Does Venture Capital Improve Corporate Social Responsibility Performance?

ABSTRACT

In recent years, market agents have paid more attention to firm-level sustainable developments, but the economic effects of venture capital on corporate social responsibility (CSR) performance are not clear. We empirically investigated this issue using data from Chinese nonfinancial A-share listed firms between 2010 and 2019. We found that venture capital participation may reduce the CSR performance of portfolio companies (e.g., SMEs), and the quality of internal control (ICQ) is an effective mechanism for venture capital to affect CSR performance. We offer new insights into the relationship between venture capital and CSR in emerging markets.

Keywords: venture capital, corporate social responsibility (CSR), agency theory, imprinting theory, internal control quality

1. Introduction

Achieving more efficient, equitable, and sustainable development has recently become a hot topic. The degree to which firms contribute to social welfare has attracted more attention (Gillian et al., 2021), which can be measured by corporate social responsibility (CSR) performance. As an influential channel for funding, venture capital has developed rapidly and played an increasingly important role in the market. At the end of 2022, the number and scale of venture capital investment had reached 133,637 and 13.109 trillion (CNY) in China, respectively. In this context, we aim to answer the following questions: **(1) Does venture capital affect portfolio companies' CSR performance? and (2) Through which channels does venture capital affect portfolio companies' CSR performance?**

Due to the limited data disclosure in China's venture capital industry and different accounting rules (Moore et al., 2015), China-based venture capital-relevant studies are still limited, and further academic investigations are required (Chen et al., 2017). The extant studies are more focused on how venture capital affects portfolio companies' operations management and the derived economic consequences (Li and Song, 2017; Wen and Feng, 2018) rather than discussing the relationships between venture capital and portfolio companies' CSR performance or other nonfinancial consequences. Furthermore, there are still limited papers that discuss how venture capital uses internal control mechanisms to influence corporate performance in different aspects (Tan et al., 2008).

Although scholars argue that institutional investors are interested in and capable of affecting corporate-level decision-making, discussions on the impacts of institutional investors' activities on portfolio companies' CSR performance have developed only recently (Dyck et al., 2019). Despite existing relevant studies highlighting that institutional investors would affect portfolio companies' decision-making through backroom negotiations and proxy voting (Becht et al., 2017; Krueger et al., 2020), they discussed all types of institutional investors in general. Namely, current studies failed to analyse the impacts of different types of institutional investors on portfolio companies' CSR performance (Dyck et al., 2019). Furthermore, extant studies rarely discuss the relationship between venture capital and portfolio companies' CSR (Lerner and Nanda, 2020), especially the relevant underlying mechanisms.

We argue that venture capital restricts the enhancement of CSR performance in two perspectives. First, in line with agency theory (Walls et al., 2012), venture capital is active investor who monitor the boards of directors of portfolio companies and pressure management to reduce CSR performance. Because venture capital investments that occur are more speculative and driven by short-term profits (Jia and Li, 2011). While social responsibility cannot immediately generate returns, which does not fit the expectations of venture capital (Nejati et al. ,2017). Second, drawing from the imprinting theory (Alakent et al., 2020),

powerful venture capital's value and management approaches can have an imprint on portfolio companies' development from the early stage by directing portfolio companies' operations.

By selecting Chinese nonfinancial A-share listed firms between 2010 and 2019 as the sample, we empirically explored the relationships between venture capital and portfolio companies' CSR performance in sustainable development-driven contexts. We empirically found that venture capital negatively affects portfolio companies' CSR performance, especially private small and medium-sized enterprises. Furthermore, we also found that the quality of internal control (ICQ) is an effective mechanism for venture capital to affect CSR performance. Hence, we suggest that regulatory departments further guide institutional investors to establish the perceptions of SRI, optimise the information disclosure of CSR and enhance the listed companies' internal control system.

To guarantee the validity of the empirical findings, we test and confirm the robustness of the results in several ways. First, we substitute the OLS regressions with censored regression (Tobit). We find that the *VC* coefficient in both research approaches is significantly negative in the predicted direction. Importantly, the results remain unchanged when we use the introduction of direct high-speed rail between venture capital and portfolio companies as shocks to venture capital monitoring intensity (Bernstein et al.,2016; Yang et al., 2019) and subsequently establish a multiperiod difference-in-difference model (DID) to investigate changes in CSR performance and venture capital for a paired sample of firms. We also implement Heckman two-stage model with an instrument variable (i.e., *GRI*, which is set to 1 if a firm discloses a CSR report adopting the GRI guidelines and 0 otherwise) (Li et al., 2021), mitigating potential endogeneity concerns and increasing confidence in the directionality of our result.

Our findings contribute to both theoretical and practical knowledge. First, unlike previous studies that mainly focus on operations, withdrawals (e.g., IPOs and acquisitions), and the financial performance of venture capital, we explore the impacts of venture capital on portfolio companies' CSR performance—a type of nonfinancial performance. Namely, we expand a new

branch to discuss the relationship between venture capital and portfolio companies. Second, we treat venture capital as an independent individual to analyse its impacts on CSR rather than generally exploring the nexus between institutional investors and CSR, as in previous studies, which enriches the extant CSR-relevant literature. Third, different from most companies that highlight the positive impacts of venture capital on portfolio companies, our result helps to better understand the restrictions of venture capital in the practical context. For instance, venture capital' short-term speculative and opportunistic activities would sacrifice stakeholders' interests and damage the corporate value of the portfolio companies.

Following this introduction, we synthesise the relevant literature and develop hypotheses. In the third section, we describe the research methodology, such as data collection, variable setting, and modelling design. The empirical findings are shown in Section Four. In the fifth section, we further discuss the mechanisms of how venture capital affects CSR performance by conducting a subsample analysis. Finally, we conclude our empirical findings and make suggestions for regulatory departments to guide venture capital and portfolio companies to achieve sustainable developments.

2. Literature Review and Hypothesis Development

2.1 Venture Capital and CSR

2.1.1 The Impact of Venture Capital on Corporate Performance

The relationship between venture capital and corporate performance in different dimensions (e.g., employment, innovations, and return on assets) is still a hot topic (Bertoni et al., 2010). However, there are limited studies on the subject, especially in emerging or transitional markets such as China (Tan et al., 2013). Currently, relevant studies mainly focus on venture capital's impacts on firms' performance in the late stage, which has generated three assumptions: (1)

value-adding services (Hochberg, 2012); (2) exploitation behaviours (White et al., 2005; Wen and Feng, 2018); and (3) certification effects (Cho and Lee, 2013; Wang and Wan, 2013).

Value-adding Services. Venture capital could be value-adding investors of 'smart money', as they provide both financial resources and other value-adding services such as monitoring the process of their portfolio companies. Giving investee firms access to the network of contacts (e.g., technology experts, suppliers, and intellectual property consultants) would be another value-adding service. Bertoni et al. (2010) emphasised that venture capital stimulates innovation outputs by loosening financial constraints, increasing portfolio companies' R&D inputs, and achieving better performance than their competitors who are not supported by venture capital. Furthermore, venture capital often monitors portfolio companies to deal with the agency problem since uncertainties and information asymmetry are the characteristics of early-stage or technology-intensive firms, such as by investing in portfolio companies in the early stage, syndicating investments with other venture capital, and filling board seats. More importantly, venture capital is involved in portfolio companies' productions, operations, and management, optimising the governance of portfolio companies by accelerating their accounting information transparency (Hochberg, 2012). However, there are still limited studies discussing the mechanisms of the value-adding services of venture capital.

Exploitation Behaviours. Current studies (Gompers and Lerner, 1996; Wen and Feng, 2018) have found negative impacts of venture capital on corporate performance. The limited corporate life of venture capital makes them speculative and opportunistic—they attempt to obtain high returns within the short term, which may negatively affect portfolio companies' developments and corporate value (White et al., 2005; Bebchuk and Tallarita, 2020). Wen and Feng (2018) indicated that venture capital would restrict the portfolio company's innovation in the early stage since the propriety knowledge may be exposed to competitors who are also supported by the venture capital—because venture capital are also under pressure to return capital to their partners over a short investment period. Additionally, young venture capital are more likely to

push their portfolio companies to be listed with a higher degree of under-pricing (Gompers and Lerner, 1996), which damages the portfolio companies' interests and corporate value.

Certification Effects. Venture capital can use their reputations as guarantees and send positive signals that the portfolio companies are reliable, and therefore, the reputable venture capital' certification effects are stronger (Cho and Lee, 2013). Additionally, supported by reputable venture capital, portfolio companies often have higher stock prices than without venture capital-backed companies (Nahata, 2008). Wang and Wan (2013), based on signalling theory, proposed that venture capital-backed firms are more likely to be subscribed without under-pricing because the certification effects cut portfolio companies' costs of being listed and increase the net profits of the issuing firm. Furthermore, when a reputable venture capital invests in a company, this company is more likely to attract other external investors (Memba, 2011) and catalyse the generation of an alliance that includes multiple investors, which can further add value for investees (Hoehn-Weiss and Karim, 2014). Brau et al. (2004) also found that the certification role provided by venture capital contributes to mitigating information asymmetries by facilitating access to capital markets.

Since China's accounting rules differ from international accounting standards, venture capital in China makes it difficult to obtain data about its portfolio companies' assets (Moore et al., 2015). Additionally, managers may not always reveal the actions within firms (Chen et al., 2017), which also restricts the data sources for academic purposes. Consequently, China-based venture capital-relevant studies are still limited. Although extant studies have proven that venture capital impacts investees' performance through different approaches, there are still limited studies discussing the relationships between venture capital and CSR or other nonfinancial profits from the stakeholder perspective (Li et al., 2021). Moreover, the impacts of venture capital on corporate performance are still uncertain. It is worth mentioning that venture capital does not entail a random investment in companies but rather a cautious selection of potential investees with characteristics (e.g., the potential for innovations). Therefore, scholars should still determine whether venture capital are good at selecting investees with good

potential or applying their specialists to add value for their investees (not sure if they are relevant).

2.1.2 Institutional Investors and CSR Performance

As professional investors with deep pockets, institutional investors often hold large amounts of stocks in their portfolio companies to have a say in long-term management and impact portfolio companies' decision-making (Rong et al., 2017). As Salzmann (2013) noted, institutional investors would help build CSR since they always treat investments with long-term horizons (Dyck et al., 2019)—the more stock they hold, the greater the portfolio companies would like to adopt CSR (Chen et al., 2020). More importantly, Krueger et al. (2020) empirically found that institutional investors' preferences in CSR influence portfolio companies' CSR performance by reaching agreements with the board of directors directly or affecting firm-level decision-making during the annual general meeting by voting (Becht et al., 2017). However, from the corporate decision-making perspective, there are limited studies that analyse the impacts of institutional investors on CSR performance.

However, other scholars (Zhang and Li, 2017; Quan et al., 2018; Erhemjamts and Huang, 2019) found that institutional investors' perceptions of CSR would have no effect, or even a negative effect, on listed companies' CSR performance. Quan et al. (2018) found no significant relationships between institutional investors' proportions of shareholding and portfolio companies' CSR performance. On the other hand, scholars (e.g., Zhang and Li, 2017; Erhemjamts and Huang, 2019) have emphasised that institutional investors with short-term investment purposes reduce portfolio companies' CSR performance. For instance, institutional investors simply attempt to maximise short-term financial performance, which causes intertemporal loss of profit, and stakeholders' rights are damaged by reneging on implicit contracts (Erhemjamts and Huang, 2019). Furthermore, Xiang et al. (2021) argued that institutional investors' inaction negatively affects portfolio companies' CSR performance, especially those with more agency problems.

The extant studies also found that different institutional investors manage their resources, networks, and investment strategies differently and vary in value-added potential. As indicated by Li et al. (2021), qualified foreign institutional investors (QFIIs) from countries with a good sense of social responsibility enhance portfolio companies' CSR performance. Monberg and Zetterberg (2011) argued that pensions would intervene in shareholding companies' CSR performance by proactively communicating with managerial levels or impacting shareholders' voting. However, in contrast to the above studies, Gao et al. (2011) did not find significant effects of fund/insurance companies' activities on corporate information disclosure. On the other hand, Liang and Renneboog (2020) proposed that sovereign wealth funds (SWFs) would enhance companies' CSR performance because they are possibly considering stakeholders' opinions in their investment goals rather than only focusing on financial profits.

In conclusion, the number of studies exploring the impacts of institutional investors' activities on portfolio companies' CSR performance has increased only recently (Dyck et al., 2019), although scholars widely accept that institutional investors are willing and capable of changing corporations' decision-making. However, extant studies are more willing to discuss institutional investors in general rather than categorising them more specifically. More importantly, few studies focus on venture capital's impacts on portfolio companies' CSR performance (Cheng et al., 2022), and they (e.g., Alakent et al., 2020) still lack in-depth mechanism-relevant discussions.

2.2 Hypothesis Development

2.2.1 Venture Capital and CSR Performance

According to the agency theory (Walls et al., 2012), the best arrangements to reduce agency costs and maximize shareholder benefits are "intervention plus monitoring" and "exit". As an innovative approach to financing and risk-sharing, venture capital satisfies SMEs' needs for

innovation funding, which involves venture capital in portfolio companies' operations management (Li and Song, 2017). Consequently, this leads to access to monitoring portfolio companies' resource consumption (e.g., CSR-relevant practices). That is, venture capital will fulfil a significant monitoring function within the corporate governance system.

When accounting for the agency theory, we assume that adopting a broader stakeholder view is less likely to occur in firms with and without venture capital support (Alakent et al., 2020). Because venture capital investments that occur are more speculative and driven by short-term profits. For instance, scholars (e.g., Tan et al., 2008) have indicated that local venture capital prefer to invest in the growth or pre-IPO stage. Hence, venture capital overemphasises short-term financial performance, which forces portfolio companies to enhance short-term performance at the expense of long-term developments (White et al., 2005). Similarly, Jia and Li (2011) found that China's venture capital is eager for quick success and profits, such as pushing portfolio companies to be listed in a rush, which negatively affects portfolio companies' long-term developments. According to neoclassical economics, CSR would increase production costs and distract firm managers (Alakent et al., 2020). Therefore, companies may put themselves in an unfavourable competitive position (Brammer and Millington, 2008) and negatively influence corporate values (Bebchuk and Tallarita, 2020). Furthermore, Nejati et al. (2017) noted that social responsibility cannot immediately generate returns, which does not fit the expectations of venture capital. Consequently, venture capital would intervene or restrict the frequencies and degree of portfolio companies' CSR-relevant events.

Managers' CSR decision-making is based on their personal values, which creates a strategic role for undertaking CSR-relevant activities (Nejati et al., 2017). For instance, a portfolio company's CEOs and independent directors are more willing to donate or invest in their affiliated institutions (e.g., their universities), which reflects their personal interests rather than the firm's selections for donations or investments (Cai et al., 2021). Research (e.g., Alakent et al., 2020) has found that top managers' self-serving activities damage the profits of the firm's stakeholders. However, the senior management of portfolio company is less motivated by

protecting stakeholders' rights as it is in directing the firm, while ordinary stakeholders are less powerful (Bebchuk and Tallarita, 2020). Hence, to maximise their own interests, venture capital may pressure the manager with firm invested to sacrifice ordinary stakeholders' interests, which reduces their portfolio companies' CSR performance.

Based on imprinting effects (Alakent et al., 2020), powerful venture capital's value and management approaches can have an imprint on portfolio companies' development from the early stage by directing portfolio companies' operations. More importantly, the imprinting effects brought by venture capital often align with their interests, which affect portfolio companies' future CSR practices (Alakent et al., 2020) through several approaches. For instance, the performance-driven culture and norms of venture capital during the founding years would persist even after the contract with portfolio companies has expired. Additionally, the legitimacy concerns and institutionalisation of the operating logic make the portfolio companies maintain the operating modes of venture capital.

To conclude, venture capital cannot sufficiently guarantee stakeholders' interests, which is contrary to CSR perceptions. Therefore, potential investees may be cautious about upcoming venture capital protecting their stakeholders, and we derive the following hypothesis:

H1: Venture capital restricts the enhancement of CSR performance.

2.2.2 Venture Capital, Internal Control, and CSR Performance

Principal-agent relationships connect venture capital and portfolio companies. As agents, portfolio companies operate and manage the capital invested and create value. However, principal-agent relationships characterised by high information asymmetries generate adverse selections and moral hazards, reflecting the agency problem. Li and Yan (2019) indicated that internal control is significant for maintaining long-term partnerships and exchanges since it balances the relationships between venture capital and portfolio companies (e.g., by protecting stakeholders' rights). Similarly, Li et al. (2011) noted that internal control mitigates conflicts between shareholders and the firm's managers and guarantees the transparency of information

and commitments from the board of directors. Furthermore, from the agency perspective, Brammer and Millington (2008) emphasised that CSR practices confer significant managerial benefits rather than financial benefits. In this case, venture capital is eager to build a high-quality internal control system to safely inject money and depart after receiving high returns.

Venture capital are often proactively involved in building the portfolio companies' internal control system through different approaches, such as filling board seats, changing CEOs, or monitoring portfolio companies' managers (Li and Song, 2017). Jia (2019) argued that venture capital effectively improves a company's internal control quality by monitoring its operations and reducing the degree of information asymmetry between internal and external investors (Bernstein et al., 2016). Moreover, venture capital improves the listed company's resource allocation efficiency in different aspects, such as the efficiency of investments, financing, and R&D inputs. Additionally, portfolio companies that accept venture capital are more likely to attract opportunities for syndication when their investors have better reputations (Dimov and Milanov, 2010), strengthening internal control monitoring.

Although government regulations are crucial for companies to adopt CSR, the applications of CSR are still determined by a firm's governance, which should be based on the developments of the internal control system. After all, a well-structured internal control system creates a sound environment for companies to adopt CSR, such as meeting stakeholders' expectations (Liu, 2018). Moreover, one of the components of the internal control framework is the control environment, which avoids incidents of omitting CSR (Liu, 2018). Krueger et al. (2020) found that institutional investors' ESG preferences and their impacts on portfolio companies' performance are significantly impacted by internal control (e.g., by being the operators behind or proxy voting).

To summarise, research has found that high-quality internal control moderates the relationships between venture capital and CSR performance (weak); thus, we postulate the following hypothesis:

H2: Venture capital strengthens internal control quality to reduce CSR activities at portfolio companies.

3. Data and Research Design

3.1 Data Sources and Sample Construction

3.1.1 Data Sources

Our sample includes all A-share listed firms publicly traded on either the Shanghai Stock Exchange or the Shenzhen Stock Exchange between 2010 and 2019. Our sample consists of venture capital data from the CV Source database, CSR data from Hexun.com, and the internal control index from the Dibo database. The railway data from the Chinese Research Data Services (CNRDS) and financial and accounting data from the China Stock Market & Accounting Research Database (CSMAR). To ensure the reliability of the empirical results, we have removed financial firms, specially treated stocks (ST, * ST or PT), and data with missing key values. All continuous variables are winsorised at the 1st and 99th percentiles of their respective distribution to remove the influence of outliers. Our final sample comprises 14,051 firm-year observations with 2,847 listed firms.

3.2 Key Variables

Following Cheng et al. (2020), we adopt the CSR rating data from Hexun.com to evaluate the CSR performance[1] regarded as the dependent variable. *CSR* represents the aggregate score for all subcomponents, with higher values corresponding to a better quality of social conduct. Shareholders' responsibility score (SR), employees' responsibility score (ER), suppliers', customers', and consumers' responsibility score (SCCR), environmental responsibility score (EVR), and government responsibility score (GR) are proxies for the five subcomponents. The

[1] CSR investment is how managers' decisions to invest discretionary resources in the portfolio company's CSR initiatives. Thus, CSR performance is the result of CSR investment.

independent variable, VC, is a dummy variable that takes a value of 1 to indicate that the firm is invested in by venture capital and 0 otherwise.

We have eleven types of control variables affecting CSR performance. The literature supports that CSR can help improve the firm characteristics (Jahmane and Gaies, 2020). Firm characteristics is measured by five commonly used indicators: firm age (AGE), research and development expenditures (*R&D*), book-to-market ratio (*BM*), operating cash flow (*OCF*) and net profit growth rate (*Growth*). We adopt ownership concentration (*Shrcr*) and institutional ownership (*Block*) to measure ownership structure, which plays important role in firms participating in corporate CSR activities (Krueger et al., 2020). we controll board structure variables including CEO-Chairman duality (*Dual*), female executives' ratio (*Diversity*) to the company's governance, which determines applications of CSR. Jo and Harjoto (2014) notes that analysts' attention to listed firms can improve their aggregate CSR levels. The number of analyst teams (*Analyst*) and the number of analyst reports (*Report*) are adopted to measure analysts' attention.

3.3 Model Specification

To investigate the relationship between venture capital and CSR performance, we specify the following regression model with fixed effects following Dyck et al. (2019):

$$CSR_{it} = \alpha + \beta_1 VC_{it\text{-}1} + \sum \beta_k control_{it\text{-}1} + province_i + industry_i + year_i + \varepsilon_{it\text{-}1} \quad (1)$$

where CSR performance (*CSR, SR, ER, SCCR, EVR, GR*) is a dependent variable; *VC* is an independent variable; and control is a vector of variables that may potentially affect CSR performance. Province, Industry, and Year are province, industry, and year dummy variables, respectively, to control for unobserved heterogeneity across provinces and industries and capture time effects. We cluster standard errors at the province level, and all right-hand-side variables are lagged by one year.

4. Empirical Findings and Analysis

4.1 Summary Statistics

Table 2 shows the summary statistics. It shows that the overall CSR performance vary considerably, ranging from -3.75 to 73.69, with a mean value of 24.08 and a standard deviation of 15.40. This indicates that the CSR performances among the firms are quite different. The five dimensions of CSR, *SR, ER, SCCR, EVR* and *GR*, have similar characteristics. In addition, The mean value for *VC* is 0.02, which means that almost the firms don't have venture capital during the sample period. The distributions of other control variables are all within a reasonable range and will not be repeated here.

4.2 Empirical Results and Analysis

4.2.1 Main Regression Results and Robustness Test

To explore the impact of venture capital on CSR performance, we estimated Equation (1) and reported the results in Table 3. In Models 1, the coefficient estimates on VC are negative and statistically significant, which implies a strong effect linking venture capital with the firm's CSR performance, supporting Hypothesis 1. This indicates that venture capital has a strong profit-seeking motivation and little desire to practice socially responsible investment.

Then, we adopt the CSR subscore as the dependent variable regression in Equation (1) to further explore the impact of venture capital on CSR performance. The *VC* coefficients in Models 2 to 6 of Table 3 are all significantly negative, indicating that venture capital has played an important role in reducing SR, *ER*, *SCCR* and EVR. Hypothesis 1 is empirically supported.

4.2.2 The Mechanism of Venture Capital Used to Push for Poor CSR Performance

The interests of many stakeholders in a firm are not always aligned, but internal controls could balance relationships between different groups (Allen et al., 2015). Perfect internal control helps firms to fulfil their social responsibilities. Thus, we empirically examined whether venture capital utilises internal control quality to push for CSR performance. Following Chang

et al. (2019), we use the internal control index from the Dibo database to evaluate the internal control quality regarded as the mediating variable. We predict that internal control quality enhances the negative relationship between venture capital and CSR performance.

The results are displayed in Table 4. The coefficients of ICQ in Model 1 are significantly negative. Thus, companies with venture capital seems to reduce internal control quality. From Model 2 to Model 7 report the impact of including the internal control quality (ICQ) in the regression. The regression coefficient of ICQ is positive and significant at the 1% level. Thus, internal control quality seems to improve the CSR performance of the listed companies. In addition, the coefficients of VC are similarly to the previous coefficients of Table 3. Hence, our evidence supports that internal control quality plays a mediating role on the way venture capital reduces CSR performance at portfolio companies, confirming Hypothesis 2.

4.2.3 Robustness Tests

We perform several robustness tests to examine the validity of our main finding, The results are shown in Table 5. First, we present the estimation results without the control variables to mitigate the concern that some of these control variables may be endogenous, as shown in Model 1. Second, we alternatively measure *VC* with the share percentage of venture capital (*VC_scale*), as shown in Model 2. Third, given that a firm's slack resource availability, such as *ROA*, may have a positive effect on CSR performance (Li et al., 2021), we repeat our analysis with inclusion of *ROA* into our model specification and display the result in Model 3. Fourth, we alternatively measure *CSR* with the log of the aggregate CSR score (*LnCSR*), as shown in Model 4. Finally, we use censored regression (Tobit) to maximise the efficiency of our parameter estimation because the dependent variable, *CSR*, is within a certain range, as shown in Model 5. The *VC* coefficients are negative and highly significant in all models, suggesting that firms with *VC* exhibit lower CSR scores, further confirming Hypothesis 1.

4.2.4 Endogeneity Tests

Wang and Chen (2017) found that institutional investors in China are more inclined to invest in firms that perform better in the CSR dimension, indicating that there may be a reverse causality problem. That is, venture capital may affect the social responsibility performance of portfolio companies; conversely, firms with good CSR may also be more likely to receive venture capital. To alleviate such concerns, we employ a multiperiod DID model to check whether our result is robust. Considering that the province, industry, and year fixed-effects approach has been used to regress unobservable firm characteristics, we no longer consider the problem of missing variables.

The introduction of direct high-speed rail service can alleviate information asymmetry between venture capital and their portfolio companies (Bernstein et al.,2016; Yang et al., 2019). Although the decision of addresses for firms and venture capital may be related to the local tax policy, industrial policy, and legal environment (Zhao et al., 2018), site selection, construction progress and route planning for high-speed rails have nothing to do with listed firms and venture capital. They are determined by the country based on economic development needs. Therefore, we use the introduction of direct high-speed rail service between venture capital and portfolio companies as shocks to venture capital monitoring intensity and establish a multiperiod difference-in-difference model to study the causal relationship between venture capital and CSR performance. The specific model is as follows:

$$CSR_{it} = \alpha + \beta_1 VC_{it\text{-}1} * HSR_{it\text{-}1} * Post_{it-1} + \sum \beta_k control_{it\text{-}1} + city_i + industry_i + \varepsilon_{it\text{-}1} \quad (4)$$

where *HSR*Post* is defined as a dummy variable equal to 1 if there is direct high-speed rail service between the venture capital and the portfolio firm in the given year and 0 otherwise. *HSR*Post* equals 0 for firms without venture capital. The coefficient estimate of *VC*HSR*Post* shows the effect of venture capital on CSR performance after the introduction of direct high-speed rail.

All *VC* coefficients in Table 6 are significantly negative except for the GR. The results of the DID analysis presented in Table 8 are consistent with the main regression findings reported in

Tables 5 and 6, suggesting *VC* monitoring leads to poor CSR performance, and the effect is likely to be causal.

5. Further Analysis

5.1 The Incremental Effect of CSR Driven by the Presence of Venture Capital

We extend the study by exploring the incremental effects of CSR driven by the presence of venture capital from two aspects.

First, we focus on the interplay between venture capital and CSR performance to empirically investigate whether firms with venture capital can increase financial performance by reducing CSR performance. The following specification is used:

$$Tobinq_{it} = \alpha + \alpha_1 VC_{it\text{-}1} + \alpha_2 CSR_{it} + \alpha_3 VC_{it\text{-}1} * CSR_{it} + \sum \alpha_k control_{it\text{-}1} + \varepsilon_{it\text{-}1} \quad (5)$$

where Tobinq stands for financial performance, measured as total assets minus book value of equity plus market value of equity divided by book value of total assets. *CSR* is proxy for CSR performance. The incremental effect of CSR performance through the presence of venture capital on financial performance is captured by the interaction term between *VC* and CSR performance, which is our main interest. We expect this effect to be positive because corporate social responsibility (CSR) may promotes financial performance (Jahmane and Gaies, 2020).

The results of Model 1 in Table 7 indicate that the *VC*CSR* coefficient is positive and statistically significant. This suggests that, firms with venture capital have worse CSR performance, which significantly contributes to lower values of Tobinq. In other words, the reduction in CSR performance through the presence of venture capital leads to poorer financial performance.

Second, we examine the interaction between venture capital and CSR performance on access to finance. We then re-estimate equation (5) by replacing Innovation with KZ, measured as KZ index. Following Kaplan and Zingales (1997), the parameters in the KZ index equation of firms

is estimated, and the KZ index of firm is calculated accordingly. Higher value of the KZ index implies that the firm is more capital constrained. Cheng et al. (2014) point out that firms with better CSR performance face lower capital constraints. We thus expect that a decrease in CSR driven by the participation of venture capital may have an incremental effect on firms' access to finance.

The result of Model 2 in Table 7 indicates that the *VC*CSR* coefficient is significantly negative. This implies that the declined CSR performance driven by the presence of venture capital leads to greater KZ index. In other words, the decrease in CSR performance associated with the existence of venture capital results in harder access to finance.

5.2 Subsample Analysis based on Ultimate Control

Firms with different ultimate control rights have different social resources, and venture capital may also have different impacts. To test whether our results differ because of different ultimate control rights, we partition our sample based on whether a firm is state-owned and then rerun Equation (1), and the results are reported in Table 8. We define a state-owned firm as a firm whose ultimate controlling owner is the government.

We find that the negative coefficients for venture capital are mainly driven by private firms in Panel A, which could be explained by the following reasons. First, private firms face stronger financing constraints and have a greater need to obtain external capital, so they are more subject to venture capital. Second, state-owned firms are affected by many government regulations, and the corporate system clearly requires them to perform and disclose CSR.

5.3 Subsample Analysis based on Firm Size

Large-scale firms are more likely to be noticed by analysts, the media and so on, and firm size may have something to do with how venture capital regards CSR activities. We employ the book value of total assets to measure firm size. A large (small) scale firm is a firm whose total assets are above (below) the median. To test this premise, we re-estimate Equation (1), and the results are shown in Table 9.

We find that the negative coefficients for *VC* are mainly driven by firms with a large scale in Panel A, which could be explained by the following reasons. Compared with large-scale firms, small-scale firms have less social attention and more extreme information asymmetry, so it is more difficult for them to gain external investors. In addition, small-scale firms' sustainable development relies more on external governance and supervision.

6. Conclusion

In this study, we investigate the impact of venture capital on corporate social responsibility performance. Using data on A-share listed firms in China's nonfinancial sector from 2010 to 2019, we provide reliable evidence that venture capital pushes firms towards poor corporate social responsibility performance, suggesting that most venture capital currently has a strong profit-seeking appeal. In addition, we find that the quality of internal control (ICQ) is an effective mechanism for venture capital to affect CSR performance. Furthermore, our result reveals that such a negative effect is more pronounced in small-scale and private firms than in large-scale and state-owned firms. Our extended analysis shows that the reduction in corporate social responsibility performance associated with the presence of venture capital results in greater firm innovation. Our finding is robust to several additional approaches, including censored regression and weighted least squares. Importantly, our finding holds after endogeneity concerns are carefully addressed based on alternative research designs, such as the multiperiod DID model and the treatment effects model.

Our findings also have several implications for firms and policy-makers. By studying the relationship between venture capital and CSR performance, our study is free from endogeneity concerns and thus provides meaningful insights for future studies regarding the impact of venture capital on CSR actions. Our finding suggests that venture capital's short-term speculative and opportunistic activities would sacrifice stakeholders' interests, so the government should activate the intrinsic motivations of venture capital change to the socially

responsible investment model. Other stakeholders may couldn't influence whether company choose venture capital for financing, so they should collaborate with small-scale private firms to protect their rights. The international business community which prioritizes socially responsible investment should avoid cooperation with venture capital in China. Given that VC play an influential role in fostering a socially responsible culture at portfolio companies, management should select a venture capital which considers infusing more socially responsible actions.

There are several limitations of this study. In our study, CSR is measured as the social responsibility scores of China's listed companies by Hexun.com, which may not capture all the CSR activities of firms. Future research can explore other CSR performance metrics. We also acknowledge that our results may not generalizable to other countries, therefore, our paper calls for more research in understanding more generally how venture capital affect sustainable development.

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Appendix

Table 1 Definition of Key Variables

Dependent variables	**Definitions**
CSR	The overall CSR score
SR	Responsibility towards shareholder score
ER	Responsibility towards employee score
SCCR	Responsibility towards supplier, consumer, and customer score
EVR	Responsibility towards the environment score
GR	Responsibility towards government score
LnCSR	The log of the aggregate CSR score
Independent variable	**Definition**
VC	A dummy variable that takes 1 to indicate the firm is invested in by venture capital; otherwise, 0
VC_scale	The share percentage of venture capital
Mediating variable	**Definitions**
ICQ	Internal control quality
Control variables	**Definitions**
AGE	The years since listing
BM	Book value of assets over the market value of assets
OCF	Operating cash flow
Growth	Net profit in the current period is scaled by Net profit in the previous period
R&D	Research and development (R&D) expenditures
Block	Total institutional ownership
Shrcr	The ownership concentration of the top ten shareholders
Dual	A dummy that equals 1 if the CEO also chairs the board
Diversity	The percentage of women in management
Analyst	the number of analyst teams
Report	the number of analyst reports
ROA	Earnings before interests and taxes (EBIT) scaled by the book value of total assets
Extended analysis	**Definitions**
Tobinq	*Total assets minus book value of equity plus market value of equity divided by book value of total assets*
KZ	*KZ index*

Table 2 Summary Statistics

Variable	Observations	Mean	Standard Deviation	Minimum	Maximum Value
CSR	14,051	24.08	15.40	-3.75	73.68
SR	14,051	14.26	6.240	-3.22	24.75
ER	14,051	2.59	2.900	0	13.30
SCCR	14,051	1.48	4.450	0	19
EVR	14,051	1.58	4.880	0	23
GR	14,051	4.16	3.720	-10	15
VC	14,051	0.02	0.140	0	1
AGE	14,051	16.11	5.460	4	31
BM	14,051	0.33	0.150	0.0500	0.770
OCF	14051	671.80	1877	-1350	12655
Growth	14,051	0.300	0.650	-0.670	4.160
R&D	14,051	181.7	390.6	0.560	2572
Shrcr	14,051	44.01	25.23	0.280	90.34
Dual	14,051	59.71	14.37	23.18	90.09
Diversity	14,051	0.290	0.450	0	1
Block	14,051	82.33	10.70	52.94	100
Analyst	14,051	10.19	9.83	1	44
Report	14,051	21.06	23.97	1	115

Notes: This table reports summary statistics of all variables (variable definitions are presented in Table 1). All variables are winsorised at the 1st and 99th percentiles.

Table 3 The Impact of Venture Capital on CSR Performance

	Model 1	**Model 2**	**Model 3**	**Model 4**	**Model 5**	**Model 6**
	CSR	SR	ER	SCCR	EVR	GR
VC	-1.620***	-0.662*	-0.272***	-0.456***	-0.491***	0.233*
	(0.547)	(0.344)	(0.097)	(0.077)	(0.105)	(0.133)
_cons	9.639***	5.752***	0.924***	0.103	-0.314	3.079***
	(1.509)	(0.645)	(0.267)	(0.349)	(0.379)	(0.444)
Control	Yes	Yes	Yes	Yes	Yes	Yes
Province	Yes	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes
N	14,051	14,051	14,051	14,051	14,051	14,051
Adj. R^2	0.231	0.228	0.199	0.202	0.197	0.170
F	147.489	335.103	66.972	59.829	38.836	19.510

Notes: This table reports the results of the impact of venture capital on firms' CSR performance. The dependent variable is CSR performance (*CSR*, *SR*, *ER*, *SCCR*, *EVR*, and *GR*). *VC* equals one if venture capital holds shares of the firm, and zero otherwise. And control is a vector of variables that may have potential effects on CSR performance (*AGE*, *BM*, *OCF*, *Growth*, *R&D*, *Block*, *Shrcr*, *Dual*, *Diversity*, *Analyst*, *Report*, respectively). Variable definitions can be found in Table 1. All regressions control for province, industry, and year fixed effects. All variables are winsorised at the 1st and 99th percentiles. All right-hand-side variables are lagged by one year. Standard errors, clustered at the province level, are reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 4 The Mechanism Venture Capital Uses to Push for CSR Changes

	Model 1	**Model 2**	**Model 3**	**Model 4**	**Model 5**	**Model 6**	**Model 7**
	ICQ	*CSR*	*SR*	*ER*	*SCCR*	*EVR*	*GR*
VC	-20.423***	-1.196*	-0.371	-0.310**	-0.370***	-0.413***	0.246
	(5.265)	(0.599)	(0.369)	(0.132)	(0.080)	(0.106)	(0.155)
ICQ		0.018***	0.011***	0.001***	0.002***	0.001***	0.002***
		(0.002)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)
_cons	581.986***	-0.088	-0.607	0.375	-0.660	-1.030**	1.726***
	(15.118)	(1.621)	(0.718)	(0.238)	(0.406)	(0.461)	(0.457)
Control	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	14,051	14,051	14,051	14,051	14,051	14,051	14,051
Adj. R^2	0.166	0.279	0.290	0.240	0.241	0.239	0.185
F	227.914	417.745	539.904	82.278	77.931	74.440	32.159

Notes: This table presents the mechanism venture capital ues to push for CSR performance. The dependent variable is CSR performance (*CSR*, *SR*, *ER*, *SCCR*, *EVR*, *GR*). *VC* equals one if venture capital holds shares of the firm, and zero otherwise. Mediator is Internal control quality (ICQ). And *control* is a vector of variables that may potentially affect CSR performance (*AGE*, *BM*, *OCF*, *Growth*, *R&D*, *Block*, *Shrcr*, *Dual*, *Diversity*, *Analyst*, *Report*, respectively). Variable definitions can be found in Table 1. All regressions control for province, industry, and year fixed effects. All variables are winsorised at the 1st and 99th percentiles. All right-hand-side variables are lagged by one year. Standard errors, clustered at the province level, are reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 5 Robustness Tests

	Model 1	**Model 2**	**Model 3**	**Model 4**	**Model 5**
	CSR	CSR	CSR	LnCSR	CSR
VC	-1.600***		-1.472**	-0.073**	-1.620***
	(0.504)		(0.538)	(0.028)	(0.546)
VC_scale		-0.637**			
		(0.253)			
Roa			44.845***		
			(3.269)		
_cons	24.110***	18.752***	10.725***	2.380***	18.259***
	(0.010)	(3.494)	(1.381)	(0.086)	(2.162)
Control	No	Yes	Yes	Yes	Yes
Province	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes
N	14,051	277	14,051	13,539	14,051
Adj./ Pseudo R^2	0.156	0.313	0.261	0.148	0.0327
F	10.073	314.303	146.067	97.524	.

Notes: This table reports robustness tests. The result of without control variables is displayed in Model (1), the different Independent variable in Model (2), the inclusion of additional control in Model (3), the different Independent variable in Model (4), censored regression (Tobit) in Model (5). Variable definitions can be found in Table 1. All regressions control for province, industry, and year fixed effects. All variables are winsorised at the 1st and 99th percentiles. All right-hand-side variables are lagged by one year. Standard errors, clustered at the province level, are reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. The F value in model 5 has been reported as missing. Stata has done that to not be misleading, not because there is something necessarily wrong with your model.

Table 6 High-Speed Rail Service as A Shock to *VC* Monitoring

	Model 1	**Model 2**	**Model 3**	**Model 4**	**Model 5**	**Model 6**
	CSR	*SR*	*ER*	*SCCR*	*EVR*	*GR*
*VC*HSR*Post*	-1.332**	-0.724*	-0.166**	-0.332***	-0.384**	0.247*
	(0.579)	(0.393)	(0.079)	(0.104)	(0.151)	(0.138)
_cons	9.632***	5.753***	0.922***	0.100	-0.317	3.079***
	(1.511)	(0.644)	(0.267)	(0.350)	(0.381)	(0.444)
Control	Yes	Yes	Yes	Yes	Yes	Yes
Province	Yes	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes
N	14,051	14,051	14,051	14,051	14,051	14,051
Adj. R^2	0.231	0.228	0.199	0.202	0.197	0.170
F	171.924	339.682	78.596	72.601	49.911	19.479

Notes: This table presents the difference-in-difference analysis of the exogenous shock from *High-Speed Rail Service*. *HSR*Post* is defined as a dummy variable equal to 1 if there is direct HSR service between the venture capital and the portfolio firm in the given year and 0 otherwise. *HSR*Post* equals 0 for firms without venture capital. The coefficient estimate of *VC*HSR*Post* shows the effect of venture capital on CSR performance after the introduction of direct high-speed rail service. The dependent variable is CSR performance (*CSR, SR, ER, SCCR, EVR, GR*); and *control* is a vector of variables that may potentially affect CSR performance (*AGE, BM, OCF, Growth, R&D, Block, Shrcr, Dual, Diversity, Analyst, Report*, respectively). Variable definitions can be found in Table 1. All regressions control for province, industry, and year fixed effects. All variables are winsorised at the 1st and 99th percentiles. All right-hand-side variables are lagged by one year. Standard errors, clustered at the province level, are reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 7 The Incremental Effect of CSR Performance

	Model 1	**Model 2**
	Tobinq	KZ
CSR	0.002*	-0.027***
	(0.001)	(0.002)
VC	-0.270***	0.560**
	(0.092)	(0.269)
VC*CSR	0.007**	-0.028***
	(0.003)	(0.009)
_cons	4.086***	4.749***
	(0.141)	(0.191)
Control	Yes	Yes
Province	Yes	Yes
Industry	Yes	Yes
Year	Yes	Yes
N	14,051	14,051
Adj. R2	0.433	0.429
F	301.746	673.441

Notes: This table reports the incremental effect of CSR performance through the presence of venture capital on firm innovation. The interaction term between *VC* and CSR performance is our main interest. The dependent variable is innovation performance (innovation), and the independent variable is *VC* and CSR performance (*CSR, SR, ER, SCCR, EVR, GR*); and control is a vector of variables that may have potential effects on CSR performance (*AGE, BM, OCF, Growth, R&D, Block, Shrcr, Dual, Diversity, Analyst, Report*, respectively). Variable definitions can be found in Table 2. All variables are winsorised at the 1st and 99th percentiles. Due to space limitations, this table does not display the control variables. All right-hand-side variables are lagged by one year. Standard errors, clustered at the city level, are reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 8 *VC* and CSR Performance: Subsample Analysis based on Ultimate Control

	Model 1	**Model 2**	**Model 3**	**Model 4**	**Model 5**	**Model 6**
	CSR	*SR*	*ER*	*SCCR*	*EVR*	*GR*
Panel A: State-owned Firm						
VC	-1.722	-0.688	-0.065	-0.563*	-0.753	0.349
	(1.501)	(0.510)	(0.293)	(0.307)	(0.543)	(0.299)
_cons	5.720	6.492***	-0.461	-1.274	-2.867*	3.626***
	(3.873)	(1.387)	(0.874)	(1.136)	(1.481)	(0.924)
Control	Yes	Yes	Yes	Yes	Yes	Yes
Province	Yes	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes
N	4,511	4,511	4,511	4,511	4,511	4,511
Adj. R^2	0.307	0.326	0.270	0.282	0.283	0.273
F	39.490	111.997	22.145	12.735	11.109	7.599
Panel B: Private Firm						
VC	-1.215*	-0.749**	-0.182	-0.261**	-0.223**	0.167
	(0.626)	(0.343)	(0.110)	(0.111)	(0.101)	(0.155)
_cons	11.547***	5.957***	1.607***	0.629	0.660*	2.656***
	(1.979)	(0.768)	(0.372)	(0.446)	(0.358)	(0.606)
Control	Yes	Yes	Yes	Yes	Yes	Yes
Province	Yes	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes
N	9,540	9,540	9,540	9,540	9,540	9,540
Adj. R^2	0.205	0.218	0.158	0.163	0.144	0.136
F	252.345	368.910	78.286	61.811	34.909	16.809

Notes: This table reports the results of venture capital on CSR performance according to subsample analysis for firms with different ultimate controls. The dependent variable is CSR performance (*CSR*, *SR*, *ER*, *SCCR*, *EVR*, and *GR*). *VC* equals one if venture capital holds shares of the firm, and zero otherwise. And control is a vector of variables that may have potential effects on CSR performance (*AGE*, *BM*, *OCF*, *Growth*, *R&D*, *Block*, *Shrcr*, *Dual*, *Diversity*, *Analyst*, *Report*, respectively). Variable definitions can be found in Table 1. Due to space limitations, this table does not display the control variables. All regressions control for province, industry, and year fixed effects. All variables are winsorised at the 1st and 99th percentiles. All right-hand-side variables are lagged by one year. Standard errors, clustered at the province level, are reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 9 Venture Capital and CSR Performance: Subsample Analysis based on Firm Size

	Model 1	**Model 2**	**Model 3**	**Model 4**	**Model 5**	**Model 6**
	CSR	*SR*	*ER*	*SCCR*	*EVR*	*GR*
Panel A: Large scale firm						
VC	-1.678*	-0.623	-0.259*	-0.437***	-0.461**	0.077
	(0.946)	(0.460)	(0.152)	(0.147)	(0.175)	(0.247)
_cons	10.489***	5.772***	0.522	0.622	-0.271	3.628***
	(2.190)	(1.235)	(0.560)	(0.580)	(0.716)	(0.574)
Control	Yes	Yes	Yes	Yes	Yes	Yes
Province	Yes	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes
N	7,025	7,025	7,025	7,025	7,025	7,025
Adj. R^2	0.330	0.275	0.306	0.320	0.320	0.197
F	80.590	99.883	20.406	14.800	13.305	15.393
Panel B: Small scale firm						
VC	-0.592	-0.532**	-0.071	-0.202	-0.198	0.384
	(0.417)	(0.225)	(0.076)	(0.144)	(0.168)	(0.244)
_cons	10.336***	5.151***	1.598***	0.257	0.275	3.069***
	(1.880)	(1.001)	(0.423)	(0.606)	(0.537)	(0.655)
Control	Yes	Yes	Yes	Yes	Yes	Yes
Province	Yes	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes
N	7,026	7,026	7,026	7,026	7,026	7,026
Adj. R^2	0.199	0.260	0.151	0.149	0.137	0.154
F	68.418	498.807	31.858	20.262	11.584	12.983

Notes: This table reports the results of venture capital on CSR performance according to subsample analysis for firms with different sizes. A large (small) scale firm is a firm whose total assets are above (below) the median. The dependent variable is CSR performance (*CSR, SR, ER, SCCR, EVR, GR*). *VC* equals one if venture capital holds shares of the firm, and zero otherwise. And *control* is a vector of variables that may have potential effects on CSR performance (*AGE, BM, OCF, Growth, R&D, Block, Shrcr, Dual, Diversity, Analyst, Report*, respectively). Variable definitions can be found in Table 1. Due to space limitations, this table does not display the control variables. All regressions control for province, industry, and year fixed effects. All variables are winsorised at the 1st and 99th percentiles. All right-hand-side variables are lagged by one year. Standard errors, clustered at the province level, are reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

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