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journal homepage: [www.elsevier.com/locate/iref](http://www.elsevier.com/locate/iref)Mandatory corporate social responsibility disclosure and financial constraints: Evidence from China<sup>☆</sup>Xiao Liang<sup>a</sup>, Xiaomeng Charlene Chen<sup>b,\*</sup><sup>a</sup> School of Government Audit, Nanjing Audit University, Nanjing, China<sup>b</sup> Macquarie Business School, Macquarie University, Sydney, Australia

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## ABSTRACT

We investigate the impact of mandatory CSR disclosures on firms' financial constraints in China, where CSR reporting is mandated for a subset of listed firms. Employing a difference-in-differences approach, we find that mandatory CSR reporting firms experience greater financial constraints after the mandate. We identify controlling shareholder expropriation as a plausible channel through which the mandate affects financial constraints. Further analyses reveal that mandatory CSR reporting firms with political connections or located in more marketized regions/provinces can alleviate their financial constraints. Our findings add evidence to the economic implications of CSR disclosure mandates. Given the prevailing global trend toward enforcing CSR disclosures and the call for more research on mandatory CSR reporting, our study sheds light on how these mandates shape firms' access to finance.

## 1. Introduction

In recent years, there has been a notable global surge in regulatory requirements mandating companies to disclose information on their corporate social responsibility (CSR) activities. This increasing emphasis on CSR disclosures stems from a growing recognition among regulatory bodies that CSR information is of significant relevance to both stakeholders and shareholders. Countries such as China, the European Union (EU), the United States (US), South Africa, and others have enacted regulations that impose mandatory CSR reporting for selected firms within their jurisdictions. The widespread adoption of mandatory CSR reporting has amplified the need for deeper insights into the potential economic outcomes of such reporting (Boubakri et al., 2020; Ioannou and Serafeim, 2019). While increased accountability and transparency through mandatory CSR disclosures may discipline firms and drive improvement in CSR performance, it also introduces certain pressures. Firms may face resource commitments to CSR activities, leading to higher costs that could impact shareholder interests.

This study explores the impact of mandatory CSR disclosures on firms' financial constraints within the specific context of China. Notably, China ranks among the top five countries where firms experience the most significant financial constraints out of 80 countries surveyed in the World Business Environment Survey and the Investment Climate Assessment Surveys. A staggered 75% of surveyed

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Chinese firms cite financing as their primary obstacle (Claessens and Tzioumis, 2006). Formal financing for Chinese firms primarily relies on lending by banks, particularly the dominant state-owned banks, with state-owned enterprises (SOEs) being the preferred recipients of such financing (Cong et al., 2019; Ru, 2018). On the other hand, financing through bond and equity markets accounts for only about one-fifth of the total credit (Song and Xiong, 2018). Furthermore, informal financing options, such as interpersonal lending and private money houses, are limited in scope due to dependence on interpersonal relationships and lack of legal security. Consequently, these alternatives cannot adequately address the financial needs of most Chinese firms in a cost-effective manner.

Existing literature has highlighted the positive association between superior CSR performance and firms' enhanced financial access, based on studies in voluntary CSR disclosure settings. For instance, Cheng et al. (2014) demonstrate that firms exhibiting better CSR performance enjoy improved financial access and encounter reduced financial constraints than their counterparts. However, it remains unclear whether these findings can be extended to settings with mandatory CSR disclosures, where the underlying incentives for engaging in CSR activities may differ (Christensen et al., 2021). Given the pervasive adoption of mandatory CSR disclosure requirements in emerging markets, it becomes imperative to comprehend their economic effects. Therefore, our study focuses on examining the influence of mandatory CSR reporting requirements on firms' access to finance, specifically within the Chinese context.

China presents an optimal context for this investigation for several reasons. First, China's two stock exchanges, namely the Shanghai Stock Exchange (SHSE) and Shenzhen Stock Exchange (SZSE), have mandated a subset of listed companies to release CSR reports alongside their annual reports since December 2008. The selected companies are obligated to reveal various CSR undertakings, including those related to product quality, employee and environmental protection, and community development, in alignment with the guidelines issued by the stock exchanges. This mandate reflects the Chinese government's initiatives to encourage CSR practices and balance economic growth and socio-environmental sustainability. Moreover, this setting enables us to employ a difference-in-differences (DiD) regression design, facilitating a comprehensive analysis of alterations in financial constraints after the mandate between firms obligated to report CSR (treated firms) and firms exempt from this obligation (control firms). This approach addresses some of the endogeneity concerns often encountered in studies related to voluntary CSR disclosures (Christensen et al., 2021).

In accordance with the shareholder expense view, which emphasizes shareholder value maximization, engaging in CSR activities requires corporate resources and is perceived as burdensome to shareholders (Friedman, 1970; Preston & O'Bannon, 1997). Recent studies examining the real effects of mandatory CSR disclosures corroborate this perspective, highlighting that CSR improvements resulting from mandates often come at a cost (Chen et al., 2018; Christensen et al., 2017; Rauter, 2020). When firms are bound by mandatory CSR disclosure requirements, they face pressures to allocate resources toward CSR initiatives. While pursuing these social objectives is laudable, firms may be compelled to divert resources that could otherwise be deployed to identify and support profitable projects. Chen et al. (2018) and Lu et al. (2021) reveal that mandatory CSR reporting requirements have adverse effects on the financial performance of Chinese-listed firms subject to the mandate. As these requirements potentially distort the optimal allocation of corporate resources and diminish firm profitability, it leads us to hypothesize that after the CSR reporting mandate, firms under the mandate (i.e., mandatory CSR reporting firms) will exhibit restrained access to external finance and encounter greater financial constraints compared to firms not under this mandate (i.e., non-mandatory CSR reporting firms).

Next, we explore a plausible channel through which mandatory CSR disclosures affect financial constraints. The conflict of interests between controlling and minority shareholders is the central theme of agency problems in Chinese firms (Guariglia and Yang, 2016; Jiang et al., 2010).<sup>1</sup> Controlling shareholders, often government agents, seek benefits through alternative channels due to limited ownership benefits of price appreciation (Lin et al., 2011; Masulis et al., 2009). These dominant shareholders may divert corporate resources for private benefits, prioritizing self-interests (Guariglia and Yang, 2016). Moreover, the state's role as the ultimate controlling shareholder for SOEs introduces political and social motives into the decision-making process (Gong et al., 2021; Jiang and Kim, 2015). Given the emphasis on CSR by the Chinese government, firms may prioritize CSR initiatives, even at the expense of their financial health. Consequently, controlling shareholders' incentives become crucial in determining the allocation of firm resources, potentially diverting funds away from profitable projects and prioritizing CSR initiatives. As such, we propose our second hypothesis: The effect of mandatory CSR disclosures on financial constraints is mediated by controlling shareholder resource allocation preferences, which prioritize CSR initiatives.

We adopt a sample of Chinese listed firms covering 2006–2013. The sample period consists of a pre-CSR reporting mandate phase from 2006 to 2008 and a post-mandate phase from 2009 to 2013. Utilizing a DiD regression design along with the propensity score matching approach, we analyze the changes in financial constraints between firms subject to the CSR reporting mandate (treated firms) and those not mandated to issue CSR reports (control firms). Our empirical analysis reveals a notable increase in financial constraints for treated firms compared to control firms. The findings suggest that under the mandate, firms are compelled to divert resources toward CSR activities, potentially distorting the optimal allocation of corporate resources and restraining firms' ability to access external financing. These results remain robust across alternative measures of financial constraints and different sample specifications, and satisfy the parallel trends assumption. Furthermore, our findings hold when we perform a placebo test and exclude the years 2008–2009 concurrent with the global financial crisis from the sample period. Additionally, we find a decline in the generation of future cash flows internally and reduced access to external financing for mandatory CSR reporting firms compared to firms not mandated to issue CSR reports, suggesting that these factors play a role in exacerbating the financial constraints faced by mandatory CSR reporting firms.

To explore the mechanisms underlying the effect of CSR disclosure mandates on financial constraints, we perform mediation

<sup>1</sup> All Chinese listed firms have a dominant/controlling shareholder by heritage and by the design of the corporate ownership structure. Shares of dominant/controlling shareholders are subject to stringent trading restrictions (Jiang et al., 2010).

analyses. The results indicate that mandatory CSR disclosing firms exhibit more pronounced controlling shareholder resource allocation preferences than non-mandatory disclosing firms. This suggests that controlling shareholder expropriation partially explains the influence of CSR reporting mandates on financial constraints, especially within SOEs.

Furthermore, our analysis examines cross-sectional variations in the treatment effect of CSR reporting mandates on financial constraints. We find that politically connected firms experience a weaker treatment effect, as they can leverage government support and preferential treatment (Li et al., 2006; Su et al., 2019). In contrast, non-politically connected firms face stronger pressure to allocate corporate resources toward CSR objectives, leading to higher costs and increased financial constraints. Additionally, we analyze how treatment effects vary with the levels of marketization in different regions/provinces. Our findings show that firms located in less marketized regions/provinces experience a significant increase in financial constraints after the mandate, while those in more marketized regions/provinces do not. This highlights that firms in less marketized regions are more constrained by government intervention and less responsive to stakeholder demands for CSR initiatives (Gang et al., 2018).

In exploring the distinction between mandatory and voluntary CSR reporting firms, our analysis reveals that mandatory reporting firms face greater financial constraints than their voluntary counterparts. This highlights the strategic adjustments voluntary reporting firms make to achieve a favorable cost-benefit trade-off in anticipation of CSR costs. Conversely, mandatory reporting firms may face negative cost-benefit trade-offs as they are compelled to disclose CSR information without prior voluntary engagement, consistent with Grewal et al. (2019). Lastly, we compare financial constraints between mandatory CSR reporting SOEs and non-SOEs. Our findings show that SOEs tend to face greater financial constraints as they prioritize CSR initiatives at the expense of shareholders, relying on government support for critical resources.

Our study makes contributions to the literature in several ways. First, we provide empirical evidence regarding the potential economic consequences of mandatory CSR disclosure, adding to the literature on CSR reporting. Prior studies show that CSR improvements due to mandates can come at a cost, leading to reduced profitability (Chen et al., 2018; Lu et al., 2021), productivity (Christensen et al., 2017), and resource allocation distortions (Rauter, 2020). We extend these findings by demonstrating that firms subject to mandatory CSR reporting experience an increase in financial constraints. Additionally, we identify a decline in generating future cash flows internally and reduced access to external financing as underlying factors contributing to the financial constraints faced by these firms.

Second, our research expands the understanding of the determinants of financial constraints. While previous studies reveal that voluntary non-financial disclosures can alleviate financial constraints (Cheng et al., 2014; Dhaliwal et al., 2011), we document that mandatory CSR reporting leads to aggravated financial constraints for firms. This suggests that the cost-benefit trade-off for mandated CSR disclosures is often negative for shareholders, as these mandates may be more oriented toward other stakeholders (Christensen et al., 2021). We further highlight that the connection between mandatory CSR disclosure and financial constraints is influenced by factors such as political connections and the marketization process across regions/provinces.

Furthermore, our study extends the work of Cheng et al. (2014), who examined the relationship between CSR performance and financial constraints in a voluntary CSR disclosure setting. We build upon their findings by exploring this relationship within the context of a CSR disclosure mandate, utilizing a DiD regression design to address selection issues (Christensen et al., 2021). This approach enhances our comprehension of how CSR reporting mandates influence firms' financial constraints. Our study contributes to the existing evidence concerning the economic outcomes associated with government regulation related to CSR disclosures at the firm level.

Lastly, given the increasing global trend of mandating CSR disclosures and the demand for deeper investigations into mandatory CSR disclosure (Christensen et al., 2021), our study provides valuable insights into how CSR disclosure mandates can affect firms' financial aspects. By shedding light on this issue, our research contributes to the ongoing discussions about the consequences of CSR disclosure regulations for companies and their financial performance.

## 2. Institutional context and hypotheses development

### 2.1. Institutional context of CSR initiatives in China

China has been pursuing economic growth since its market transition in 1978. Its economic development has relied excessively on energy-intensive and high-polluting industries that generate almost a third of the annual gross domestic product (GDP). Consequently, the economic loss caused by environmental pollution accounts for approximately 3% of China's GDP (SEPA and NBS, 2006). Chinese firms are often criticized for poor environmental performance, workforce safety issues, and product quality scandals. Given the growing concerns about environmental issues, low product quality, and heightened inequality, the Chinese government has begun promoting CSR practices. It has issued several guidelines to balance economic development and social and environmental sustainability.<sup>2</sup> In particular, Article 5 of the 2006 China Company Law explicitly states the need for Chinese firms to assume social

<sup>2</sup> In 2002, the China Securities Regulatory Commission introduced the first CSR guidelines as part of the Code of Corporate Governance for Listed Companies. In 2003, the Ministry of Environmental Protection announced the first regulation concerning corporate environmental disclosure, which requires companies, particularly those with significant environmental impact, to share environmental information, while also fostering an environment for voluntary disclosures. In 2008, the state-owned Assets Supervision Administration Commission of the State Council required central-state-owned enterprises to prepare CSR reports and disclose information on CSR activities. The Application Guidelines for Auditing of Enterprise Internal Controls released in 2010 specify the social responsibilities that companies should fulfill.

responsibility.

In conjunction with the government's CSR initiatives, China's two stock exchanges, the SHSE and SZSE, have taken active steps to promote the disclosure of CSR activities by listed companies. In December 2008, both exchanges issued the "Notice Concerning Listed Companies' Preparation for 2008 Annual Report," which mandated a specific subset of listed companies to incorporate CSR reports as part of their annual reporting requirements.<sup>3</sup> Moreover, the SHSE and SZSE actively encourage other listed firms to embrace voluntary CSR disclosures. They have introduced comprehensive guidelines outlining the specifics of CSR report content.<sup>4</sup> Before the CSR reporting mandate, voluntary CSR disclosure was limited in China. For example, in 2007, only 28 of the largest 100 Chinese listed firms chose to disclose CSR activities through various means, including standalone CSR reports, inclusion in annual reports, or via their corporate websites (Gao, 2009). The CSR disclosure mandate acted an exogenous shock, significantly altering the disclosure landscape for Chinese listed firms. This regulatory change provides an ideal setting to examine the resulting economic effects.

## 2.2. Access to financing in China

The inability to obtain financing directly relates to financial constraints, which involve market impediments preventing companies from funding all their desired investments (Denis and Sibilkov, 2010; Lamont et al., 2001). In China, firms rely on formal or informal external financing and internal financing channels to fund investments (Allen et al., 2005). Within the Chinese financial landscape, the formal financial sector encompasses institutions with state charters, including banks, stock and corporate bond markets, and other established lending channels (Dong et al., 2016). The informal financial system, including self-fundraising, private money houses, and underground lending houses, is complementary to service the market's lower end.

Lending by banks, especially by the four dominant state-owned banks, constitutes the primary financing source for Chinese firms (Bailey et al., 2011; La Porta et al., 2002). The landscape of bond and equity markets as financing avenues in China is challenged by imperfections in its capital markets (Cull et al., 2015). The contribution of these avenues to the overall credit landscape in China is relatively limited, accounting for approximately one-fifth of the total credit (Song and Xiong, 2018). In comparison to developed economies, the Chinese bond and equity markets are relatively smaller and less sophisticated, both in terms of market capitalization and the total traded value as a fraction of the GDP (Allen et al., 2019).<sup>5</sup> China's corporate bond market is less than a quarter of the size of its government bond market.<sup>6</sup> The history of China's stock market has largely revolved around governmental privatization efforts, and it's only been more recently that the listing of private firms has been permitted (Song and Xiong, 2018; Wang et al., 2004).<sup>7</sup> Furthermore, the avenues for obtaining financing from other formal financial institutions like factoring and leasing are also relatively underdeveloped, reducing firms' likelihood of accessing finance through these channels in China (Gregory & Tenev, 2001).

While the formal financial system cannot provide sufficient funds for the expansion of local companies, the informal financial system, which includes interpersonal lending and trade credit, private money houses, and underground lending entities, has become the main funding source (Allen et al., 2005). However, informal financing usually revolves around small, short-term loans that lack security. Should borrowers fail to meet their commitments to underground lending houses, they might face coercion and even violence (Ayyagari et al., 2010). Moreover, private money houses and underground lending organizations impose interest rates that surpass the state-mandated rate limits, which aren't endorsed by the People's Bank of China (Cheng and Degryse, 2010). This informal financial system, founded on interpersonal relationships and lack of legal assurances, fails to provide Chinese firms with cost-effective and secure financial support, thereby elevating financial risk. The literature shows an association between CSR performance and firms' ability to secure financing (Cheng et al., 2014). Our study is motivated to investigate whether the exogenous regulatory shift in CSR disclosure requirements impacts firms' financial constraints.

## 2.3. CSR and financial constraints

The literature on the performance and value implications of CSR has contrasting perspectives: the stakeholder value maximization view and the shareholder expense view. The stakeholder value maximization view highlights that firms that effectively manage stakeholder relationships gain net benefits. For example, CSR can have a positive impact by attracting and retaining skilled employees

<sup>3</sup> This subset includes three distinct categories of companies: (1) companies featured in either the SHSE Corporate Governance Index or the SZSE 100 Index, (2) firms with shares listed overseas, and (3) companies operating within the financial sector.

<sup>4</sup> The guidelines state that the CSR report should encompass, without being restricted to, the subsequent aspects: (1) CSR activities related to employee welfare, environmental preservation, product quality, and community interactions; (2) evaluation of CSR initiatives' execution, along with explanations for disparities between actual CSR achievements and guideline-defined criteria; and (3) strategies for enhancing CSR and a proposed timeline for enacting these strategies.

<sup>5</sup> For instance, while bank credit amounted to 128% of China's GDP in 2012, bond sales constituted a relatively minor proportion of the total funds raised by firms, approximately 41% of China's GDP in the same year (Elliott and Yan, 2013).

<sup>6</sup> The lack of maturity in China's bond market can be attributed to a combination of factors, including an overabundance of government regulation and the absence of robust institutional investors and reliable credit rating agencies. These elements collectively hinder the accurate pricing of debt securities (Ayyagari et al., 2010).

<sup>7</sup> The China Securities Regulation Commission, responsible for monitoring and regulating the nation's stock exchanges and listed firms, has exercised its control to limit the size of initial public offerings. Additionally, China's stock market is dominated by speculators and has been ineffective in allocating economic resources, given ineffective regulation, inadequate investor safeguards, and limited corporate transparency (Allen et al., 2019; Bruton and Ahlstrom, 2003; Morck et al., 2000).

(Greening and Tuban, 2000), enhancing customer awareness (Servaes and Tamayo, 2013), and boosting green innovation (Chen et al., 2023).

However, Bhandari and Javakhadze (2017) put forth the perspective that directing limited corporate resources toward CSR endeavors might divert valuable resources away from profitable investment undertakings. They find evidence suggesting a certain degree of exacerbation of financial constraints due to CSR activities. Their results align with the viewpoint that emphasizes shareholder value maximization, suggesting that channeling constrained resources into CSR initiatives could needlessly elevate costs and subsequently weaken a firm's competitive stance (Benabou and Tirole, 2010; Friedman, 1970). Thus, the literature presents mixed evidence on whether CSR affects firms' ability to secure financing from capital markets. With the increasing prevalence of mandatory CSR disclosure regulations in recent times, there is a growing need to better understand the implications of financial constraints within the context of CSR reporting mandates.

#### 2.4. Hypothesis development

The trade-off hypothesis, as supported by the shareholder expense view (Preston & O'Bannon, 1997), posits that firms face a trade-off when engaging in CSR activities. According to this view, allocating resources to CSR initiatives can lead to additional costs for the firm, resulting in reduced profitability and potentially placing the firm in a competitive inferior position compared to less engaged firms. Consistent with the trade-off hypothesis, Bhandari and Javakhadze (2017) find that CSR activities distort firm-level resource allocation efficiency and negatively affect firms' performance, which leads to restricting their access to external financing. Moreover, several studies examine the real effects of mandatory CSR reporting and find that CSR improvements due to the mandates often come at a cost (Christensen et al., 2017; Fiechter et al., 2022; Rauter, 2020). Christensen et al. (2017) find that mine safety has improved after the US Securities and Exchange Commission (SEC) made the mine safety disclosure provision mandatory in regulatory filings for SEC-registered firms. Simultaneously, the productivity of these coal mines has declined compared with that of the non-SEC-registered firms. Rauter (2020) investigates the influence of mandatory disclosures of extraction payments, aimed at discouraging corporate payment avoidance, on the financial contributions and investments made by multinational oil, gas, and mining firms in foreign host countries. He documents that disclosing firms pay higher prices for extraction rights to host governments but reduce their investments and secure fewer extraction licenses compared with non-disclosing competitors.

When mandated to disclose CSR activities, firms are pressured to allocate resources to CSR initiatives by the government and interest groups (Chen et al., 2018), or by reputation risk resulting from public backlash and negative publicity (Christensen et al., 2021). Under the framework of mandatory CSR reporting requirements, firms are obliged to participate in charitable activities, uphold employee welfare, ensure environmental protection, foster community development, and undertake various CSR initiatives. However, these social endeavors might entail reallocating company resources that could otherwise be directed toward identifying and financing potentially profitable projects. Chen et al. (2018) and Lu et al. (2021) reveal that mandatory CSR disclosure requirements adversely affect firm performance. Specifically, Chinese listed firms subjected to these mandates have witnessed a decline in their profitability after implementation. Their findings suggest that CSR disclosure mandates potentially distort the optimal allocation of corporate resources and reduce firms' profitability. Thus, we predict that firms compelled to provide CSR reports due to mandates likely experience greater financial constraints compared with non-mandatory CSR reporting firms, supporting our hypothesis as follows:

##### H1. *Mandatory CSR reporting firms face greater financial constraints following CSR disclosure mandates.*

Friedman (1970) asserts that engaging in CSR activities that negatively impact shareholder wealth signals an agency problem and is socially irresponsible. He argues that managers pursue CSR for personal gains, such as advancing their social, political, or career objectives, which may come to the detriment of shareholders. Through the lens of agency theory, it's plausible that the benefits of engaging in CSR may accrue to managers instead of shareholders (McWilliams et al., 2006). Supporting this viewpoint, Cheng et al. (2023) reveal that investing in CSR activities disproportionately raises costs and diverts firm resources, benefiting some stakeholders without necessarily adding value to the firm. Similarly, Krüger (2015) reports that investors respond slightly negatively when positive information about the CSR activities of a firm is revealed, implying that positive CSR news may be perceived as bad news for shareholders from the agency theory perspective.

Chinese listed firms exhibit a unique feature in the form of a singular dominant shareholder, whose ownership significantly surpasses that of the second-largest shareholder (Chen et al., 2009). The presence of dominant/controlling shareholders, coupled with the strict limitations on trading controlling shares, and the relatively underdeveloped legal and corporate governance structures, directs the central attention of agency-related concerns within Chinese firms centers toward the conflict of interest existing between controlling and minority shareholders. This dynamic takes precedence over the traditional emphasis on the divergence between managers and shareholders (Guariglia and Yang, 2016; Jiang et al., 2010). Controlling shareholders have incentives to seek benefits through other channels, as their ownership benefits of price appreciation are limited (Lin et al., 2011; Masulis et al., 2009). These dominant shareholders, often government agents, may divert corporate resources for private benefits, prioritizing self-interests (Guariglia and Yang, 2016).

Moreover, the state's role as the ultimate controlling shareholder for SOEs introduces political and social motives into their



decision-making process (Gong et al., 2021; Jiang and Kim, 2015). In line with the Chinese government's active promotion of CSR activities, as evidenced by guidelines in the national Five-Year plans guiding economic and social development,<sup>8</sup> CSR has become a legitimate and desired activity that aligns with the government's political and social objectives (Marquis and Qian, 2014).

Given the state's emphasis on CSR, firms may prioritize engaging in CSR initiatives, even if it comes at the expense of their financial health. This phenomenon is no uncommon in China's institutional environment, where government intervention in SOEs through majority state ownership can lead to distorted investment behavior and inefficiency (Chen et al., 2011). Considering the commitment to CSR and its potential impact on financial constraints, the incentives of controlling shareholders play a crucial role. Controlling shareholders' preference to allocate firm resources toward CSR activities, potentially at the cost of funding profitable projects, can act as a mediator or channel through which mandatory CSR disclosures impact financial constraints. Building upon these insights, we propose the second hypothesis as follows:

**H2.** *The effect of mandatory CSR disclosures on financial constraints is mediated by controlling shareholder resource allocation preferences, which prioritize CSR initiatives.*

### 3. Variable measurement and research design

#### 3.1. Measuring financial constraints

Given the distinctive features of China's legal, financial systems, and institutional context compared to developed economies, the direct application of the KZ index proposed by Kaplan and Zingales (1997) may not be appropriate for assessing financial constraints in China. As an alternative, we adopt the methodology suggested by Kaplan and Zingales (1997), using the accounting information of listed Chinese firms spanning from 1998 to 2013, to gauge the extent of financial constraints. Specifically, we employ an ordered logit regression approach, and use the regression coefficients derived from this model to construct the *KZ index*, an index measure of financial constraints. This index consists of a linear combination of five financial ratios (as depicted in Eq. (1)).<sup>9</sup> For a detailed explanation of the construction process of this index, please refer to Appendix A. A higher value of the *KZ index* value signifies a heightened degree of financial constraints for a firm.

$$KZ\ index_{i,t} = -10.283 \times \frac{CF_{i,t}}{A_{i,t-1}} - 47.961 \times \frac{D_{i,t}}{A_{i,t-1}} - 6.203 \times \frac{C_{i,t}}{A_{i,t-1}} + 5.043 \times LEV_{i,t} + 0.598 \times Q_{i,t} \quad (1)$$

The outcomes of the ordered logit regression analysis are provided in Appendix B. These findings reveal that all coefficients exhibit statistical significance and align with the expected directions (Kaplan and Zingales, 1997; Lamont et al., 2001). Firms with greater leverage and Tobin's Q display a significantly elevated probability of being categorized as financially constrained. The likelihood is considerably lower if firms have higher levels of cash flows, cash holdings, and dividend payouts.

#### 3.2. Difference-in-differences analysis

We conduct a DiD analysis to alleviate the concern that other concurrent events may affect financial constraints but are not related to mandatory CSR reporting. The DiD specification compares the changes in the treated firms' (i.e., mandatory CSR reporting firms) financial constraints with those of the control firms (i.e., non-mandatory CSR reporting firms) subsequent to the CSR disclosure mandate. If mandatory CSR reporting is detrimental to firms' ability to access finance, the treated firms will face greater financial constraints than the control firms. We employ the following DiD specification to test H1 (with firm and year subscripts removed for simplicity):

$$KZ\ index = \beta_0 + \beta_1 Treated \times Post + \beta_2 Treated + \beta_3 Post + \sum Controls + \varepsilon \quad (2)$$

where *KZ index* is the financial constraint measurement as defined in Section 3.1. *Treated* represents a dummy variable that takes a value of 1 for firms mandated to report CSR activities and 0 for firms exempt from mandatory CSR disclosures.<sup>10</sup> *Post* is a dummy variable, with a value of 1 for the years 2009–2013 (the post-CSR reporting mandate interval), and 0 for the years 2006–2008 (the pre-CSR reporting mandate interval). The interaction term, *Treated* × *Post*, is the variable of interest, capturing the incremental effect of mandatory CSR reporting on the financial constraints of treated firms as contrasted with control firms subsequent to the mandate. If the coefficient on *Treated* × *Post* in Eq. (2),  $\beta_1$ , is estimated to be positive, it aligns with our prediction that the CSR reporting mandate is detrimental to firms' ability to access finance, and the hypothesis is supported. A negative coefficient on  $\beta_1$  suggests a decline in financial constraints after the CSR reporting mandate.

We incorporate several control variables identified by previous research to be associated with financial constraints or to potentially

<sup>8</sup> During the national 11th Five-Year Plan (2006–2010), the Chinese government set a specific target for emission control, aiming to reduce main pollutant emissions by 10% compared with the levels recorded in 2005. The national 12th Five-Year Plan (2011–2015) requires reducing carbon intensity by 17% and main pollutant emissions by 10% compared with the levels reported in 2010.

<sup>9</sup> The period starts from 1998 because cash flow information for publicly traded firms is accessible from 1998 in the China Security Market and Accounting Research database.

<sup>10</sup> Voluntary CSR reporting firms are excluded from the control group for the main tests and are used as the control firms in an additional analysis.

confound the observable effect of CSR disclosure on financial constraints (Dai et al., 2018; Lin et al., 2011; Rajan and Zingales, 1998): firm size (*Size*), trade credit (*Trade credit*), sales growth (*Sales growth*), debt (*Debt*), stock return (*Return*), audit quality (*Big 4*), government ownership (*State*), institutional ownership (*InsHold*), and corporate donations (*Donation*). Variable definitions are provided in Appendix A. Additionally, we estimate an alternative regression model that incorporates firm and year fixed effects, accounting for time-invariant firm characteristics and time-specific effects on financial constraints.

### 3.3. Propensity score matching approach

We use the propensity score matching approach to address the issue of non-random selection of treated firms, and to mitigate potential biases arising from observable differences between treated and control firms. For the pre-CSR reporting mandate period, we employ a first-stage logit regression to estimate the probability that a firm falls into the treated group based on the following firm characteristics: market value of equity (*MV*), corporate donations (*Donation*), share turnover (*Turnover*), government ownership (*State*), political connection (*Connection*), stock return (*Return*), analyst following (*Analyst*), and accounting profitability (*ROE*).<sup>11</sup> The outcomes of the first-stage logit regression can be found in Panel A of Appendix C, showing a Pseudo  $R^2$  value of 31.2%. We observe a positive association between the likelihood of being a treated firm and various factors, including the market value of equity, accounting profitability, state ownership, political connection, and analyst following, and a negative association with corporate donations.

Following the estimation of each treated firm's propensity score using the logit model's predicted probabilities, we conduct matching with control firms using the nearest neighbor matching algorithm. This matching process involves a caliper width of 0.2 times the standard error of the propensity score and replacement. The outcomes detailed in Panel B of Appendix C reveal that the differences in average values of firm characteristics between the treated and propensity score-matched control firms are statistically insignificant. We obtain a final sample of 3,772 firm-year observations, comprising 1,909 treated firm observations and 1,863 control firm observations. This sample represents 513 distinct firms.

## 4. Sample and empirical results

### 4.1. Sample selection

Our sample is limited to the period from 2006 to 2013, where 2006–2008 represents the pre-CSR reporting mandate period, and 2009–2013 corresponds to the post-CSR reporting mandate period. We collect financial data from the China Security Market and Accounting Research database, focusing on all A-share (local shares) listed firms on the SHSE and SZSE. To ensure consistency, we exclude financial firms, firms listed after 2008, and B-share (foreign shares) listed firms, as they follow distinct regulations and market trading mechanisms. Moreover, we remove firms that make voluntary CSR disclosures and drop observations with missing data for any variables used in our empirical tests or with a negative equity book value. After applying these criteria, our final sample comprises 9,062 firm-years, consisting of 1,933 treated firm-year observations and 7,129 control firm-year observations.

### 4.2. Descriptive statistics

Table 1, Panel A, provides an overview of the summary statistics for the variables employed in our analysis, focusing on the propensity score-matched sample. To ensure robustness, all continuous variables are winsorized at the 1st and 99th percentiles of their respective distributions. The summary statistics are in line with the results reported in previous studies (Chen et al., 2018; Wang and Qian, 2011). Panel A shows that the financial constraint measure, *KZ index*, has a mean value of 1.097 for the sample firms. Panel B reports that the average value of *KZ index* is 0.943 for the treated firms and 1.255 for the control firms, indicating a considerable variation in financial constraints between both.

Table 2 presents the Pearson correlations among the variables. Significantly positive correlations between *Trade credit* and *KZ index* and between *Debt* and *KZ index* indicate that firms with higher levels of trade credit and debt are more financially constrained. Additionally, *Big 4*, *State*, *InsHold*, and *Donation* are significantly negatively correlated with *KZ index*, suggesting that firms audited by Big Four accounting firms, those with higher levels of government and institutional ownership, and those making more donations face lower financial constraints.

### 4.3. Main results

The findings from estimating Eq. (2) using the propensity score-matched sample are displayed in Table 3. In column (1), a significantly negative coefficient on *Treated* indicates that the treated firms faced lower financial constraints than the control firms before the introduction of mandatory CSR disclosure regulation. An insignificant coefficient of *Post* suggests that the financial constraints of control firms did not change after the implementation. However, the coefficient on *Treated*×*Post* shows a significantly positive value. This result demonstrates that mandatory CSR disclosing firms experienced a considerable increase in financial

<sup>11</sup> We select these firm characteristics based on the criteria outlined in the SHSE Corporate Governance Index and SZSE 100 Index guidelines (Chen et al., 2018).

**Table 1**  
Descriptive statistics.

Panel A: Descriptive statistics for the propensity score-matched sample						
Variable	N	Mean	Median	Std. Dev	P25	P75
<i>KZ index</i>	3,772	1.097	1.440	2.126	0.010	2.520
<i>Size</i>	3,772	22.415	22.263	1.220	21.534	23.163
<i>Trade credit</i>	3,772	0.180	0.149	0.129	0.080	0.250
<i>Sales growth</i>	3,772	0.378	0.092	1.357	−0.059	0.342
<i>Debt</i>	3,772	0.213	0.204	0.146	0.094	0.311
<i>Return</i>	3,772	0.466	0.14	1.011	−0.254	0.965
<i>Big 4</i>	3,772	0.089	0.000	0.284	0.000	0.000
<i>State</i>	3,772	0.170	0.000	0.222	0.000	0.357
<i>InsHold</i>	3,772	0.203	0.148	0.190	0.048	0.309
<i>Donation</i>	3,772	0.020	0.004	0.041	0.000	0.020
<i>OtherRec</i>	3,772	0.020	0.010	0.028	0.004	0.022

Panel B: Descriptive statistics for the treated and the propensity score-matched control firms					
Variable	Treated firms		Control firms		Difference
	N	Mean	N	Mean	
<i>KZ index</i>	1,909	0.943	1,863	1.255	−0.312***
<i>Size</i>	1,909	22.831	1,863	21.988	0.842***
<i>Trade credit</i>	1,909	0.184	1,863	0.176	0.008*
<i>Sales growth</i>	1,909	0.355	1,863	0.401	−0.047
<i>Debt</i>	1,909	0.209	1,863	0.216	−0.007
<i>Return</i>	1,909	0.466	1,863	0.466	0.000
<i>Big 4</i>	1,909	0.142	1,863	0.033	0.109***
<i>State</i>	1,909	0.18	1,863	0.16	0.021***
<i>InsHold</i>	1,909	0.214	1,863	0.192	0.022***
<i>Donation</i>	1,909	0.018	1,863	0.022	−0.003**
<i>OtherRec</i>	1,909	0.017	1,863	0.022	−0.005***

Panel A of this table displays descriptive statistics for the propensity score-matched sample. Panel B displays descriptive statistics for the treated firms and the control firms that were matched based on propensity scores. Variable definitions can be found in [Appendix A](#). \*\*\*, \*\*, and \* represent statistical significance at the 1%, 5%, and 10% thresholds, respectively.

constraints following the implementation of the mandate, compared with non-CSR disclosing firms. These results support [H1](#), suggesting that firms faced pressure to allocate resources to CSR activities under the CSR reporting mandate, potentially leading to suboptimal allocation of corporate resources and hindered access to finance. The estimated effect of the implementation of the mandate on financial constraints is economically significant, with a 38% increase in financial constraints for mandatory CSR reporting firms.<sup>12</sup>

The outcomes of an alternative model that incorporates firm and year fixed effects are displayed in column (2). *Treated* and *Post* indicators are removed from this specification as they are absorbed in the firm and year fixed effects, respectively. The findings in column (2) are in line with those presented in column (1), reinforcing the consistency of our results. Furthermore, the control variables such as *Trade credit*, *Sales growth*, *Size*, *Debt*, *State*, *InsHold*, and *Donation* show expected signs and are generally highly significant across both columns, aligning with the findings reported in previous studies.

#### 4.4. Identifying underlying sources

To explore the factors underlying the increase in financial constraints faced by mandatory CSR reporting firms, we conduct further analyses in this section. Specifically, we examine how a firm's ability to generate future cash flows internally and its access to external financing may drive our main findings. To measure a firm's ability to generate future cash flows and assess the perceived riskiness in generating its expected cash flows, we employ Tobin's Q measure (*Tobin's Q*) ([Nekhili et al., 2017](#)). Additionally, we gauge a firm's access to debt markets using a dummy variable (*Debt Issuance*), which is set to 1 when the firm's net debt issued over total assets exceeds 1%, and 0 otherwise ([El Ghoul et al., 2017](#)). We substitute *KZ index* in Eq. (2) with these variables and re-estimate the DiD model, while keeping the same control variables as in Eq. (2). In both *Tobin's Q* and *Debt Issuance* regressions, as shown in [Table 4](#), we observe significantly negative coefficients on *Treated*×*Post*. These findings indicate that mandatory CSR disclosing firms encounter a reduction in their ability to generate future cash flows internally and in accessing external financing relative to the control firms. These underlying sources contribute to the observed rise in financial constraints among mandatory CSR reporting firms.

<sup>12</sup> Here, 38% = 0.359/0.943. This value is derived by dividing the estimated coefficient on *Treated*×*Post* in column (1) of [Table 3](#), Panel A (which is 0.359), by the mean value of *KZ index* for the treated firms in Panel B of [Table 1](#) (which is 0.943).



**Table 2**  
Correlation matrix.

	KZ index	Size	Trade credit	Sales growth	Debt	Return	Big 4	State	InsHold	Donation
<i>KZ index</i>										
<i>Size</i>	0.035**									
<i>Trade credit</i>	0.114***	0.112***								
<i>Sales growth</i>	0.019	0.030*	0.072***							
<i>Debt</i>	0.498***	0.178***	−0.262***	−0.007						
<i>Return</i>	0.004	−0.150***	0.035**	0.059***	−0.008					
<i>Big 4</i>	−0.046***	0.361***	−0.012	−0.016	−0.059***	−0.042***				
<i>State</i>	−0.088***	0.019	−0.021	0.003	0.033**	0.207***	0.034**			
<i>InsHold</i>	−0.103***	0.058***	−0.025	0.003	−0.048***	0.121***	0.076***	0.026		
<i>Donation</i>	−0.171***	−0.062***	0.002	−0.031*	−0.116***	−0.087***	−0.047***	−0.060***	0.072***	
<i>OtherRec</i>	0.159***	−0.113***	0.059***	0.065***	0.005	0.065***	−0.057***	−0.042***	−0.031*	0.016

This table displays the Pearson correlation matrix for the propensity score-matched sample. Variable definitions can be found in [Appendix A](#). \*\*\*, \*\*, and \* represent statistical significance at the 1%, 5%, and 10% thresholds, respectively.

**Table 3**  
Effect of mandatory CSR disclosure on financial constraints.

Dependent variable	<i>KZ index</i>	<i>KZ index</i>
	(1)	(2)
<i>Treated</i> × <i>Post</i>	0.359*** (0.122)	0.379*** (0.125)
<i>Treated</i>	−0.350*** (0.127)	
<i>Post</i>	0.038 (0.094)	
<i>Size</i>	−0.195*** (0.054)	−0.665*** (0.129)
<i>Trade credit</i>	2.649*** (0.501)	1.350* (0.801)
<i>Sales growth</i>	−0.090** (0.038)	−0.111*** (0.037)
<i>Debt</i>	7.396*** (0.333)	6.953*** (0.427)
<i>Return</i>	0.029 (0.030)	−0.074 (0.052)
<i>Big 4</i>	0.223 (0.157)	0.136 (0.226)
<i>State</i>	−0.739*** (0.200)	−0.570** (0.239)
<i>InsHold</i>	−0.333* (0.184)	−0.391* (0.206)
<i>Donation</i>	−2.464*** (0.882)	−1.774* (0.985)
Fixed Effects	Industry	Firm & Year
N	3,772	3,772
Adj. R <sup>2</sup>	0.124	0.181

This table displays the DiD estimates from regressions that examine the influence of mandatory CSR disclosure on financial constraints. These estimates are based on the propensity score-matched sample, with robust standard errors clustered by firms indicated in parentheses. Variable definitions can be found in [Appendix A](#). \*\*\*, \*\*, and \* represent statistical significance at the 1%, 5%, and 10% thresholds, respectively.

**Table 4**  
Identifying underlying sources.

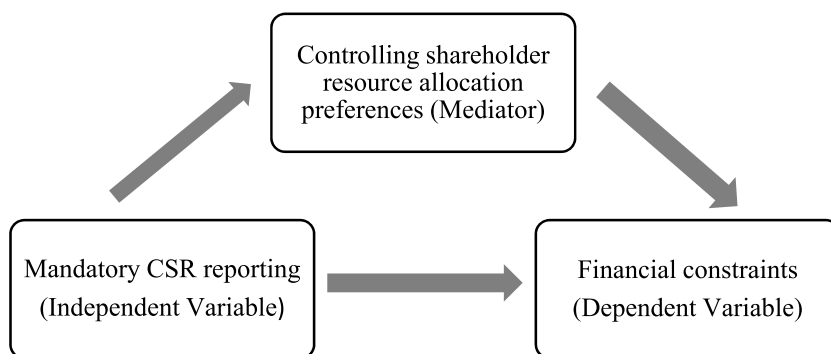
Dependent variable	<i>Tobin's Q</i>	<i>Debt Issuance</i>
	(1)	(2)
<i>Treated</i> × <i>Post</i>	−0.210*** (0.068)	−0.214** (0.109)
<i>Treated</i>	0.195** (0.089)	0.165* (0.097)
<i>Post</i>	0.417*** (0.065)	0.108 (0.088)
Controls	Yes	Yes
Fixed Effects	Industry	Industry
N	3,772	3,202
Adj. R <sup>2</sup>	0.405	0.063

This table displays the DiD estimates from regressions that examine the influence of mandatory CSR disclosure on Tobin's Q and net debt issuance, respectively. These estimates are based on the propensity score-matched sample, with robust standard errors clustered by firms indicated in parentheses. Variable definitions can be found in [Appendix A](#). \*\*\*, \*\*, and \* represent statistical significance at the 1%, 5%, and 10% thresholds, respectively.

#### 4.5. Mediation analysis

To investigate the role of controlling shareholder resource allocation references as a channel through which mandatory CSR disclosures affect financial constraints (H2), we perform a mediation analysis following the three-step approach outlined by [Baron and Kenny \(1986\)](#). [Fig. 1](#) provides a visual representation of the logic underlying our mediation analysis for testing H2.

We employ a three-model set to analyze the relationships among the independent variable, mediator, and dependent variable, which are necessary to demonstrate mediation.



**Fig. 1.** The mediating effect of controlling shareholder resource allocation preferences on the relationship between mandatory CSR reporting and financial constraints.

$$OtherRec = \beta_0 + \beta_1 Treated \times Post + \beta_2 Treated + \beta_3 Post + \sum Controls + \varepsilon \quad (3)$$

$$KZ\ index = \beta_0 + \beta_1 Treated \times Post + \beta_2 Treated + \beta_3 Post + \sum Controls + \varepsilon \quad (4)$$

$$KZ\ index = \beta_0 + \beta_1 Treated \times Post + \beta_2 Treated + \beta_3 Post + \beta_4 OtherRec + \sum Controls + \varepsilon \quad (5)$$

We employ controlling shareholders' borrowings from the firm scaled by total assets (*OtherRec*) as a proxy for controlling shareholder resource allocation preferences (Jiang et al., 2010; Qian and Yeung, 2015).<sup>13</sup> We gather information on intercorporate loans through the mandatory accounting item “other receivables” in Chinese listed firms, which serves as our mediator in the three-model set. In the first step, we estimate Eq. (3) to establish a relationship between the independent variable, *Treated*×*Post*, and the mediator, *OtherRec*. Based on H2, we expect a positive association between *Treated*×*Post* and *OtherRec*, indicating that controlling shareholder resource allocation for self-interested gains increase after the CSR reporting mandate.

Moving to the second step, we assess the effect of the independent variable, *Treated*×*Post*, on the dependent variable, *KZ index*, using Eq. (4). We have successfully completed this step and found a significantly positive association between *Treated*×*Post* and *KZ index*, confirming H1 that the CSR reporting mandate affects financial constraints.

In the final step, we demonstrate that the mediating effect of *OtherRec* on the relationship between *Treated*×*Post* and *KZ index*. According to Baron and Kenny (1986), mediation can be established if the inclusion of the mediator in Eq. (5) reduces the magnitude of the relationship between the independent and dependent variables in Eq. (4). In other words, the mediator acts as a plausible channel through which the CSR reporting mandate affects financial constraints.

In Eq. (5), we incorporate *OtherRec* as an additional explanatory variable. We expect a positive association between *Treated*×*Post* and *KZ index*, and once *OtherRec* is included, the magnitude of the coefficient on *Treated*×*Post* in Eq. (5) should decrease compared to its value in Eq. (4). Our findings align with this expectation. In column (1) of Table 5, Panel A, the results of estimating Eq. (3) show a positive association between *Treated*×*Post* and *OtherRec*, indicating an increase in controlling shareholder resource allocation preferences for private benefits after the CSR reporting mandate.

Column (1) of Table 3 presents the results of estimating Eq. (4), revealing a significantly positive association between *Treated*×*Post* and *KZ index*. When we move to column (2) of Table 5, Panel A, where we estimate Eq. (5) with *OtherRec* included, the coefficient on *Treated*×*Post* (Coeff. = 0.332) remains significantly positive but is lower than the coefficient in column (1) of Table 3 (Coeff. = 0.359). The difference of the two coefficients is statistically significant ( $Chi^2 = 6.14$ ;  $p$ -value = 0.0132). The reduction in magnitude of the coefficient on *Treated*×*Post* is attributed to the inclusion of *OtherRec* in Eq. (5), supporting the notion that controlling shareholder resource allocation preferences partially mediate the effect of the CSR reporting mandate on financial constraints, supporting H2.

As part of a robustness check, we investigate whether the conflict of interests between managers and shareholders could be another potential mediator or channel through which mandatory CSR disclosures influence financial constraints. Following Ferrell et al. (2016), we adopt cash holdings, free cash flows, and dividend payout ratio as proxies for the agency problem between managers and shareholders. However, we find no significant relationships of any of these proxies with the interaction term, *Treated*×*Post* (not tabulated). Thus, we rule out managers' expropriation as a possible mediator or channel through which CSR disclosure mandates affect financial constraints.

Consistent with H2, we expect that the effect of controlling shareholder resource allocation preferences for self-interested gains would be more pronounced in SOEs compared to non-SOEs. To empirically investigate this conjecture, we split the sample into SOEs and non-SOEs and estimate Eqs. (3)–(5) separately. The regression results are displayed in Panel B of Table 5. We find that SOEs

<sup>13</sup> In China, the primary tool that controlling shareholders use to expropriate resources is intercorporate loans. The China Security Regulatory Commission has issued repeated warnings on the use of intercorporate loans and, in 2002, it made the disclosure of these loans mandatory (Jiang et al., 2010).

**Table 5**  
Mediation analysis.

Panel A: Mediation analysis for the propensity score-matched sample						
Dependent variable	<i>OtherRec</i>		<i>KZ index</i>			
	(1)		(2)			
<i>Treated</i> × <i>Post</i>	0.004**		0.332***			
	(0.002)		(0.122)			
<i>Treated</i>	−0.008***		−0.306**			
	(0.002)		(0.125)			
<i>Post</i>	−0.009***		0.091			
	(0.002)		(0.095)			
<i>OtherRec</i>			6.253***			
			(1.301)			
Controls	Yes		Yes			
Fixed effects	Industry		Industry			
N	3,772		3,772			
Adj. R <sup>2</sup>	0.052		0.125			

Panel B: Mediation analysis for SOEs versus non-SOEs						
Dependent variable	SOEs			Non-SOEs		
	<i>OtherRec</i>	<i>KZ index</i>	<i>KZ index</i>	<i>OtherRec</i>	<i>KZ index</i>	<i>KZ index</i>
	(1)	(2)	(3)	(4)	(5)	(6)
<i>Treated</i> × <i>Post</i>	0.006**	0.349**	0.314**	0.002	0.202	0.190
	(0.002)	(0.144)	(0.143)	(0.004)	(0.230)	(0.232)
Comparing coefficients		<i>Chi</i> <sup>2</sup> = 4.40 <i>p</i> -value = 0.036				
<i>Treated</i>	−0.008***	−0.299**	−0.253*	−0.005	−0.471*	−0.428*
	(0.003)	(0.144)	(0.143)	(0.006)	(0.261)	(0.250)
<i>Post</i>	−0.011***	−0.022	0.042	−0.004	0.246	0.273
	(0.002)	(0.118)	(0.118)	(0.004)	(0.171)	(0.170)
<i>OtherRec</i>			6.278***			6.940***
			(1.493)			(2.451)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Fixed Effects	Industry	Industry	Industry	Industry	Industry	Industry
N	2,799	2,799	2,799	973	973	973
Adj.R <sup>2</sup>	0.140	0.138	0.053	0.073	0.102	0.100

Panel A displays the outcomes of the mediation analysis conducted using the propensity score-matched sample. In Panel B, the outcomes of the mediation analysis are presented for SOEs versus non-SOEs. Robust standard errors clustered by firms are provided in parentheses. The comparison of the coefficient in column (2) of Table 5, Panel A, with the coefficient in column (1) of Table 3 is detailed in Section 4.5. Variable definitions can be found in Appendix A. \*\*\*, \*\*, and \* represent statistical significance at the 1%, 5%, and 10% thresholds, respectively.

**Table 6**  
Testing for parallel trends assumption.

Dependent variable	<i>KZ index</i>
<i>Treated</i> × <i>Post</i> <sup>−2</sup>	0.024
	(0.166)
<i>Treated</i> × <i>Post</i> <sup>−1</sup>	0.114
	(0.170)
<i>Treated</i> × <i>Post</i> <sup>+1</sup>	0.103
	(0.168)
<i>Treated</i> × <i>Post</i> <sup>+2</sup>	0.362**
	(0.173)
<i>Treated</i> × <i>Post</i> <sup>+3</sup>	0.596***
	(0.156)
Controls	Yes
Fixed Effects	Industry
N	3,772
Adj. R <sup>2</sup>	0.398

This table displays the temporal shifts in financial constraints during years −2, −1, 1, 2, and 3 in relation to the year of the CSR reporting mandate. Robust standard errors clustered by firms are provided in parentheses. Variable definitions can be found in Appendix A. \*\*\*, \*\*, and \* represent statistical significance at the 1%, 5%, and 10% thresholds, respectively.

experience a significant increase in *OtherRec*, indicating that controlling shareholders diverted corporate resources for self-interested gains following the introduction of CSR disclosure mandates (as shown in column (1)). Furthermore, the coefficient of *Treated*×*Post* in column (3) is noticeably smaller than that in column (2), and this difference is statistically different. These findings suggest that controlling shareholder expropriation partially explains the impact of CSR disclosure mandates on financial constraints in treated SOEs. However, no such effects are observed in non-SOEs. In conclusion, our analysis provides evidence supporting the mediating role of controlling shareholder resource allocation preferences in explaining how mandatory CSR disclosures affects financial constraints, with this effect being particularly evident in SOEs.

#### 4.6. Parallel trends assumption and pseudo test

The robustness of our DiD analysis hinges on the parallel trends assumption, positing that the outcomes for the treated and control firms would exhibit a similar rate of change if there were no treatment. To verify the integrity of this assumption, we substitute *Treated*×*Post* in Eq. (2) with *Treated*×*Post*<sup>-2</sup>–*Treated*×*Post*<sup>+3</sup>, signifying indicators for periods before and after the mandate. For instance, *Treated*×*Post*<sup>-1</sup> corresponds to one year before the mandate year, while *Treated*×*Post*<sup>+3</sup> signifies three or more years after the mandate year.

Table 6 shows the coefficients associated with the indicators for periods before the mandate *Treated*×*Post*<sup>-2</sup> and *Treated*×*Post*<sup>-1</sup>, indicating their lack of statistical significance. In contrast, the coefficients linked to the post-mandate period indicators *Treated*×*Post*<sup>+2</sup> and *Treated*×*Post*<sup>+3</sup> are significantly positive and generally exhibit an increasing magnitude over time. These findings imply that during the pre-mandate period, the alterations in financial constraints follow a comparable trend for both treatment and control groups. Only following the implementation of the disclosure mandate does the escalation in financial constraints become more pronounced for treated firms in comparison to control firms. Thus, the parallel trends assumption is upheld in our context. Moreover, the extent of this increase tends to be greater in the later years than in the earlier years subsequent to the mandate. This outcome is logical, given that CSR investment is typically a prolonged endeavor, and its full impact necessitates time to unfold.

#### 4.7. Robustness checks

We introduce alternative metrics of financial constraints to enhance the robustness of our results. Following the literature (Baker et al., 2003; Hu and Liu, 2015), we employ a modified version of the KZ index (*KZ index2*).<sup>14</sup> Meng et al. (2020) assert that Tobin's Q does not adequately mirror Chinese firms' investment decisions due to the inefficiency inherent in China's capital markets. The refined version of the KZ index, which eliminates Tobin's Q from the Kaplan and Zingales (1997) approach, aligns more effectively with China's institutional and financial landscape. Furthermore, we employ the SA index proposed by Hadlock and Pierce (2010) (*SA index*). The outcomes in Panel A of Table 7 demonstrate that our conclusions remain steadfast when considering these alternative benchmarks for financial constraints.

To gauge the sensitivity of our findings, we conduct our analyses using three distinct sample variations: (1) a full sample; (2) a sample in which pre- and post-mandate periods possess equivalent durations; and (3) a sample necessitating each firm to have at least one observation in both these periods. As demonstrated in Panel B, the coefficients associated with *Treated*×*Post* consistently maintain their significantly positive trend. This indicates that our results remain resilient even when employing different sample configurations.

To further verify the integrity of the parallel trends assumption that forms the foundation of our DiD analysis, we employ a placebo test by designating 2007 as a pseudo CSR reporting mandate year. In this setup, 2006 represents the pre-mandate period, and 2007–2008 constitutes the post-mandate period. The outcomes, as presented in column (1) of Panel C, reveal a coefficient on *Treated*×*Post* that lack significance. This observation demonstrates that no substantial increase in financial constraints was experienced by the treated firms during 2007–2008. This outcome suggests that the trends for treated and control firms exhibit resemblance in the period prior to the supposed mandate. Furthermore, recognizing that the timing of the CSR disclosure mandate coincides with the global financial crisis – a factor that might exacerbate financial constraints – we omit firm-years for 2008 and 2009 and re-evaluate our primary regression model. As demonstrated in column (2) of the same panel, our findings remain consistent.

## 5. Additional analyses

### 5.1. Political connections

Within this section, our focus shifts to an exploration of differences in the treatment effect of the CSR reporting mandate on financial constraints, specifically in relation to firms' political affiliations. We anticipate that firms subject to the CSR disclosure mandate would engage in CSR endeavors to align with governmental objectives. In the broader context, these governmental motives include redistributing resources to ensure societal harmony (Bai et al., 2005). Consequently, mandatory CSR reporting firms are under pressure from the government to achieve non-financial objectives, such as ensuring employee and environmental protection, contributing to community development, and resolving the region's unemployment challenges (See, 2008).

Firms that are politically connected often enjoy preferential treatment and governmental backing, such as favorable business

<sup>14</sup>  $KZ\ index2_{i,t} = -1.002 \times \frac{CF_{i,t}}{A_{i,t-1}} - 39.368 \times \frac{D_{i,t}}{A_{i,t-1}} - 1.315 \times \frac{C_{i,t}}{A_{i,t-1}} + 3.139 \times LEV_{i,t}$



**Table 7**  
Robustness checks.

Panel A: Alternative measures of financial constraints			
Dependent variable	<i>KZ index2</i>		<i>SA index</i>
	(1)	(2)	(2)
<i>Treated</i> × <i>Post</i>	0.196*** (0.056)		0.044*** (0.006)
<i>Treated</i>	−0.267*** (0.063)		0.053*** (0.015)
<i>Post</i>	−0.051 (0.041)		−0.130*** (0.004)
Controls	Yes		Yes
Fixed Effects	Industry		Industry
N	3,772		3,772
Adj. R <sup>2</sup>	0.285		0.686
Panel B: Alternative samples			
	Full sample	Sample with even pre- and post-periods	Sample requiring firms to have observations in both pre- and post-periods
	(1)	(2)	(3)
<i>Treated</i> × <i>Post</i>	0.436*** (0.100)	0.294** (0.122)	0.343*** (0.123)
<i>Treated</i>	−0.097 (0.108)	−0.366*** (0.121)	−0.311** (0.128)
<i>Post</i>	0.159*** (0.052)	0.082 (0.091)	0.049 (0.095)
Controls	Yes	Yes	Yes
Fixed Effects	Industry	Industry	Industry
N	9,062	2,835	3,748
Adj. R <sup>2</sup>	0.141	0.385	0.125
Panel C: Alternative sample periods			
	A placebo test using sample period 2006–2008		Excluding years 2008 and 2009
	(1)	(2)	(2)
<i>Treated</i> × <i>Post</i>	−0.076 (0.150)		0.472*** (0.150)
<i>Treated</i>	−0.360** (0.143)		−0.351** (0.138)
<i>Post</i>	0.540*** (0.150)		0.223 (0.144)
Controls	Yes		Yes
Fixed Effects	Industry		Industry
N	1,419		2,805
Adj. R <sup>2</sup>	0.114		0.378

Panels A and B of this table display the DiD estimates from regressions that examine the influence of mandatory CSR disclosure on financial constraints using alternative measures of financial constraints and alternative samples, respectively. Panel C reports the DiD estimates stemming from different sample periods. Robust standard errors clustered by firms are provided in parentheses. Variable definitions can be found in [Appendix A](#). \*\*\*, \*\*, and \* represent statistical significance at the 1%, 5%, and 10% thresholds, respectively.

opportunities, improved access to financial resources, and the potential for advantageous tax policies and government subsidies (Firth et al., 2009; Su et al., 2019). Additionally, these firms typically face reduced consequences when breaching labor and environmental standards (Calomiris et al., 2010). In contrast, firms obligated to adhere to CSR reporting requirements but lacking political ties do not gain these privileges. These firms confront the necessity to deploy corporate resources toward fulfilling CSR commitments, incurring high costs for mandatory CSR reporting. Consequently, we anticipate a more pronounced treatment effect of mandatory CSR disclosures on financial constraints for firms subject to the mandate yet devoid of political affiliations in comparison to their politically connected counterparts.

Following Fan et al. (2007), we define a firm's political connections through the current or past service of its chief executive officer or board directors in governmental roles, either at the central or local level, or in the military. Subsequently, we partition the propensity score-matched sample firms into two distinct subsets based on their political affiliations. We then proceed to re-estimate Eq. (2) using each subset separately. The outcomes, displayed in column (1) of [Table 8](#), show that the coefficient attributed to *Treated*×*Post* exhibits a statistically significant positive trend for firms subject to mandatory CSR reporting requirements but lacking political connections. However, in column (2), the coefficient assigned to *Treated*×*Post* proves to be statistically insignificant for firms under the mandate yet boasting political affiliations. These findings signify that post the CSR reporting mandate, firms mandated to report CSR

**Table 8**  
Effect of mandatory CSR disclosure on financial constraints conditional on political connections.

	Without Political Connections	With Political Connections
	(1)	(2)
<i>Treated</i> × <i>Post</i>	0.405*** (0.157)	0.232 (0.170)
<i>Treated</i>	−0.537*** (0.169)	−0.210 (0.170)
<i>Post</i>	0.099 (0.121)	−0.106 (0.140)
Controls	Yes	Yes
Fixed Effects	Industry	Industry
N	1,813	1,959
Adj. R <sup>2</sup>	0.367	0.401

This table displays the DiD estimates from regressions that examine the influence of mandatory CSR disclosure on financial constraints, considering whether the firm is politically connected. Robust standard errors clustered by firms are provided in parentheses. Variable definitions can be found in [Appendix A](#). \*\*\*, \*\*, and \* represent statistical significance at the 1%, 5%, and 10% thresholds, respectively.

without political connections face increased financial constraints relative to non-mandatory CSR reporting firms. In contrast, the impact of the mandate on financial constraints is insignificant for mandatory CSR reporting firms with political affiliations. This alignment of outcomes supports the argument that political connections intercede to moderate the relationship between CSR disclosure mandates and a firm's financial constraints.

## 5.2. Regional divergence of marketization

China's economic development and marketization process are uneven across its regions and provinces. While the eastern coastal areas, including Shanghai and Shenzhen, are highly developed and more marketized, some inland provinces, such as Gansu, Qinghai, and Guizhou, fall behind significantly. For example, during 1995–2016, Shenzhen achieved average annual GDP growth of over 28%, whereas inland provinces contributed only a fraction of the GDP growth in the eastern coastal areas ([Hu et al., 2019](#)). The disparities in the interprovincial marketization process are reflected by the disparate development of institutional and legal frameworks and government intervention across regions/provinces ([Gang et al., 2018](#)).

We explore whether the treatment effect of the CSR reporting mandate on financial constraints differs between firms located in regions/provinces that are more and less marketized. More marketized regions/provinces are expected to be more connected with the global trend of adopting CSR practices. Consequently, firms located in these regions/provinces are more responsive to stakeholder demand and benefit from enhanced stakeholder engagement through mutual trust and better relationships with customers, business partners, and employees. By contrast, regions/provinces that are less marketized have incomplete institutional and legal frameworks and experience excessive government intervention, which to some extent, conflict with the market mechanism ([Gang et al., 2018](#)). Thus, we anticipate the treatment effect of the CSR reporting mandate on financial constraints will be stronger among companies situated in regions/provinces that are less marketized.

Following previous research (e.g., [Chen et al., 2020](#); [He et al., 2020](#)), we utilize the National Economic Research Institute (NERI)

**Table 9**  
Effect of mandatory CSR disclosure on financial constraints conditional on the marketization process across regions/provinces.

	High marketization	Low marketization
	(1)	(2)
<i>Treated</i> × <i>Post</i>	0.187 (0.178)	0.644*** (0.164)
<i>Treated</i>	−0.071 (0.177)	−0.703*** (0.171)
<i>Post</i>	−0.038 (0.139)	0.041 (0.121)
Controls	Yes	Yes
Fixed Effects	Industry	Industry
N	1,976	1,796
Adj. R <sup>2</sup>	0.380	0.402

This table displays the DiD estimates from regressions that examine the influence of mandatory CSR disclosure on financial constraints, taking into account the marketization process at the provincial level. Robust standard errors clustered by firms are provided in parentheses. Variable definitions can be found in [Appendix A](#). \*\*\*, \*\*, and \* represent statistical significance at the 1%, 5%, and 10% thresholds, respectively.

Index of Marketization, developed by Fan et al. (2016), to account for the level of marketization across provinces. Based on 23 indicators, the NERI index assesses five aspects of marketization across provinces each year: the government–market relationship (government intervention); the growth of product markets, the advancement of factor markets, the development of the private sector; and the progress of market intermediaries and the legal framework. A higher index value signifies a greater level of marketization within the region/province.

We partition the propensity score-matched sample firms into two categories based on whether the NERI index value in a particular year for the region/province where a firm is situated is higher or lower than the annual median in the sample. We then conduct an estimation of Eq. (2) for both groups. The outcomes are presented in Table 9. In column (2), the coefficient on *Treated*×*Post* is significantly positive for the treated firms belonging to the low marketization group, while it is statistically insignificant for those in the high marketization group in column (1). These findings suggest that, following the CSR reporting mandate, mandatory CSR reporting firms located in regions/provinces with lower marketization levels confront greater financial constraints compared to non-mandatory CSR reporting firms. In contrast, the impact of the mandate on financial constraints is not noteworthy for mandatory CSR reporting firms situated in regions/provinces with higher marketization levels, affirming the moderating influence of marketization in the association between mandatory CSR disclosure and firms' financial constraints.

### 5.3. Benchmarking with voluntary CSR reporting firms

In this section, we investigate whether the increase in financial constraints is equally significant for voluntary CSR reporting firms as it is for mandatory reporting firms after the introduction of the CSR disclosure mandate. The Chinese government strongly influences firms because it controls critical resources that shape their operating environments and competitive positions (Marquis and Qian, 2014). The government promotes CSR initiatives among firms to tackle social and environmental problems, such as pollution, inequality, and social conflicts. As a result, firms may voluntarily and strategically engage in CSR activities to create reputational goodwill with government agencies and regulators and retain the government's financial and political support. Lin et al. (2015) document that Chinese listed firms engage in CSR activities to bond with local politicians following city-level political power transitions, and those firms receive higher government subsidies in return.

Firms that opt not to release CSR reports until the CSR disclosure mandate are likely to experience a negative trade-off between costs and benefits. This negative trade-off arises due to the combination of proprietary and political costs associated with CSR disclosure, along with the perception of low benefits (Grewal et al., 2019). Additionally, Grewal et al. (2019) provide evidence that the stock market's response is particularly negative for EU firms that have previously provided limited voluntary CSR disclosure and are subsequently obligated to report CSR information due to an EU directive on non-financial disclosure. These findings align with the notion that investor expectations reflect the belief that the costs of the disclosure mandate outweigh the benefits for firms with insufficient CSR disclosure prior to the mandate.

We expect that voluntary CSR reporting firms anticipate the costs associated with their CSR activities and make adjustments to strike a favorable balance between costs and benefits. Thus, they are likely to experience lower financial constraints than firms mandated for CSR reporting. To examine this conjecture, we initially identify voluntary CSR reporting firms from the Chinese Corporate Social Responsibilities database.<sup>15</sup> The count of voluntary CSR reporting firms varies from a minimum of 23 firms in 2006 to a peak of 235 firms in 2013. Subsequently, we replace the control firms (i.e., firms without CSR reporting) in the propensity score-matched sample with the voluntary CSR reporting firms, and then re-estimate Eq. (2). The outcomes presented in Table 10 illustrate that, following the implementation of the disclosure mandate, firms compelled to report CSR information encounter greater financial constraints compared to voluntary CSR reporting firms, aligning with our projected outcomes.

### 5.4. SOEs versus Non-SOEs

Previous research (e.g., Chen et al., 2018; Lu et al., 2021) highlights the variability of the treatment effect of mandatory CSR disclosure on operational performance concerning SOEs and non-SOEs. This section seeks to explore whether our primary findings diverge between these two categories. Given that SOEs typically receive substantial resources that enhance their operational landscapes and competitive standings through government support, they are inclined to closely align with government policies, even if it involves shareholder interests being compromised. Lu et al. (2021) demonstrate that operational costs for SOEs surge post the implementation of CSR disclosure mandates, unlike non-SOEs, implying that SOEs allocate significant resources to pursue CSR initiatives while non-SOEs may not glean equivalent essential advantages from CSR involvement.

Hence, our anticipation is that mandatory CSR reporting for SOEs will contribute to exacerbated financial constraints compared to mandatory CSR reporting for non-SOEs. We segment the sample based on whether a firm's ultimate controlling owner is the government in a specific year (classifying it as an SOE), and we re-estimate Eq. (2). The outcomes are displayed in Table 11, where the coefficient on *Treated*×*Post* emerges as notably positive (lacking statistical significance) for mandatory reporting SOEs (non-SOEs). These findings illustrate that after the CSR reporting mandate, mandatory CSR reporting SOEs witness an intensification of financial

<sup>15</sup> Encompassing all Chinese publicly traded firms that have issued CSR reports since 2006, this database aggregates a comprehensive array of CSR-related elements from diverse origins. These sources include annual reports, regulatory submissions, company disclosures, media communiqués, governmental releases, and publications from non-governmental organizations. The database can be accessed through the Chinese Research Data Services Platform.

**Table 10**  
Benchmarking with voluntary CSR reporting firms.

Dependent variable	KZ index
<i>Treated</i> × <i>Post</i>	0.303** (0.135)
<i>Treated</i>	0.008 (0.135)
<i>Post</i>	0.103 (0.111)
Controls	Yes
Fixed Effects	Industry
N	3,949
Adj. R <sup>2</sup>	0.398

This table displays the DiD estimates from regressions that examine the influence of mandatory CSR disclosure on financial constraints, utilizing voluntary CSR reporting firms as the control group. Robust standard errors clustered by firms are provided in parentheses. Variable definitions can be found in [Appendix A](#). \*\*\*, \*\*, and \* represent statistical significance at the 1%, 5%, and 10% thresholds, respectively.

**Table 11**  
Effect of mandatory CSR disclosure on financial constraints for SOEs versus non-SOEs.

	SOEs	Non-SOEs
	(1)	(2)
<i>Treated</i> × <i>Post</i>	0.377*** (0.145)	0.203 (0.227)
<i>Treated</i>	−0.300** (0.145)	−0.472* (0.259)
<i>Post</i>	0.229** (0.097)	0.243 (0.169)
Controls	Yes	Yes
Fixed Effects	Industry	Industry
N	2,799	973
Adj. R <sup>2</sup>	0.191	0.157

This table displays the DiD estimates from regressions that examine the influence of mandatory CSR disclosure on financial constraints, distinguishing between SOEs and non-SOEs. Robust standard errors clustered by firms are provided in parentheses. Variable definitions can be found in [Appendix A](#). \*\*\*, \*\*, and \* represent statistical significance at the 1%, 5%, and 10% thresholds, respectively.

constraints, while non-SOEs do not undergo similar changes.

## 6. Conclusion

This study explores the impact of mandatory CSR disclosures on the financial constraints of firms within China. Specifically, a subset of publicly listed firms are directed by two stock exchanges, the SHSE and SZSE, to release CSR reports concurrently with their annual reports starting from December 2008. Using a DiD regression design and a dataset encompassing Chinese listed firms throughout the span of 2006–2013, we show that firms mandated to adhere to mandatory CSR reporting experience heightened financial constraints in comparison with firms exempt from this obligation, subsequent to the implementation of the mandate. Our findings retain their robustness when subjected to alternative financial constraint metrics, various sample scenarios, and distinct time frames.

By employing a mediation analysis, we identify controlling shareholder expropriation as a plausible channel through which the mandate affects firms' financial constraints. Additional analyses reveal how political connections and regional marketization intervene in the relationship between mandated CSR disclosure and financial constraints. The outcomes suggest that mandatory CSR reporting firms with political connections alleviate the costs associated with the disclosure mandate. Similarly, firms located in more marketized regions/provinces experience advantages through stakeholder engagement, leading to a reduction in financial constraints for mandatory CSR reporting entities. Lastly, we undertake a comparison of the shifts in financial constraints among mandatory CSR reporting firms and voluntary CSR reporting firms subsequent to the disclosure mandate. We use the latter category as a control group. Our inferences continue to hold.

Our findings add evidence to the potential economic outcomes of CSR disclosure mandates, underscoring the negative economic

impacts these mandates can exert on firms' capacity to secure financing. Given the prevailing global inclination toward enforcing CSR disclosures and the call for more research on mandatory CSR reporting, our study provides insights into how government regulations regarding CSR disclosures influence firms' ability to access finance.

### Author statement

Xiao Liang: Conceptualization, Formal analysis, Writing – Original Draft.

Xiaomeng Chen: Methodology, Writing – Review & Editing, Supervision.

### Data availability

Data will be made available on request.

### Appendix A. Variable definitions

Variable	Definition
<b>Measures of financial constraints</b>	
<i>KZ index</i>	<p>Following Kaplan and Zingales (1997), we calculate the following financial ratios using the accounting information of listed Chinese firms from 1998 to 2013: cash flow to lagged total capital (<math>CF_{it}/A_{it-1}</math>), dividends to lagged total capital (<math>D_{it}/A_{it-1}</math>), cash holdings to lagged capital (<math>C_{it}/A_{it-1}</math>), debt to total capital (<math>LEV_{it}</math>), and Tobin's Q (<math>Q_{it}</math>). Cash flow is determined as the sum of operating income and depreciation. Total capital is defined as the sum of debt and total shareholder equity. Dividends denote total annual dividend payments. Cash includes cash and marketable securities. Debt comprises short-term and long-term debt. Tobin's Q is calculated using a formula involving book assets, book equity, deferred taxes, and market equity.</p> <p>In addition, we create indicator variables: <math>kz_1</math>, equal to 1 if <math>CF_{it}/A_{it-1}</math> of a firm-year is below the median value across all firms during that year, otherwise it is 0. Similarly, <math>kz_2</math>, <math>kz_3</math>, <math>kz_4</math>, and <math>kz_5</math>, are set to 1 if <math>D_{it}/A_{it-1}</math>, <math>C_{it}/A_{it-1}</math>, <math>LEV_{it}</math>, or <math>Q_{it}</math> falls below the respective median values across all firms for the same year, and 0 otherwise. We aggregate these <math>kz</math> variables into <math>kz_0</math>, which is the summation of <math>kz_1</math> through <math>kz_5</math>.</p> <p>To categorize firms into distinct levels of financial constraints based on <math>kz_0</math>, we conduct an ordered logit regression analysis, which links this classification to the financial ratio variables. The resulting coefficients from this regression are employed to construct the <i>KZ index</i>, an index representing a linear combination of the five financial ratios mentioned above.</p> $KZ\ index_{it} = -10.283 \times \frac{CF_{it}}{A_{it-1}} - 47.961 \times \frac{D_{it}}{A_{it-1}} - 6.203 \times \frac{C_{it}}{A_{it-1}} + 5.043 \times LEV_{it} + 0.598 \times Q_{it}$
<i>KZ index2</i>	<p>Following Hu and Liu (2015) and Meng et al. (2020), we define <i>KZ index2</i> as follows. <i>KZ index2</i> is based on the Kaplan and Zingales (1997) method but excludes Tobin's Q:</p> $KZ\ index2_{it} = -1.002 \times \frac{CF_{it}}{A_{it-1}} - 39.368 \times \frac{D_{it}}{A_{it-1}} - 1.315 \times \frac{C_{it}}{A_{it-1}} + 3.139 \times LEV_{it}$ <p>where the definitions of the variables are the same as for <i>KZ index</i>.</p>
<i>SA index</i>	<p>Following Hadlock and Pierce (2010), we define <i>SA index</i> as follows:</p> $SA_{it} = -0.737 \times Size_{it-1} + 0.043 \times Size_{it-1}^2 - 0.040 \times AGE_{it}$ <p>where <i>Size</i> represents the natural logarithm of total assets and <i>AGE</i> signifies the number of years preceding the given year during which the firm possesses a stock price that is not missing.</p>
<b>Variables of interest</b>	
<i>Treated</i>	A dummy variable equal to 1 if a firm is obliged to publish CSR reports, beginning in December 2008, and 0 if the firm is not subject to such a mandate.
<i>Post</i>	A dummy variable equal to 1 for years after 2008, and 0 otherwise.
<b>Control variables</b>	
<i>Size</i>	The natural logarithm of total assets at the fiscal year end.
<i>Trade credit</i>	Sum of notes payable, accounts payable, and deposit receivable, divided by total assets at the fiscal year end.
<i>Sales growth</i>	Sales in the current year minus sales in the previous year, divided by sales in the previous year.
<i>Debt</i>	Amount of short-term and long-term borrowings, divided by total assets at the fiscal year end.
<i>Return</i>	Annual stock return.
<i>Big 4</i>	Dummy variable equal to 1 if a firm's audit is conducted by one of the Big Four audit firm, and 0 otherwise.
<i>State</i>	Percentage of government shareholdings.
<i>InsHold</i>	Percentage of institutional shareholdings.
<i>Donation</i>	The natural logarithm of 1 plus the amount of donations, divided by total assets at the fiscal year end.
<b>Other variables</b>	
<i>MV</i>	The natural logarithm of market value of equity at the fiscal year end.
<i>Turnover</i>	Total number of shares traded divided by the total number of shares outstanding for the fiscal year.
<i>ROE</i>	Return on equity, calculated by dividing a firm's net income by its shareholders' equity at the fiscal year end.
<i>Connection</i>	A dummy variable equal to 1 if either the firm's chief executive officer or chairman of the board currently serves or has previously served in governmental roles, either at the central or local level, or in the military.
<i>Analyst</i>	The natural logarithm of 1 plus the number of financial analysts following a firm.
<i>OtherRec</i>	Other receivables divided by total assets at the fiscal year end.
<i>Tobin's Q</i>	The market value of equity plus total debt divided by total assets at the fiscal year end.
<i>Debt</i>	A dummy variable equal to 1 when the ratio of the net amount of debt issued to total assets exceeds 1%, and 0 otherwise.
<i>Issuance</i>	



## Appendix B. Ordered logit regression to construct measure of financial constraints

	Coeff.	t-stat.
	(1)	(2)
$CF_{it}/A_{it-1}$	-10.283***	(0.261)
$D_{it}/A_{it-1}$	-47.961***	(1.845)
$C_{it}/A_{it-1}$	-6.203***	(0.200)
$LEV_{it}$	5.043***	(0.220)
$Q_{it}$	0.598***	(0.027)
Fixed effects	Firm & Year	
N	20,483	
Pseudo R <sup>2</sup>	0.347	

This table displays the coefficient estimates along with robust standard errors clustered by firms (in parentheses) obtained from the ordered logit regression. This regression was conducted to construct *KZ index*, following the Kaplan and Zingales (1997) approach and using accounting information from Chinese listed firms from 1998 to 2013. \*\*\*, \*\*, and \* represent statistical significance at the 1%, 5%, and 10% thresholds, respectively.

## Appendix C. Propensity score matching approach

Panel A: Logit model used to find propensity scores				
	Coeff.		t-stat.	
	(1)	(2)	(1)	(2)
<i>MV</i>	0.949***			(0.089)
<i>Turnover</i>	-0.024			(0.021)
<i>Return</i>	0.087			(0.074)
<i>ROE</i>	1.714***			(0.558)
<i>State</i>	1.069***			(0.273)
<i>Connection</i>	0.424***			(0.113)
<i>Donation</i>	-2.164*			(1.265)
<i>Analyst</i>	0.546***			(0.067)
Fixed effects	Industry & Year			
N	2,775			
Pseudo R <sup>2</sup>	0.312			

Panel B: Post-matching differences				
	Treated	Control	t-stat.	p-value
<i>MV</i>	15.665	15.696	-0.570	0.568
<i>Turnover</i>	5.610	5.806	-1.150	0.251
<i>Return</i>	0.866	0.817	0.690	0.490
<i>ROE</i>	0.113	0.113	-0.090	0.927
<i>State</i>	0.332	0.348	-1.300	0.194
<i>Connection</i>	0.567	0.544	0.850	0.394
<i>Donation</i>	0.024	0.025	-0.060	0.954
<i>Analyst</i>	2.314	2.292	0.390	0.695

The table illustrates the methodology of the propensity score matching approach. Panel A displays the coefficient estimates, accompanied by robust standard errors clustered by firms (in parentheses), derived from the logit regression. Panel B displays differences between treated and the propensity score-matched control firms regarding the mean values of firm characteristics. Variable definitions can be found in Appendix A. \*\*\*, \*\*, and \* represent statistical significance at the 1%, 5%, and 10% thresholds, respectively.

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