aspect	Focus on	Proxy	Conclusion
Tan and Liu (2016)	Australia	2004-2013	Managers' characteristics	CEO's managerial power	Construct a power index to measure the level of managerial power of the CEO.	Higher managerial power decreases idiosyncratic volatility.
Ferreira &Laux (2007)	US	1990-2001	Corporate governance	Anti-takeover	Anti-takeover provisions index, which incorporates three antitakeover provisions (Cremers and Nair, 2005).	More anti-takeover clauses increase idiosyncratic volatility.
Leung et al. (2012)	China	2003-2005	Corporate governance	Family control	Whether the number of family board directors is greater than or equal to 2 or not; the fraction of total shares held by the family board members.	Family firms exhibit higher idiosyncratic volatility than similar nonfamily firms.
Chok and Sun (2007)	US	1996-2001	Corporate governance	Executive stock options	The value of stock options divided by the CEO's total compensation, the sum of stock options, salary, and bonus.	Executive stock options are positively related to idiosyncratic volatility.
Hao and Xiong (2021)	China	2011-2017	Investor attention	Retail investor attention	Baidu search index	Investor attention has a positive impact on idiosyncratic volatility.
Li et al. (2018)	China	2007-2016	Investor attention	Internet stock message boards	Establishment of the internet stock message boards.	Idiosyncratic volatility significantly increases after Internet stock message boards are established.
Xu et al. (2013)	China	2003-2010	Analyst attention	Star analysts	Whether an analyst is selected by The New Fortune as one of the best analysts.	Star analyst attention increases idiosyncratic volatility.
Jiang et al. (2018)	China	2004-2011	Analyst attention	Mutual-fund-affiliated analysts	The number of mutual-fund-affiliated analysts covering.	Mutual-fund-affiliated analysts increases idiosyncratic volatility.
Gao et al. (2020)	China	2003-2016	Analyst attention	Analyst coverage	The changes in the number of analyst coverage.	The reduced analyst coverage leads to an increase in idiosyncratic volatility.
He et al. (2022)	China	2006-2019	Information disclosure	ESG information disclosure	Whether ESG reports are disclosed.	Firms' idiosyncratic volatility is significantly reduced after ESG disclosure.
Chang & Dong (2006)	Japan	1975-2003	External monitoring	Institutional herding	The change in institutional ownership of individual stocks.	The herding behavior of institutional investors increases idiosyncratic volatility.
Abdoh & Varela (2017)	US	2005-2014	Industry environment	Product market competition	Herfifindahl-Hirschman index of concentration (HHI)	Higher competition in the product market increases idiosyncratic volatility.
Caglayan et al. (2020)	47 regions	1995-2016	Region level	Stock market turnover;	Total stock market turnover; The degree of information disclosed by the	Stock market turnover has a positive impact on the country-level

				Information disclosure; Investor uncertainty avoidance degree	firms in financial reports (La Porta et al., 2006); The degree to which the members of a society feel uncomfortable with uncertainty and ambiguity(Hofstede et al., 2010).	idiosyncratic volatility; Information disclosure and investor uncertainty avoidance degree have a negative impact on the country-level idiosyncratic volatility.
Li et al. (2021)	China	2006-2014	Market environment	Whether dividend tax induced lock-in or not.	The 2012 Dividend Tax Reform in China.	High dividend firms experience a reduction in idiosyncratic volatility, relative to low dividend firms, after the reform.