Corporate Social Responsibility and Short-Selling: Evidence from China[*]

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This Draft: December 2022

[*] We would like to thank participants at the 12th Financial Markets and Corporate Governance Conference, and the discussant, Poorya Kabir at the 2022 Vietnam Symposium in Banking and Finance for valuable comments and suggestions.
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Abstract

The argument that corporate social responsibility (CSR) can be used opportunistically by insiders suggests that exercising CSR may be detrimental to shareholder value. Consistent with this view, we document a positive relationship between firms with higher scores of CSR and short-selling activities, based on a sample of Chinese public firms over 2010-2021. We explore several strategies to alleviate the issue of endogeneity. Analysis based on the instrumental variable approach and differences-in-differences approach confirms our results. Further investigation reveals that firms with higher CSR scores are more likely to engage in earnings management and overinvestment.

JEL classification: M14, G10, D21, L21

Keywords: corporate social responsibility, short-selling, instrumental variable, earnings management, investment distortion, China

1. Introduction

Corporate social responsibility (CSR) has increasingly become an important topic around the world. Anecdotal evidence indicates that the annual outlay for some large corporations in the US amounts to hundreds of millions of dollars (Hong et al., 2012). In China, while the overall spending on CSR-related investments is unknown, survey evidence shows that in 2018 the top 100 companies (in terms of revenue) participated in about 2,500 socially responsible projects. Over time, Chinese companies seem to become more conscientious about stakeholder needs as an increasing number of firms set up social responsibility committees, and the number of public companies in Chinese stock markets that disclose CSR has increased from less than 30 in 2007 to more than 900 in 2019.[1]

Why do firms engage in CSR? Like many other corporate finance issues, CSR can be examined through the lens of principal-agency models. Under this agency view, managers engage in socially responsible activities for self-serving purposes at the expense of shareholders. In discussion of the "stakeholder society," Tirole (2001) argues that if a firm's goal is to maximize stakeholders vis-à-vis shareholders' surplus, managers will be capable of rationalizing any costly action (e.g., empire building). This view is also shared by Jensen (2001), who argues that this stakeholder theory "leaves its managers empowered to exercise their own preferences in spending the firm's resources." Barnea and Rubin (2010) and Masulis and Reza (2015) provide empirical evidence supporting this view. On the other hand, based on the argument of "doing well by doing good," the value-enhancing view suggests firms can actually benefit from serving stakeholders such as employees, customers, and communities responsibly. The idea is that when firms behave responsibly, stakeholders reward them reciprocally. In support of this view, Edmans (2011), for example, finds that employee satisfaction is positively related to long-run stock returns. Dimson et al. (2015) document that successful engagement in CSR events is associated with positive abnormal stock returns. Ferrell et al. (2016) also find a positive relation between CSR and stock return. Lastly, Gao et al. (2018) show that firms facing non-

[1] "2020 Chinese Corporate Social Responsibility White Book", released by Hurun Research Institute. see: http://www.hurun.net/CN/Article/Details?num=2B1EEDE04F4E

fundamental shocks can actively signal the market with CSR investments, and the market listens to it.

The motivations for companies in China to engage in CSR activities, notwithstanding, might be much more complicated for three reasons. First, the ownership structure is different. In the U.S., a dispersed ownership structure creates a separation of ownership and control. Managers, usually owning very little of the firm, may behave in a way that benefits themselves but hurts the shareholders. In China, the typical agency problem is the expropriation of minority shareholders by controlling shareholders (Jiang and Kim, 2020). Second, legal, institutional and societal differences create cross-country variations in corporate CSR behavior (e.g., Bartling et al., 2015; Liang and Renneboog, 2017). China differs from developed Western countries in many aspects such as economic development, institutions (economic, legal, etc.), and culture. These differences imply that the overall CSR environment in China is likely to be different from those in developed countries. Last, related to the second one is that the CSR initiatives in the last decade were mostly driven by the Chinese government using the top-down approach, whereby a number of regulations were promulgated to promote conscientiousness of CSR in China. This is different from the bottom-up approach toward CSR in developed countries.[2] Because the existing theory regarding CSR does not provide clear guidance that caters to these specific differences in China, it remains to be an empirical question of what motivates firms in China to exercise corporate social responsibility.

In this paper, we attempt to shed light on this issue by studying short-selling activities from the perspective of investor behavior in China. We focus on short-sellers instead of the overall value impact of CSR from the market because research on the latter has thus far yielded inconclusive results.[3] In addition, unlike the stock markets in developed countries where institutional investors are the major players, the Chinese stock markets are dominated by retail investors, who typically are less informed, lack expertise, and thus are

[2] See Wang and Juslin (2009) for an excellent description of the history and institutional background of the CSR development in China.

[3] For example, Ferrell et al. (2016) and Albuquerque et al. (2019) document a positive association between CSR and Tobin's Q; Dimson et al. (2015) find that firms with successful social responsibility engagements are followed by positive abnormal returns. In contrast, Di Giuli and Kostovetsky (2014) find that increases in firm CSR ratings is associated with negative future stock return. Based on event studies, Krüger (2015) also finds that market reacts negatively to positive CSR events.

more susceptible to speculative trading (Liu et al., 2019; Allen et al., 2020). As a result, the overall market reaction may be affected by these noise trades and fail to correctly incorporate the true impact of CSR activities. Short-sellers, instead, are often considered sophisticated investors, who possess the expertise and resources to make an informed decision (Boehmer et al., 2008; Chang et al., 2014; Chang et al., 2019).[4] Their views may be different from the overall market assessment. This is especially important given that CSR events can be potentially disguising in the sense that managers can use them as a camouflage to cover bad news. [5]

To empirically examine how short-sellers respond to CSR activities, we assemble a sample of panel data on Chinese public firms eligible for short sale from 2010 to 2021. Following the literature, we measure short sale intensity as the fraction of stocks sold short in a year. We measure firms' CSR performance using CSR scores from Hexun.com, one of China's leading business news outlets. Our results from firm fixed-effect models point to an overall positive association between CSR scores and the proportion of shares sold short in the full sample. We further show that, out of the five subcategories of CSR, *employee responsibility*, *supplier and customer responsibility*, and *environmental responsibility* exhibit a statistically significant effect on short selling, while *shareholder responsibilities* and *social responsibilities* obtain positive yet statistically insignificant coefficients.

In addressing the effect of CSR on short selling, we pay considerable attention to the endogeneity issue that can exist in our tests. Because there are no legally binding standards that require firms to comply with when preparing CSR reports (Krüger, 2015), our estimations can potentially suffer from the problem of measurement errors associated with CSR performance, to the extent that the construction of CSR scores relies in large part on

[4] While it is true that not all short-sellers are sophisticated investors, Chang et al. (2014) claim that because short-selling is relatively new to Chinese investors, unsophisticated investors choose to steer clear of short-selling. Using data from the Chinese stock markets, they provide evidence that short-sellers' profits are driven by sophisticated skills or superior information. Another institutional feature of short-selling in China is that investors have to satisfy certain requirements before they are eligible to make short sales. Two of these requirements are that 1) the average daily assets in securities for the previous 20 trading days must be above 500,000 Yuan, and 2) an investor must have a minimum of 6 months of experience in security trading. These requirements imply that noise traders are less likely to constitute a significant portion of short-seller cohort.

[5] Caulkin (2002) describes CSR as "a fig leaf that legitimates flagrant irresponsibility." In the discussion of the motivations for CSR, Hemingway and Maclagan (2004) note that "corporations adopt CSR to cover up the impact of corporate misdemeanor."

self-disclosed CSR reports. In addition, the issue of reverse causality presents another obstacle as previous literature has shown that firms use CSR as a signaling vehicle when facing short-selling pressure (e.g., Gao et al., 2018). We take two approaches to address these concerns: instrumental variable (IV) and difference-in-differences (DiD) approaches. Our first IV exploits an exogenous variation in death tolls caused by disasters such as natural hazards, geologic hazards, forest fires, and earthquakes. The idea behind this identification strategy is that these dramatic events are considered natural experiments because they are either exogenous in nature or notoriously difficult to predict (e.g., earthquakes). In addition, corporations around the world have a tradition of making donations when disasters strike, and more importantly, the amount of donations usually increases with the severity of disasters. Our second IV is a dummy variable for firms included in the "Corporate Governance Sector," has stocks listed overseas for Shanghai Stock Exchange, or included in the "Shenzhen 100 Index." The variable is likely to be exogenous because the decision to be included in those specific groups is out of firms' control. In the meantime, these firms are required by the exchanges to issue CSR reports. As a robustness check, we also use the yearly industry average CSR score as our third IV. The results from all three IVs yield qualitatively similar results, and confirm that firms with higher CSR scores are associated with more short selling. In our difference-in-differences approach, we take advantage of the emission restrictions imposed on hosting cities when an international event is held in China. Because one important component of CSR score is environment protection, imposing emission restrictions is going to affect the CSR scores of firms located in the hosting cities during the event time. This exogenous shock in CSR scores is then used to identify the effect of CSR scores on short-selling activities. Results from this approach are consistent with the results from the IV approach.

In the second stage of the analysis, we investigate the mechanisms through which CSR performance affects short-selling. On the one hand, one strand of the literature on CSR has argued that corporations adopt CSR to cover up the impact of corporate misdemeanors (Hemingway and Maclagan, 2004). On the other hand, the literature on short-selling has shown that short-sellers, as sophisticated investors, are able to detect and discipline financial misconduct and earnings management (Karpoff and Lou, 2010; Fang et al., 2016). If the claim that firms use CSR as a camouflage to cover up inappropriate behavior is true,

then we would expect to see that firms with higher CSR scores engage in more earnings management, because corporate misconduct (e.g., siphoning of funds by insiders) ultimately will show up in a firm's earnings (Leuz et al., 2003).[6]

In addition, another strand of literature holds that short-selling pressure has a positive effect on firms' investment decisions (Chang et al., 2019). Socially responsible activities, such as capital expenditures on pollution-reducing equipment and facilities or corporate donations for disaster relief, often involve substantial investments. If investors perceive these investments as negative NPV projects, we would expect a negative market reaction, including short selling, as well. Both channels are equally likely. Following the literature, we start by examining whether firms with higher CSR scores are more likely to engage in earnings management, poor investment decisions, or both. Using discretionary accruals as a measure of earnings management, we find that firms with higher CSR scores are indeed associated with more earnings management. Measuring investment distortions as regression residuals based on standard investment models (Biddle et al., 2009), we find evidence that firms with higher CSR scores are positively associated with overinvestment. Based on these analysis, we conclude that the relation between the CSR score and short sales is driven by both earnings management and poor investment decisions.

This paper is closely related to Krüger (2015). Based on event studies in the US, Krüger (2015) provides evidence that investors respond strongly negatively to negative CSR events and weakly negatively to positive CSR events. Notably, he documents that when CSR is driven by agency issues, it is detrimental to shareholder value. While our results point in the same direction as his, our research differs from his in several aspects. First, while Krüger (2015) examines the overall market reaction to socially responsible (and irresponsible) events, we focus on how the stock market responds to CSR performance through the lens of short-sellers, who are often regarded as sophisticated investors. Second, in tackling the problem of endogeneity, he utilizes the event study that examines the immediate market reaction; we address this issue using the instrumental variable and differences-in-differences approaches. Last, we went one step further by examining the

[6] Based on international data, Leuz et al (2003) provide empirical evidence that firms use earnings management to mask firm performance and conceal the private control benefit from outsiders.

channels through which socially responsible activities affect investor behaviors. Our research hence complements Krüger (2015) by providing a different angle to examine the issue related to CSR motivations in China.

The issue of whether CSR affects accounting quality has been examined in the accounting literature. However, the evidence is mixed. Based on a small sample of firms with charitable foundations, Petrovits (2006), for example, provides direct evidence that firms strategically use contribution to the foundations to manipulate earnings. Based on data from 46 countries, Chih et al (2008) also document a positive relation between CSR and earnings aggressiveness. Kim et al. (2012) instead find that socially responsible firms, measured using social performance data from KLD, are associated with lower earnings management. Our work extends this line of research by providing causal evidence that in China, a major developing economy where the development of CSR is different from that in developed economies, firms engaging in more CSR activities are actually associated with more earnings management. This finding resonates well with the notion that CSR should "be fundamentally related to not only a firm's own choice but also regulations, institutional arrangements, and societal preferences" (Liang & Renneboog, 2017).

To the best of our knowledge, this is the first work that examines CSR issues from the perspective of short sellers in China.[7] Our finding that the positive relation between short sales and CSR scores is driven by firms window-dressing their financial statements or firms that overinvest has implications for CSR policies. Since the goal for "building a harmonious society" was proposed in 2004, the Chinese government has rolled out several important CSR-related regulations (Chen et al., 2018). The most significant one is the new Chinese Company Law, which requires that a company assume social responsibility in the course of conducting business.[8] This is in sharp contrast to many developed countries where CSR is often treated as voluntary corporate behavior beyond legal compliance (Lin, 2020). While enforcing CSR may seem to be a sensible way to enhance social welfare, it is vital to have a reliable empirical assessment of the intended or unintended consequences

[7] Typically based on differences-in-differences estimation strategy, some papers have examined the issue of how firms adjust CSR investments when facing short-selling pressure. However, we do not find any existing paper that investigates how short-sellers respond to CSR investments.
[8] See Article 5 of the 2006 Company Law.

so that policymakers can evaluate and recalibrate those policies and make informed decisions.

The rest of the paper is organized as follows: Section 2 provides a review of the related literature; Section 3 presents the data; Section 4 shows the primary empirical results; Section 5 addresses the endogeneity issue and establishes causality; Section 6 investigates the mechanisms; and Section 7 concludes.

2. Literature Review

There are two main strands of literature on the motivation of CSR. One strand of literature examines the dark side of CSR investments. Similar to other corporate finance issues, this view treats CSR as a form of agency cost caused by self-interested managers pursuing their own benefits at the expense of shareholders. As a proponent of this view, Milton Friedman famously argues that "The Social Responsibility of Business Is To Increase Its Profits" (Friedman, 1970). In discussing the "stakeholder society," Tirole (2001) illustrates the difficulty of aligning the interests of mangers' incentives with the sum of the stakeholders' vis-a-vis shareholders' surplus. In addition to the obvious obstacle of correctly measuring aggregate welfare, he argues that managers can easily rationalize any action by invoking its impact on welfare, many of which have been shown to be detrimental to firm value.

Empirically, Masulis and Reza (2015) provide compelling evidence that corporate giving is a manifestation of the managerial-shareholder agency problem. Based on Fortune 500 companies, their results indicate that the likelihood of corporate giving is positively related to CEOs' charitable connections and negatively related to CEOs' stock ownership, suggesting that firm donations advance CEO interests. In a similar vein, Adhikari (2016) documents that when firms are covered by more financial analysts, they tend to have lower CSR ratings. This result is also consistent with the agency view because if CSR activities are negative NPV projects, financial analysts, as external monitors, will force them to cut back on these discretionary spending. Interestingly, Petrenko et al. (2016) find that CSR is positively related to CEOs' narcissism, suggesting that CSR initiatives may result from managers' personal needs rather than firm value-maximization objectives. Last, based on an event study, Krüger (2015) finds that investors respond negatively to positive CSR

events. Interestingly, he finds a positive abnormal return when firms take corrective actions, called "offsetting CSR," for negative CSR events conducted previously.

On the other hand, another strand of literature focuses on the positive side of CSR investments. CSR can be used to signal the market strong fundamentals or reliable services. Glazer and Konrad (1996) build a model to illustrate how charitable donations that are observable can signal wealth or income. Using two exogenous shocks in the U.S. financial markets, the regulation SHO and mutual fund fire sales, Gao et al. (2018) show that firms facing non-fundamental shocks may actively signal the market with CSR investments. When encountering negative shocks, the market responds positively to firms that try to signal that they have strong fundamentals and that they are different from other firms that cannot afford expensive and sticky CSR investments. From the perspective of information quality, Kim et al. (2012) show that socially responsible firms are less likely to manage earnings through discretionary accruals. Internationally, Dhaliwal et al. (2012) find that CSR disclosure reduces analyst forecast errors.

3. Data, variables and empirical strategies

3.1.CSR Data

Our data on CSR performance come from Hexun.com (Hexun hereafter).[9] Hexun is one of the leading business news outlets in China.[10] Like many CSR rating agencies (e.g., MSCI-KLD ESG rating), Hexun measures firms' CSR performance by focusing on environmental, social, and governance (ESG) related issues while adapting to specific CSR issues in China. Specifically, Hexun evaluates firms' CSR performance on the following five dimensions: *shareholder responsibilities*, *employee responsibilities*, *supplier, client, and consumer responsibilities*, *environmental responsibilities*, and *social responsibilities*.[11] *Shareholder responsibilities* and *environmental responsibilities* correspond to governance and environmental issues, respectively, and the rest correspond to social issues. Each dimension consists of several categories, which are further cascaded into a total of 37

[9] We cross-validate our results by using a second independent data source: Sino-Securities Index Information Services CSR data. These results are available from the authors upon request.
[10] Hexun was named one of the "Top 8 Most Influential Business Media Platforms" in 2020 by Hurun. The data is manually collected from its website.
[11] In comparison, MSCI-KLD rates firms in Russell 3000 in six categories: community, diversity, employee relations, environment, human rights, and product.

detailed subcategories. In constructing the score, Hexun puts a specific weight for each category. The governance category accounts for 30%, the environmental category accounts for 20%, and the rest together account for 50%. Because the relative importance among the categories differs across different industries, Hexun adjusts weights for the environmental and social categories for some specific industries. For example, the manufacturing industry carries a higher weight in the environment category compared with other industries. It is also worth mentioning that the *social responsibility* dimension accounts for 20% of the overall CSR score. *Social responsibility* is measured by the amount of contributions made by firms to society. In later part of the paper, we use the terms *social responsibility* and *social contribution* interchangeably. Because paying income taxes is regarded as a contribution to society in China, in evaluating firms' *social responsibility*, Hexun assigns a 50% weight for how much firms pay income taxes within this dimension, with the other half coming from firms' charitable donations. See Appendix A for more details about the specific categories and weighting scheme. Like other CSR rating agencies, Hexun does not evaluate firms' CSR activities directly; instead, the score is based on CSR-related information disclosed in firms' CSR reports and annual reports made public through firms' official websites or the two major stock exchanges in China. Unlike other ratings (e.g., credit ratings) where client firms typically pay the rating agency some fee for its service, Hexun is entirely independent of the companies it rates. To further ensure the objectivity and accuracy of the score, Hexun requires that each CSR report be assessed by at least three independent CSR experts who have a minimum of three years of professional experience.[12]

3.2.Short-selling Data

Short-selling was largely prohibited in China until 2010 when the Chinese Security Regulatory Commission (CSRC) launched a pilot program that for the first time, allowed 90 publicly traded stocks to be eligible for short-selling. The list of eligible stocks has since been revised and expanded each year, with new stocks being added and old stocks removed. Both the Shanghai and Shenzhen stock exchanges have strict rules regarding which firms

[12] http://stock.hexun.com/2010/shzrbg/

are eligible for selling short.[13] Following the literature (e.g., Dechow, 2001; Asquith et al., 2005), we measure short sales as the percentage of stock sold short, which is calculated as the number of shares sold short in a year divided by the average number of shares outstanding.

3.3.Other controls

We include several controls that could potentially affect short selling. Dechow (2001) provides compelling evidence that short-sellers tend to target firms with low fundamental-to-market ratios. We use the book value of equity over the market value of equity (*Book/Market*) to proxy for this ratio. Recent work also shows that well-governed firms are associated with a higher firm value (e.g., Knyazeva, Knyazeva and Masulis, 2013), suggesting that corporate governance may affect short-selling as well. We include as our controls several standard governance variables such as the proportion of independent directors, and Chairman and CEO duality. A board with more independent directors is supposedly in a better position to monitor managers, while a CEO who is also the board' chairman is more likely to entrench himself, which could hurt firm value. Because the literature has argued that due to the concentrated ownership structure, the typical agency problem for Chinese public firms is not the conflict of interest between managers and shareholders; instead it is the problem of expropriation of small shareholders by controlling shareholders (Jiang and Kim, 2020). We include stock ownership of the largest shareholder to control for ownership concentration. In addition to the above discussed variables, we also include other standard firm attributes including return on assets, book leverage, and firm size. We expect that firms with high profitability and low leverage are less likely to be shorted. In addition, we control for whether a firm is a state-owned enterprise (SOE) or privately owned (NSOE) because of inherent differences between these two types of firms.

[13] For example, according to "Implementation Rules on Margin-Trading and Short-Selling", released by the Shanghai Stock Exchanges on November 25, 2011, these rules include: 1) the firm was listed on the stock exchange for a minimum of 3 months; 2) the number of shareholders is greater than 4,000; 3) the number of tradable shares is greater than 200 million or the market capitalization of tradable shares is greater than 800 million Yuan; 4) in the previous three months, the average daily stock turnover is not less than 15% of the benchmark index turnover or the average daily trading volume is not less than 50 million Yuan; the average daily stock return does not deviate from the benchmark index return by more than 4%; and the daily stock return volatility is less than five times the benchmark index volatility; 5) completion of the split-share reform; 6) the stock is not under special treatment (i.e., ST stock). The eligibility rules by the Shenzhen Stock Exchange are identical to those of Shanghai.

Last, we specifically control for industry fixed effects when necessary, because as discussed in Section 3.1, the weighting scheme of the CSR score varies at the industry level.

We obtain data on short sales from Wind. Firms' accounting information, stock market data, and governance-related variables, such as ownership concentration, and the number of independent directors are obtained from the China Stock Market & Accounting Research (CSMAR) database, provided by GTA Information Technology. These two datasets have been widely used in research concerning China's finance and accounting issues. Following the literature, we eliminate firms in the financial and utility industries in constructing all samples. We restrict our sample to the period 2010-2021. We start from 2010 because it was the first year that the restrictions on short-selling in the stock market were lifted in China. To be included in our sample, firms need to be both covered by Hexun.com and eligible for short-selling. Appendix B provides definitions of these variables and sources of the data.

3.4.Empirical Strategy

To investigate how short-sellers respond to CSR scores, we set up our baseline model as follows:

$$short\ ratio_{i,t+1} = \alpha + \beta_t + \delta CSR\ score_{it} + \gamma' x_{it} + \varepsilon_{i,t+1} \quad (1)$$

where $short\ ratio_{i,t+1}$ is the number of shares sold short over the average shares outstanding for firm i in year $t+1$. $CSR\ score_{it}$ is the score for corporate social responsibility for firm i in year t. α is a constant while β_t is a year dummy that controls for the overall trend in short selling activities. x_{it} is a vector of firm - level controls as discussed earlier, and ε_{t+1} is the stochastic error term. Our coefficient of interest is δ. To make sure our results are relatively robust, we conduct our estimations using pooled ordinary least squares (OLS), random effects (RE), and firm fixed-effects (FE), without assuming a specific structure for the error term. We also cluster standard errors at the firm level to account for time series correlations in standard errors.

4. Results

4.1.Descriptive Statistics

Table I reports the summary statistics of the main variables. We winsorize our continuous variables at the 1st and 99th percentiles to reduce the influence of outliers. The percent of shares shorted (*short ratio*) ranges from 0 to around 14%, with a mean of approximately 1.3% and a standard deviation of 2.24%. The fairly large range and standard deviation suggest a considerable variation in the volume of short sales across firms and over time. This variable is skewed to the right, with the mean larger than the median, indicating that some stocks are heavily shorted. The main explanatory variable, the corporate social responsibility score (*CSR Score*) for an average firm-year is 27.13, ranging from -18.45 to around 91. On average, the book value of equity accounts for about half of the market value. Independent directors account for a little more than one third of a typical board. This is consistent with the minimum requirement imposed by the Chinese regulators on the board structure. The largest shareholder on average holds 35% of the firm's common shares, consistent with the concentrated ownership structure in Chinese public firms. A median firm has 11 billion Yuan of assets. Its book leverage and ROA average 0.47 and 0.05, respectively.

Before we delve into the regression analysis, it is helpful to compare our sample with the universe of A share stocks in the Shanghai and Shenzhen Stock Exchanges. Both the average and median size of the universe of the A share stocks in the two exchanges over our sample period is about 1.1 billion Yuan in terms of total assets, which is about one tenth of the size in our sample. The large difference in sample size is attributable to the fact that regulators restrict stocks that are eligible for short sale to be relatively large, mature, and liquid. While this may limit the generalization of our results, we argue that our research is still important as our sample firms, which account for a large percentage of the total market capitalization in the stock markets, have been the leading force in pushing for socially responsible activities in China.

4.2.Main Regression Results

Table II reports the regression results of model (1). Column (1) are estimates from pooled OLS, Column (2) from random-effects GLS, and Columns (3), (4) and (5) from firm fixed effects. The variable CSR score loads positively and is statistically significant at the 1% level regardless of how the model is estimated. Taking column (3) as an example, the

coefficient estimate on CSR score is 0.012. This means that short-sellers tend to sell more when firms have higher scores, holding other variables constant. For economic significance, a one standard deviation change in the CSR score will translate into 0.22 percentage change in the short ratio. Twenty-two basis points may look trivial on the surface. However, given that the mean (median) short interest ratio over our sample period is only 129 (44) basis points, the estimate accounts for 17% (50%) of the mean (median). For controls, the coefficient on the book-to-market ratio (*Book/Market*) is negative and significant at 1%, indicating that firms with solid fundamentals (relative to the market) appear to be less attractive to short-sellers, consistent with the findings in Dechow et al. (2001). Additionally, as expected, short-sellers are more likely to short firms with poor operating performance as ROA is negatively related to the amount of short selling.

Interestingly, we find that leverage is negatively associated with short sales. Traditional governance measures such as the proportion of independent directors and CEO/Chairman duality have no impact on short sales. Firms with a concentrated ownership structure are negatively associated with the amount of short selling. On the one hand, the concentrated ownership structure may hurt firms because it exacerbates the problem of "tunneling" by controlling shareholders. Alternatively, it may benefit firms because of the potential support provided by the controlling shareholder for firms that may suffer from financial distress. Our results seem to be consistent with this alternative view. Last, state-owned firms are more likely to be shorted than private firms. With an R-squared value around 0.3, our explanatory variables seem to have reasonably good explanatory power in explaining variation in short selling activities.

The literature has shown that state-owned firms (SOEs) have different objectives than private firms. Unlike their counterparts, SOEs have the obligation to maintain social stability such as high employment, in addition to profit maximization. Managers in SOEs, often delegates for controlling shareholders, are incentivized by both pecuniary considerations and promotions, which are evaluated based on not only the profit-maximization goal but also social stability objectives (Jiang and Kim, 2020). Because the social obligation of SOEs largely overlaps the elements in CSR, we expect that the relation between CSR scores and short sales will be less pronounced for the SOE group. We

perform a regression analysis of how the CSR score affects short sales in each of these groups. The results, which are also estimated from firm fixed effects, are shown in Columns (4) and (5). Although the coefficients on the score for both NSOE and SOE are significant at the 1% level, we find that the magnitude for the NSOE group is larger (0.014 vs. 0.009), which is consistent with the institutional facts and our conjecture.

4.3.Analysis of CSR subcategories

As discussed in Section 3, CSR performance is evaluated on five subcategories: *shareholder*, *employee*, *supplier and consumer*, *environment,* and *social contribution*. One advantage of the Hexun CSR data is that not only does it provide an overall CSR score but also the scores for each of the 5 CSR subcategories. In this section, we examine how short sellers respond to each of these subcategories by running separate regressions of short sales on each of the sub-categorical scores. The results are reported in Table III. As we can see, the positive relation between short sales and CSR score is mainly driven by the subcategories of *employee*, *supplier and consumer*, and *environmental* responsibilities. Instead, the coefficient on *shareholder responsibility* is positive but insignificant, suggesting that short-sellers do not short firms that have higher investment in corporate governance. This result is not surprising and consistent with the literature that shows a positive relationship between shareholder rights and equity value (Gompers et al., 2003). On the surface, it seems that the result on the *social responsibility* subcategory is counterintuitive: the coefficient on *CSR(social)*, although positive, does not load significantly. A closer look at the details of CSR score components reveals that the category of *social responsibility*, accounting for 20% of the total score, is composed of 50% of income taxes and 50% of corporate donations. In other words, a firm can achieve a high score in this category by paying more income taxes. This finding can potentially explain the insignificant result in Column (5) because firms that pay higher taxes are more likely to be profitable firms in China.

5. Endogeneity of CSR score

A statistically significant association between the CSR score and short sales may not be interpreted as a causal relationship in the presence of potential endogeneity of CSR activities. As argued by Krüger (2015), empirical studies on CSR are likely to suffer from

measurement errors and reverse causality. The issue of measurement errors arises because 1) the CSR score is usually compiled by a third party based on the information disclosed by firms. Although private and non-private reporting initiatives abound, there are no legally binding CSR standards that require firms to comply with. Therefore, the amount and level of CSR related information will likely vary across different firms, rendering direct comparison of the score less reliable. 2) CSR reports are not required to be audited.[14] Given that firms have incentives to overstate their good deeds and understate their bad deeds, the issue of manipulation (e.g., greenwash) is likely to jeopardize the quality of data provided by firms.[15] The reverse causality issue mimics the typical endogeneity issue in studies of the value implication of CSR investment: are firms doing well by doing good or doing good by doing well? In our case, an alternative interpretation could be that firms' choice of CSR investments may in part be a response to investors' actions (Lu et al., 2016). Although we used lagged independent variables in our regressions, we cannot eliminate this issue completely.

To address the issue of endogeneity, we explore two identification strategies: instrumental variables (IV) and difference-in-differences (DiD). In particular, we use three different instrumental variables: the number of deaths caused by disasters, the dummy for whether a firm is in the "Corporate Governance Sector," has stocks listed overseas (Shanghai Stock Exchange), or is on the list of the "Shenzhen 100 Index," and the industry average CSR scores with each IV having its own pros and cons. For DiD, we take advantage of the exogenous shock on emission restrictions on the hosting city in China when an international event was held.

5.1. Instrumental variable approach

5.1.1. Using death toll from disasters as an IV

We make use of annual variation in the number of deaths (death toll) caused by disasters as an instrument for the CSR score. As mentioned earlier, the CSR score covers five subcategories with one of them being *social contribution*, which comprises corporate

[14] In China, CSR reports need not to be audited or assured (Chen et al., 2018).

[15] As a public monitoring mechanism, a well-known Chinese news media "Southern Weekend" set up an annual "Greenwash Top List" in 2010 to deter companies from engaging in hypocritical behaviors such as double standards, outright lies, 'blank checks,' etc.

donations and income tax payments. It has been a long convention around the world for corporations to make donations when disasters strike, and more importantly, the amount of donations is usually positively related to the severity of disasters. For example, the U.S. Chamber of Commerce Foundation reported that the top 5 disasters in terms of pledges made by corporations are Hurricanes Katrina and Rita, Indian Ocean Tsunami, Japan Earthquake and Tsunami, Hurricane Harvey, and Haitian Earthquake.[16] The case of China is similar to the U.S. with the largest amount of donations going to disasters such as the 2008 Wenchuan earthquake and the 2010 Yushu earthquake.[17] Therefore, using deaths from disasters as an IV for CSR score is intuitively appealing. The data on the number of deaths come from the Chinese National Bureau of Statistics (NBS), which has yearly data available for four (potentially non-exclusive) types of disasters: natural hazards (e.g., flooding, hurricanes, droughts, and blizzards), earthquakes, forest fires, and geologic hazards (e.g., debris flows, soil erosion, landslides).[18] The data are in Appendix C.

Because these events can be considered exogenous in nature, the number of deaths resulting from these events is unlikely to be correlated with factors that affect short-selling activities. The validity of an instrument critically hinges on this exclusion restriction. As demonstrated in scientific research, natural hazards such as flooding, landslides, and debris flows in China are mainly driven by climate change (e.g., global warming) combined with rapid urbanization (Lyu et al., 2018) and earthquakes are notoriously difficult to predict (Geller, 1997). The exclusion restriction also requires that the relationship between disasters and investor behavior is fully mediated through firms' CSR investments (corporate donations in particular), such that the variation in firms' CSR activities is the only pathway through which the death toll from disasters affects short-selling activities. While the social and economic impacts of natural disasters are well documented in the scientific literature (e.g., Strobl, 2012), there has been no evidence thus far that natural disasters affect investor behavior in other ways. One potential concern with this IV is that natural disasters such as flooding may negatively affect firm performance if the firm is

[16] https://www.uschamberfoundation.org/chart-comparison-business-aid-disasters
[17] According to Yupei Dou, then Vice Minister of the Ministry of Civil Affairs, the total amount of donations for Wenchuan Earthquake is close to 70 billion Yuan. Source: https://www.chinanews.com/gn/news/2008/11-26/1463881.shtml
[18] We obtain the data at https://data.stats.gov.cn/easyquery.htm?cn=C01&zb=A0C0C&sj=2018

located or has business in the affected areas, triggering short selling activities. However, this possibility would require that there are disproportionately more firms with high CSR scores in the affected areas because the losses from disaster apply to all impacted firms, independent of firms' CSR performance. More importantly, it would work against us finding a significant result. Overall, this literature suggests that our instrumental variable, death toll from disasters, does not belong to the structural equation; we thus argue that it is a valid instrument.

To construct this IV, a natural starting point would be summing up the death toll from all four types of disasters in a year, and using the total number of deaths as the IV for the CSR score. However, because data on different types of disasters are not mutually exclusive, we instead use the death toll from natural hazards, geologic hazards, and earthquakes as separate IVs, and total death tolls as a robustness check.[19] We did not use forest fires as an IV because there were only two years of data available.

The two-stage least squares IV approach involves estimating the following second-stage structural model using the predicted values from the first-stage instrumental variables equation:

$$short\ ratio_{i,t+1} = \alpha + \beta_t + \delta CSR\ score_{it} + \gamma' x_{it} + \varepsilon_{i,t+1} \qquad (2)$$

First-stage instrumental variables model:

$$CSR\ score_{it} = \theta + \varphi Z_t + \rho' x_{it} + \upsilon_{i,t+1} \qquad (3)$$

where Z_t is our IV, the death toll from a different type of disaster, and the death toll from all types combined. The rest of the variables are defined as in equation (1). In the first stage, because the death toll only varies at the year level, we cannot add the year dummy as additional controls due to overidentification.

Identification of the IV model requires a strong correlation between the instruments and the endogenous variable, the CSR score (Bound et al., 1995; Staiger and Stock, 1997). The

[19] Conversation with the staff from the National Bureau of Statistics reveals that the data on different types of disasters are collected by different government agencies. Lack of full communication among those agencies may lead to data overlapping between different types of disasters. For example, data on natural hazards may have overlapped with geologic hazards.

results from the first-stage regression on the number of deaths are presented in Table IV, Panel A. Consistent with our conjecture, the coefficients on all instruments are positive and statistically significant at the 1% levels, suggesting that firms do respond to disasters by making donations. Additionally, reported at the bottom of this Panel are the F-statistics. We found that the F-statistics for all four instruments are well above 10, which is deemed the cutoff for weak instruments (Bound et al., 1995; Staiger and Stock, 1997), with the highest one from the instrument on natural hazards. We also performed a weak instrument test as proposed by Stock and Yogo (2005) and found that all four instruments passed the test with the F-statistics being greater than the critical value of 16.38 (using 5% bias).

The results from the second-stage IV estimates are reported in Table IV, Panel B. After controlling for the endogeneity between firm CSR score and short selling, we find that firms with higher CSR scores are associated with a larger amount of short sales, and these results are robust across different disaster-related IVs. For the control variables, we find that firms with a higher book-to-market ratio and firms with better operating performance are associated with less short sales.

5.1.2. Using a dummy variable for a subset of firms listed on Shanghai and Shenzhen Stock Exchanges as an IV

Our second IV is a dummy variable for a specific subset of firms listed on Shanghai and Shenzhen Stock Exchanges. Specifically, this dummy equals 1 if a firm is included in the "Corporate Governance Sector," has stocks listed overseas (Shanghai Stock Exchange or SSE), or is on the list of the "Shenzhen 100 Index" (Shenzhen Stock Exchange or SZSE). These firms are required by both Stock Exchanges to issue CSR reports. As mentioned in the Introduction, the push for a harmonious society in China has prompted many governmental initiatives, and one of them is to encourage firms to be socially responsible. To ensure that firms are publicly transparent about their CSR activities, starting from December 2008, the Shanghai and Shenzhen Stock Exchanges issued mandates that require these firms to issue CSR reports.[20] Although the mandate does not require any real changes in firms' activities, we expect this dummy to be correlated with CSR scores because the

[20] Chen et al. (2018) provide an excellent description of this disclosure mandate.

pressure from the government and the public would force firms with mandatory disclosure to engage in more CSR activities. As shown in Column (1) of Panel C in Table IV, when we run a regression of CSR scores on this dummy variable (*member*), controlling for other firms' attributes such as firm size, return on assets, etc, we find the coefficient on this instrument is positive and statistically significant at 1% level. This first-stage regression confirms our conjecture.

The exclusion restriction for IV requires that this dummy variable should not be correlated with factors that can potentially affect short selling. This is likely to be the case for membership in either the "Shenzhen 100 Index" or "Corporate Governance Sector" to the extent that the decision for whether or not to include a firm in these specific groups is made by the exchanges and beyond the firm's control.[21] On the other hand, the academics has identified several factors that could affect a firm's decision to list its stocks on a foreign exchange. These factors include access to capital, investor recognition, protection of minority shareholders, and improvement in information environment (Yang & Lau, 2006). While we are not aware of any evidence that short sellers target firms with cross-listings, we are worried that those factors could potentially be correlated with short-sell decisions. In robustness check, we redefine our IV as only those firms that are included in the "Shenzhen 100 Index" or "Corporate Governance Sector", removing firms with cross-listings, the results based on this IV is qualitatively similar to the initial one.[22] The results from the second-stage regressions are shown in Column (2). Again, we found a positive and statistically significant coefficient on CSR score. Interestingly, the point estimate for this IV is greater than our primary results but smaller than the results from previous IVs.

5.1.3. Using industry averages as an IV

As a further robustness check, we follow the literature and use the annual industry average of CSR scores (excluding the firm under consideration) as an alternative instrumental variable for the overall CSR score. Variations in mean industry CSR can serve as a potential IV to an individual firm's CSR score to the extent that a firm does not influence the CSR

[21] For example, the "Shenzhen 100 Index" is made by Shenzhen Securities Information Company Limited, a fully-owned subsidiary of Shenzhen Stock Exchange (SZSE); the member firms in the "Corporate Governance Sector" are chosen by China Securities Index, also controlled by the two Stock Exchanges.
[22] For brevity, we do not report results on this IV. They are available from the authors upon request.

performance of the rest of its industry, and at the same time, they are likely to be correlated. Nevertheless, the problem with this IV is that it is difficult to justify that the only pathway through which industry CSR performance affects short selling is through individual firms' CSR performance. Columns (3) and (4) of Panel C highlight the results with this alternative IV. Consistent with previous findings, we find that firms with higher CSR scores are associated with larger short selling.

5.2.Difference-in-differences approach

Thus far, we have been using the IV approach to deal with the endogeneity problem. In this section, we take a different approach to address this issue.

Specifically, we take advantage of the emission restrictions imposed on hosting cities when an international event is held in China. With the rapid economic development, China has become a popular destination for hosting international events such as international sports. At the same time, the air pollution in many cities has been severe, causing huge health problems and social losses for a long time (Jin, et al., 2016). To reduce air pollution and ensure clear skies for these events, the government often takes short-term measures, such as temporarily shutting down factories to reduce emissions. For example, in October 2019, when the 7th International Military Sports Council (CISM) Military World Games was held in Wuhan, the capital city of central China's Hubei province, the Wuhan Municipal Ecology and Environment Bureau issued a mandate on September 27, 2019, that listed detailed measures to curb air pollution around the event time. Among others, the mandate stipulated that during the two-week period between October 13, 2019 and October 28, 2019, the daily atmospheric pollutant emission be 40-60% of the average daily emission level in 2018. To achieve these goals, it requires emissions from coal-fired power stations and coke ovens to meet the highest industry standards and temporary shutting-down of earthworks in construction sites such as demolition, excavation, backfill, transport, etc. It also partially restricts the activities for non-road and heavy-duty vehicles.[23] To the extent that this mandate is the government requirement, these restrictions are likely to be strictly enforced and local firms will have to reduce their emissions. Using the 2008 Beijing Olympic Games

[23] See http://hbj.wuhan.gov.cn/fbjd_19/zc/gfxwj/202001/t20200106_560629.html for more details.

as an example, Fang et al. (2022) find that cities with air quality regulated for the Olympics cut their Air Pollution Index by about 16 points during the Games. We expect this mandate will increase local firms' CSR scores because environmental responsibilities account for 20% of the score. In addition, to the extent that the timing and location of these events are usually pre-determined, they present an exogenous shock to local firms' operations.

To test whether and how short sellers respond to local firms that experience the shock, we manually collect data on international events held in China between 2010 and 2020. To be included in our sample, for each event, we require a formal government mandate regarding air-pollution control measures. This is to ensure that the emission control is strictly enforced. Appendix D lists the events that satisfy the requirement. As expected, first-tier cities (i.e., Beijing, Shanghai, etc) are among the most popular cities to host international events with Beijing hosting the most. Some cities (e.g., Beijing) may host multiple events in the same year. We treat them as one event-year only. We define local firms as firms headquartered in the hosting cities. We next match the event data (city and year) with other data from the GTA database for our empirical analysis. Our empirical strategy is a difference-in-differences model specified as follows:

$$short\ ratio_{i,t+1} = \alpha + \beta_t + \delta treat_{it} + \gamma' x_{it} + \varepsilon_{i,t+1} \quad (4)$$

where $treat_{it}$ is our proxy for the shock to a firm's CSR score. It is defined as a dummy variable that equals one if a firm is headquartered in the host city *in the event year t*, and zero otherwise. The rest of the variables are defined as in equation (1). We want to emphasize that because the emission control measures in place are usually temporary and only occur around the event time, we designate only the event year as the treatment year and years before or after the event year as controls. This specification essentially compares short sales for firms located in host cities during the event years with short sales in other years, with firms in other cities as the benchmark. Our coefficient of interest is δ. Consistent with previous model, we cluster standard errors at the firm level.

Before we delve into the full estimation results, it is helpful to look at two separate cases: Wuhan and Hangzhou. As mentioned earlier, Wuhan is the capital city of Hubei province, and Hangzhou is the capital city of Zhejiang province. Wuhan hosted the seventh International Military Sports Council (CISM) Military World Games in 2019, and

Hangzhou hosted the eleventh G20 Summit in 2016. We chose these two cities for illustration because both cities are relatively large, there are potentially more pubic firms headquartered in them. In addition, because both events are quite influential, they are taken seriously by the local governments. To test how short sellers respond to firms in these two cities during the event years, we compare short sales for local firms in the event year with those in previous years, separately for each of these two cities. Empirically, it entails running a firm fixed-effect regression of short sales on a dummy variable (*after*) for the event year, controlling for other firm characteristics. The results are in Column (1) and (2) of Table V. For both cities, we find a positive and significant coefficient for variable *after*, suggesting firms that experience the shock are shorted more in the event year, compared with previous year. In addition, the point estimates for two of the cases vary significantly, with Wuhan about six times Hangzhou. This simple exercise provides initial evidence that short sellers respond negatively to firms that experience the shock.

While consistent with our conjecture, those results are only suggestive because they do not control for concurrent economy-wide fluctuations that may affect short-selling behavior. Column (3) of this Table presents the DiD results based on Model (4). By adding the firm fixed-effects, we are able to control firm-level unobservable factors that might correlate with the error terms. In addition, because we also include firms that never experience the event shock in the analysis, we are able to control economy-wide factors that might affect short selling. The coefficient estimate on variable *treat* is 0.129. While the magnitude is smaller than previous two cases, it is positive and statistically significant at 10% level. Collectively, this evidence is broadly consistent with our earlier results that short sellers short more when firms have higher CSR scores. The results on other variables are similar to those in our primary results. For example, the coefficient estimate for *book/market* is -1.321 and significant at the 1% level. This estimate is close to -1.340 in our primary results, indicating that short sellers are less likely to target firms with high book-to-market ratios.

6. Economic Mechanism

Previous analysis establishes a positive link between the CSR score and short sales, but it does not tell us the channels through which the CSR score affects short-selling activities.

In this section, we address this issue by looking at earnings management and investment efficiency.

Earnings management serves as a natural choice for examining the channels for two reasons. First, previous research finds that short selling serves as an effective tool to identify and deter financial misconduct. For example, Karpoff and Lou (2010) argue that "short sellers play a significant role in identifying, uncovering, and mitigating the effects of financial misconduct" (page 1880). They find that short sellers are able to anticipate financial misconduct. They show that short interest increases significantly in the 19-month period before the misrepresentation is publicly revealed. Using Regulation SHO as a randomized experiment, Fang et al. (2016) find that discretionary accruals decreased during the experiment period, indicating that short sellers are capable of deterring earnings management. Second, one strand of the literature on CSR has argued that corporations use CSR to cover up the impact of misdemeanors (Hemingway and Maclagan, 2004). Anecdotal evidence supporting this view abounds. For example, before the accounting scandal of Enron was brought into public's attention, the energy company was the recipient of several CSR awards.[24] Similarly, the Chinese dairy company China Huishan Dairy Holdings Co was one of the recipients of the "Outstanding Enterprise" award in "Corporate Social Responsibility Ranking," sponsored by the Yicai Media Group, before it was targeted by short sellers such as Muddy Waters Capital LLC in 2017 for financial misconduct.[25] As another prominent example, Hui Ka Yan, Founder of Evergrande Group, China's second-largest property developer by sales, has been on the Hurun China Philanthropy List for many years, a well-known ranking of the most generous philanthropists in Greater China. However, according to a Wall Street Journal newspaper, the company has been accused of using several unusual accounting methods over the past decades. The company was recently under extreme financial distress due to its mounting

[24] Enron won several climate protection awards from the US Environmental Protection Agency and a "corporate conscience" award from the US Council on Economic Priorities. Source: Ian King, 2015. "Corporate social responsibility is dead, so what happens now?" The Times. https://www.thetimes.co.uk/article/corporate-social-responsibility-is-dead-so-what-happens-now-hqdvfcd5xmm

[25] https://www.bloomberg.com/news/articles/2017-11-16/chinese-firm-targeted-by-muddy-waters-is-going-into-liquidation. Some Chinese media reports that the controlling shareholder of Huishan Dairy embezzled 3 billion Yuan for speculative real estate investment.

debt level.[26] Collectively, this evidence suggests that the observed relation between CSR and short-selling is driven by the fact that firms with higher CSR scores tend to engage in more earnings manipulations, because corporate misconduct, masked by CSR, ultimately will show up in a firm's earnings (Leuz et al, 2003).[27]

On the other hand, recent literature also shows that short sellers are capable of disciplining firms with poor investment decisions. Chang et al. (2019) document a positive relationship between the acquirer's announcement abnormal return and the ratio of the acquirer's value of shares available for lending (their proxy for short-selling pressure), suggesting that short sellers are able to deter managers from engaging in potentially value-destroying acquisitions. On the other hand, evidence from Chen et al. (2018) suggests that investment distortions associated with CSR-related activities lead to reduced firm performance and lower valuation. As CSR itself can be viewed as long term investments (Adhikari, 2016), the observed relation between the CSR score and short selling can also be driven by poor CSR-related investment decisions. Because presumably both channels are equally likely in the Chinese stock market, we do not attempt to argue which channel will dominate, and instead let the data speak.

6.1.CSR and Earnings Management

To test whether CSR scores are related to earnings management, we run a multiple regression of earnings management on the CSR scores, controlling for governance (e.g., independent directors, CEO/Chairman duality, etc.), growth opportunities (market to book ratio) and firm characteristics (such as size, and leverage). These controls are similar to those used in Kim et al. (2012).[28] Following existing literature, we proxy earnings

[26] Spegele, B., Steinberg, J., & Yu, E. (2021) How Evergrande Grew and Grew, Despite Years of Red Flags. The Wall Street Journal, October 8, 2021.

[27] While it seems counter-intuitive that by engaging in CSR activities, manipulating firms would want to intentionally draw public attention, potentially exposing them to short-sellers, our argument is that not all firms engage in accounting fraud, which is an extreme form of accounting manipulation. We believe that mostly likely, the majority of firms would only engage in earnings management by typically using discretionary accruals. In contrast to fraud, earnings management is often less detrimental to shareholder value, and sometimes could even be legal. What is more, it is not necessarily the case that fraudulent firms would prefer to stay away from public attention. To the contrary, they might want to pretend to be "healthy" by engaging in CSR activities when actually the firms are in deep trouble. Enron and Evergrande are two examples of this scenario.

[28] Unlike Kim et al. (2012), we did not include R&D intensity (research and development expenditure/sales) as an additional control because one out of four observations does not report R&D expenditure in our sample.

management as discretionary accruals, estimated using the modified Jones model (Dechow et al., 1995). The data used for constructing this variable are from CSMAR. We cluster the standard errors at the firm level to account for the possibility that a firm's earnings management behavior is serially correlated.

The results are in Table VI, which reports regression estimates based on different estimation strategies and different sample size. Column (1) was estimated using OLS and Column (2) using firm fixed effects. Column (3) was estimated using instrumental variable where the instrument is the dummy variable "*member*" used earlier (i.e., whether a firm belongs to the "Corporate Governance Sector", has stocks listed overseas, or is on the list of the "Shenzhen 100 Index".) In Column (4), we expanded the sample by removing the restriction on the availability of the short sale data. All independent variables are measured with one year lag to reduce the problem of endogeneity. As we can see, across different estimation methods, the point estimates for the coefficient of the *CSR score* are pretty similar, except for the IV model, which is only statistically significant at the 10% level. All else being equal, firms with higher CSR scores are associated with larger discretionary accruals. This result is in sharp contrast with the findings from the US data (e.g., Hong & Andersen, 2011; Kim et al., 2012), where a negative relation between CSR and earnings management is documented, but it is consistent with the notion that issues related to CSR could be country-specific (Liang and Renneboog, 2017). Together, these results show that firms with higher CSR scores are more likely to engage in earnings management, suggesting earnings management could be one potential channel through which CSR affects short-selling in China. The results on the control variables are generally consistent with the existing literature. For example, firms with higher growth opportunities tend to have larger discretionary accruals, and the Big 4 auditing companies have a mitigating effect on earnings management.

6.2.CSR and Investment Distortion

To test whether investment distortion could be the channel, we follow steps from the last section and examine the relationship between investment distortion and CSR scores.

In untabulated table, we also include R&D intensity as an additional control, our results are qualitatively similar. These results are available from the authors upon request.

Because most investment distortions are not directly observable, we follow the literature and use as a proxy the regression residuals from an investment model in the spirit of Biddle et al. (2009):

$$investment_{i,t+1} = \beta_0 + \beta_1 sales\ growth_{it} + \varepsilon_{i,t+1} \quad (5)$$

investment$_{i,t+1}$ is measured as net total investment (capital expenditure + acquisitions – disposal of fixed assets – divestiture) over beginning-of-year book total assets.[29] *Sales growth*$_{it}$ is our proxy for growth opportunity.[30] Because optimal investment levels are likely to vary across industries and over time, we estimate Equation (5) at the industry-year level. To ensure that our estimates are reasonably reliable, we require at least twenty observations for each industry-year. For each industry-year, we sort residuals from Equation (5) into quartiles. The top (bottom) quartiles are defined as overinvestment (underinvestment), with the middle quartiles serving as the benchmark.

To examine the relation between investment distortion and the CSR score, we create a categorical variable that equals zero if the residuals from Equation (5) are in the middle quartiles (benchmark group), one if in the top quartile (the overinvestment group), and two if in the bottom quartile (underinvestment group), we then perform a multinomial logistic regression of the categorical variable on CSR score, using the same sample as used in our main regression analysis. The results are in Columns (1) and (2) of Table VII. Presumably, if short sellers are selling stocks with higher CSR scores because they are concerned about firms making unsound investments through CSR activities, we would expect to see a positive relation between CSR score and investment distortions, either in the form of overinvestment or underinvestment. As shown in these two columns, we find that the coefficient on the CSR score for overinvestment (underinvestment) is positive (negative) and statistically significant at the 1% level, suggesting that firms with higher CSR scores are more (less) likely to engage in overinvestment (underinvestment). These results seem to be consistent with Chen et al. (2018) who document a negative relation between CSR

[29] It would be ideal to include CSR-related expenditure as part of the calculation. However, because accounting standards require expensing instead of capitalizing some of the CSR-related spending (e.g., employee training and community contributions), data on complete expenditures on CSR are generally not available.

[30] We also used Tobin's q as a measure of investment opportunity (Babenko et al., 2011), the results are almost identical (see Appendix E).

spending and firm performance; they attribute this finding to the inefficient investment associated with CSR spending. In Column (3) and (4), we expanded our sample by removing the restrictions on the availability of the short sale data. Again, we find qualitatively similar results.

In summary, we find that both earnings management and investment distortion are likely to be the channels through which CSR activities affect short-selling, consistent with the camouflage and investment distortion stories.

7. Conclusion

This article investigates market response to CSR activities from the perspective of short-sellers. Using a sample of Chinese public firms from 2010-2021, our results indicate that short-sellers tend to target firms with higher CSR scores. We use two strategies to deal with the endogeneity problems associated with CSR studies: the instrumental variable approach and the difference-in-differences approach. The results based on both approaches are consistent with previous findings.

In the second part of the article, we examine two possible channels that can potentially explain the observed relation between CSR scores and short sales. The first one is attributed to the disguising nature of CSR investments, where managers can use them as a camouflage to cover financial misconduct. In the second one, short-sellers simply view CSR investments as negative NPV projects. Using discretionary accruals as a proxy for earnings management, we find that firms with higher CSR scores engage in more earnings management, supporting the first channel. Built on standard measures of investment distortions, we also find evidence supporting the second one.

When considered together with Krüger (2015), our findings seem to suggest that even in countries where the prominent governance issue is not the one between managers and shareholders, CSR can be a negative signal to the market and thus be potentially detrimental to shareholders. Overall, our study contributes to the literature by revealing a causal link between CSR performance and short sales in one of the largest developing countries. These findings have important policy implications as Chinese regulators have

been increasingly encouraging the development and exercise of corporate social responsibility.

References

Adhikari, B. K. (2016). Causal effect of analyst following on corporate social responsibility. *Journal of Corporate Finance*, *41*, 201-216.

Albuquerque, R., Koskinen, Y., & Zhang, C. (2019). Corporate social responsibility and firm risk: Theory and empirical evidence. Management Science, 65(10), 4451-4469.

Allen, F., Qian, J., Shan, C., & Zhu, J. (2020). The Development of the Chinese Stock Market. Ch. 11 In The Handbook of China's Financial System. Princeton University Press.

Asquith, P., Pathak, P. A., & Ritter, J. R. (2005). Short interest, institutional ownership, and stock returns. *Journal of Financial Economics*, *78*(2), 243-276.

Avramov, D., Cheng, S., Lioui, A., & Tarelli, A. (2021). Sustainable investing with ESG rating uncertainty. *Journal of Financial Economics*.

Babenko, I., Lemmon, M., & Tserlukevich, Y. (2011). Employee stock options and investment. *The Journal of Finance*, *66*(3), 981-1009.

Barnea, A., & Rubin, A. (2010). Corporate social responsibility as a conflict between shareholders. *Journal of business ethics*, *97*(1), 71-86.

Bartling, B., Weber, R. A., & Yao, L. (2015). Do markets erode social responsibility?. *The Quarterly Journal of Economics*, *130*(1), 219-266.

Biddle, G. C., Hilary, G., & Verdi, R. S. (2009). How does financial reporting quality relate to investment efficiency?. *Journal of accounting and economics*, *48*(2-3), 112-131.

Boehmer, E., Jones, C. M., & Zhang, X. (2008). Which shorts are informed?. *The Journal of Finance*, *63*(2), 491-527.

Bound, J., Jaeger, D. A., & Baker, R. M. (1995). Problems with instrumental variables estimation when the correlation between the instruments and the endogenous explanatory variable is weak. *Journal of the American statistical association*, *90*(430), 443-450.

Caulkin, S. (2002). Good Thinking, Bad Practice. The Guardian (7th April). https://www.theguardian.com/business/2002/apr/07/madeleinebunting.theobserver

Chang, E. C., Luo, Y., & Ren, J. (2014). Short-selling, margin-trading, and price efficiency: Evidence from the Chinese market. *Journal of Banking & Finance*, *48*, 411-424.

Chang, E. C., Lin, T. C., & Ma, X. (2019). Does short-selling threat discipline managers in mergers and acquisitions decisions?. *Journal of Accounting and Economics*, *68*(1), 101223.

Chen, Y. C., Hung, M., & Wang, Y. (2018). The effect of mandatory CSR disclosure on firm profitability and social externalities: Evidence from China. *Journal of Accounting and Economics*, *65*(1), 169-190.

Chih, H. L., Shen, C. H., & Kang, F. C. (2008). Corporate social responsibility, investor protection, and earnings management: Some international evidence. *Journal of business ethics*, *79*(1), 179-198.

Choi, C. (2022, February 8). EXPLAINER: How China got blue skies in time for Olympics. Associated Press. https://apnews.com/article/winter-olympics-explainer-beijing-blue-skies-4707798bac96bdb68ad7250d450e902f

Dhaliwal, D. S., Radhakrishnan, S., Tsang, A., & Yang, Y. G. (2012). Nonfinancial disclosure and analyst forecast accuracy: International evidence on corporate social responsibility disclosure. *The Accounting Review*, 87(3), 723-759.

Dechow, P. M., Hutton, A. P., Meulbroek, L., & Sloan, R. G. (2001). Short-sellers, fundamental analysis, and stock returns. Journal of financial Economics, 61(1), 77-106.

Dechow, P. M., Sloan, R. G., & Sweeney, A. P. (1995). Detecting earnings management. Accounting review, 193-225.

Di Giuli, A., & Kostovetsky, L. (2014). Are red or blue companies more likely to go green? Politics and corporate social responsibility. *Journal of Financial Economics*, *111*(1), 158-180.

Dimson, E., Karakaş, O., & Li, X. (2015). Active ownership. The Review of Financial Studies, 28(12), 3225-3268.

Edmans, A. (2011). Does the stock market fully value intangibles? Employee satisfaction and equity prices. *Journal of Financial economics*, *101*(3), 621-640.

Fang, L., He, P., Tian, C., Yao, Y., & Chen, H. (2022). Beyond the ceremony: Mega-event, air quality and political career. *Plos one*, *17*(2), e0262470.

Fang, V. W., Huang, A. H., & Karpoff, J. M. (2016). Short selling and earnings management: A controlled experiment. *The Journal of Finance*, *71*(3), 1251-1294.

Ferrell, A., Liang, H., & Renneboog, L. (2016). Socially responsible firms. Journal of financial economics, 122(3), 585-606.

Friedman, M., (1970). The social responsibility of business is to increase its profits. New York Times, 122–126 September 13.

Gao, L., He, J., & Wu, J. (2018). Standing out from the crowd via corporate social responsibility: Evidence from non-fundamental-driven price pressure. Available at SSRN 2830742.

Gao, Y. (2011). Philanthropic disaster relief giving as a response to institutional pressure: Evidence from China. *Journal of Business Research*, *64*(12), 1377-1382.

Geller, R. J. (1997). Earthquake prediction: a critical review. Geophysical Journal International, 131(3), 425-450.

Glazer, A., & Konrad, K. A. (1996). A signaling explanation for charity. The American Economic Review, 86(4), 1019-1028.

Gompers, P., Ishii, J., & Metrick, A. (2003). Corporate governance and equity prices. *The quarterly journal of economics*, *118*(1), 107-156.

Hemingway, C. A., & Maclagan, P. W. (2004). Managers' personal values as drivers of corporate social responsibility. *Journal of business ethics*, *50*(1), 33-44.

Hoi, C. K., Wu, Q., & Zhang, H. (2013). Is corporate social responsibility (CSR) associated with tax avoidance? Evidence from irresponsible CSR activities. *The Accounting Review*, *88*(6), 2025-2059.

Hong, Y., & Andersen, M. L. (2011). The relationship between corporate social responsibility and earnings management: An exploratory study. *Journal of Business Ethics*, *104*(4), 461-471.

Hong, H., Kubik, J. D., & Scheinkman, J. A. (2012). *Financial constraints on corporate goodness* (No. w18476). National Bureau of Economic Research.

Jensen, M. C. (2001). Value maximization, stakeholder theory, and the corporate objective function. *Journal of applied corporate finance*, *14*(3), 8-21.

Jiang, F., Kim, K. A. (2020). Corporate Governance in China: A Survey. *Review of Finance*, 24(4), 733–772.

Jin, Y., Andersson, H., & Zhang, S. (2016). Air pollution control policies in China: a retrospective and prospects. *International journal of environmental research and public health*, *13*(12), 1219.

Karpoff, J. M., & Lou, X. (2010). Short sellers and financial misconduct. *The Journal of Finance*, 65(5), 1879-1913.

Kim, Y., Park, M. S., & Wier, B. (2012). Is earnings quality associated with corporate social responsibility?. *The accounting review,* 87(3), 761-796.

Knyazeva, A., Knyazeva, D., & Masulis, R. W. (2013). The supply of corporate directors and board independence. *The Review of Financial Studies*, *26*(6), 1561-1605.

Krüger, P. (2015). Corporate goodness and shareholder wealth. Journal of financial economics, 115(2), 304-329.

Leuz, C., Nanda, D., & Wysocki, P. D. (2003). Earnings management and investor protection: an international comparison. *Journal of financial economics*, *69*(3), 505-527.

Liang, H., & Renneboog, L. (2017). On the foundations of corporate social responsibility. The Journal of Finance, 72(2), 853-910.

Lin, L. W. (2010). Corporate social responsibility in China: Window dressing or structural change. *Berkeley J. Int'l L.*, *28*, 64.

Lin, L. W. (2020). Mandatory corporate social responsibility? Legislative innovation and judicial application in China. *The American Journal of Comparative Law*, *68*(3), 576-615.

Liu, J., Stambaugh, R. F., & Yuan, Y. (2019). Size and value in China. Journal of Financial Economics, 134(1), 48-69.

Lu, L. Y., Yu, Y., & Zhang, L. (2016). Short selling pressure and corporate social responsibility performance. Working Paper.

Lyu, H. M., Xu, Y. S., Cheng, W. C., & Arulrajah, A. (2018). Flooding hazards across southern China and prospective sustainability measures. *Sustainability*, *10*(5), 1682.

Manchiraju, H., & Rajgopal, S. (2017). Does corporate social responsibility (CSR) create shareholder value? Evidence from the Indian Companies Act 2013. *Journal of Accounting Research*, *55*(5), 1257-1300.

Masulis, R. W., & Reza, S. W. (2015). Agency problems of corporate philanthropy. *The Review of Financial Studies*, *28*(2), 592-636.

Petrenko, O. V., Aime, F., Ridge, J., & Hill, A. (2016). Corporate social responsibility or CEO narcissism? CSR motivations and organizational performance. *Strategic Management Journal*, *37*(2), 262-279.

Petrovits, C. M. (2006). Corporate-sponsored foundations and earnings management. *Journal of Accounting and Economics*, *41*(3), 335-362.

Prior, D., Surroca, J., & Tribó, J. A. (2008). Are socially responsible managers really ethical? Exploring the relationship between earnings management and corporate social responsibility. *Corporate governance: An international review*, *16*(3), 160-177.

Richardson, S. (2006). Over-investment of free cash flow. Review of accounting studies, 11(2-3), 159-189.

Spegele, B., Steinberg, J., & Yu, E. (2021) How Evergrande Grew and Grew, Despite Years of Red Flags. The Wall Street Journal, October 8, 2021.

Staiger, D., & Stock, J. H. (1997). Instrumental Variables Regression with Weak Instruments. *Econometrica*, *65*(3), 557-586.

Stock, J.H., & Yogo, M. (2005). Testing for Weak Instruments in Linear IV Regression. Ch. 5 In D.W.K. Andrews and J.H. Stock, eds. Identification and Inference for Econometric Models: Essays in Honor of Thomas J. Rothenberg. Cambridge University Press.

Strobl, E. (2012). The economic growth impact of natural disasters in developing countries: Evidence from hurricane strikes in the Central American and Caribbean regions. *Journal of Development economics*, *97*(1), 130-141.

Tirole, J. (2001). Corporate Governance. *Econometrica*, *69*(1), 1-35.

Wang, L., & Juslin, H. (2009). The impact of Chinese culture on corporate social responsibility: The harmony approach. *Journal of Business Ethics*, *88*(3), 433-451.

Yang, T., & Lau, S. T. (2006). Choice of foreign listing location: Experience of Chinese firms. *Pacific-Basin Finance Journal*, *14*(3), 311-326.

Table I: Summary Statistics

This table reports the summary statistics for a sample of Chinese public firms from 2010-2021. *Short Ratio* is the number of shares sold short divided by average shares outstanding; *CSR Score* is corporate social responsibility scores provided by Hexun.com; *Book/*Market is the book value of equity divided by market value of equity; *ROA* is net income divided by total assets*; Leverage* is book leverage, measured as total liability over total assets; *Total Assets* are book assets measured in millions of RMB; *Indep Directors* is the fraction of outside directors on a board; *Duality* is a dummy which equals one if the CEO and Chairman of the Board are the same person and zero otherwise; *Board Size* is measured as the number of directors on a board; *Ownership* is the percentage of stocks owned by the largest shareholder; *Ex Holding* is the percent of shares owned by executives.

Variables	Mean	Median	Std.Dev	Min	Max	Obs
Short Ratio (%)	1.29	0.44	2.24	0.00	13.76	9859
CSR Score	27.13	23.97	18.18	-18.45	90.87	8233
Book/Market	0.55	0.44	0.40	0.04	1.75	9803
ROA	0.05	0.04	0.07	-0.23	0.30	9803
Leverage	0.47	0.48	0.20	0.05	0.94	9803
Total Assets	34,117	10,657	74,800	270	506,393	9803
Indep Directors	0.38	0.36	0.06	0.18	0.57	9803
Duality	0.22	0.00	0.42	0.00	1.00	9621
Board Size	8.86	9.00	1.89	3.00	18.00	9803
Ownership (%)	34.77	32.43	15.71	8.57	74.89	9803
Ex Holding	0.03	0.00	0.09	0.00	0.59	9359

Table II: CSR and short sale: main results

This table reports the pooled OLS (Columns (1)), random effects (RE) GLS (Columns (2)), and firm fixed effects (FE) (Columns (3), (4) and (5)) regressions of short sales on the CSR score. NSOE (SOE) is the subsample of non-stated-owned enterprises (state-owned enterprises). The sample period is 2010-2021. The dependent variable is *Short Ratio*$_{t+1}$, which is measured as the number of shares sold short divided by average shares outstanding (multiplied by 100); *CSR Score* is corporate social responsibility scores provided by Hexun.com; *Book/Market* is the book value of equity divided by market value of equity; *ROA* is net income divided by total assets; *Leverage* is book leverage, measured as total liability over total assets; *Total Assets* are book assets measured in millions of RMB; *Indep Directors* is the fraction of outside directors on a board; *Duality* is a dummy which equals one if the CEO and Chairman of the Board are the same person and zero otherwise; *Board Size* is measured as the number of directors on a board; *Ownership* is the percentage of stocks owned by the largest shareholder; *Ex Holding* is the percent of shares owned by executives; *SOE* is a dummy which equals one if a firm is state-owned, zero otherwise. Robust standard errors that are clustered at the firm level are in parenthesis. *, **, and *** mark statistical significance at the 10%, 5% and 1% levels, respectively.

	Pooled	Random	Firm Fixed Effects		
	OLS	Effects	Full sample	NSOE	SOE
VARIABLES	(1)	(2)	(3)	(4)	(5)
CSR Score	0.013***	0.013***	0.012***	0.014***	0.009***
	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)
Book/Market	-1.370***	-1.387***	-1.528***	-1.490***	-1.513***
	(0.104)	(0.097)	(0.151)	(0.236)	(0.205)
ROA	-0.019***	-0.018***	-0.016***	-1.732***	-0.274
	(0.004)	(0.004)	(0.005)	(0.597)	(0.950)
Leverage	-1.044***	-1.038***	-0.884**	-0.690	-1.203*
	(0.220)	(0.202)	(0.370)	(0.421)	(0.636)
Ln(total assets)	0.595***	0.597***	0.726***	0.618***	0.606***
	(0.044)	(0.043)	(0.137)	(0.206)	(0.168)
Indep Directors	0.899	0.953*	1.112	-0.437	2.580**
	(0.557)	(0.528)	(0.932)	(1.251)	(1.152)
Duality	-0.002	0.007	0.073	0.164	-0.074
	(0.069)	(0.064)	(0.092)	(0.110)	(0.153)
Board Size	0.060***	0.056***	0.030	0.017	0.042
	(0.023)	(0.021)	(0.043)	(0.053)	(0.057)
Ownership	-0.017***	-0.016***	-0.021***	-0.022***	-0.007
	(0.002)	(0.002)	(0.007)	(0.008)	(0.010)
Ex holding	0.442	0.307	-1.174	-0.590	-3.374
	(0.312)	(0.299)	(0.910)	(0.926)	(4.902)
SOE	0.353***	0.346***			
	(0.071)	(0.066)			
Constant	-5.316***	-5.518***	-6.408***	-4.948***	-6.327***
	(0.501)	(0.477)	(1.182)	(1.578)	(1.555)
Firm	No	No	Yes	Yes	Yes
Industry	Yes	Yes	No	No	No
Year	Yes	Yes	Yes	Yes	Yes
Observations	8,976	8,976	8,976	4,773	4,203
R-squared	0.307		0.318	0.255	0.383

Table III: Analysis of CSR Subcategories

This table reports firm fixed-effects results for each of the five CSR subcategories: *investor responsibility*, *employee responsibility*, *supplier and consumer responsibility*, *environmental responsibility,* and *social responsibility*. The dependent variable for all regressions is *Short Ratio*$_{t+1}$, which is measured as the number of shares sold short divided by the average shares outstanding (multiplied by 100). The sample period is 2010-2021. *CSR (shareholder), CSR (employee), CSR (S&C), CSR (environment), and CSR (social)* represent CSR scores for the *shareholder responsibility*, *employee responsibility*, *supplier and consumer responsibility*, *environmental responsibility*, and *social responsibility* subcategories, respectively. All regressions include controls as in Table II. CSR scores are from Hexun.com. Robust standard errors that are clustered at the firm level are in parenthesis. *, **, and *** mark statistical significance at the 10%, 5% and 1% levels, respectively.

VARIABLES	(1)	(2)	(3)	(4)	(5)
CSR(shareholder)	0.003				
	(0.007)				
CSR(employee)		0.060***			
		(0.011)			
CSR(S&C)			0.043***		
			(0.007)		
CSR(environment)				0.034***	
				(0.006)	
CSR(social)					0.005
					(0.006)
Constant	-6.405***	-6.300***	-6.562***	-6.375***	-6.409***
	(1.184)	(1.177)	(1.186)	(1.183)	(1.183)
Controls	Yes	Yes	Yes	Yes	Yes
Firm Controls	Yes	Yes	Yes	Yes	Yes
Observations	8,976	8,976	8,976	8,976	8,976
R-squared	0.313	0.319	0.320	0.318	0.314

Table IV: Estimation based on instrumental variables.

This table presents the two-stage least squares (2SLS) regression analysis estimating equations (2) and (3) on the relationship between CSR and short sales. The sample consists of Chinese public firms that are covered by Hexun and are eligible for selling short during the period 2010-2021. In Panel A, the first-stage estimation of equation (3) is presented, using the first-stage instruments to obtain the predicted value of the CSR score. In estimation of the first-stage equation (3), four related instrumental variables are considered: number of deaths from natural hazards (*ln(natural hazards)*), number of deaths from geologic hazards (*ln(geologic hazards)*), number of deaths from earthquakes(*ln(earthquake)*), and the total number of deaths from four types of disasters: natural hazards, geologic hazards, earthquakes, and forest fires (*ln(total deaths)*). In Panel B, the estimation of the second-stage structural equation (2) is presented, using the predicted values of CSR score from the first-stage regressions. Columns (1), (2), (3) and (4) are the results based on the instrumental variable of death toll from natural hazards, geologic hazards, earthquakes and total deaths from all disasters, respectively. In Columns (1) and (2) of Panel C, the IV is a dummy (*Member*) which equals 1 if a firm is in the "Corporate Governance Sector", has stocks listed overseas (Shanghai Stock Exchange), or is on the list of the "Shenzhen 100 Index" (Shenzhen Stock Exchange). In Columns (3) and (4), the annual industry average of CSR scores (excluding the firm under consideration) is used as IV for CSR score (*CSR(Ind)*). The dependent variable is *Short* $Ratio_{t+1}$, which is measured as the number of shares sold short divided by average shares outstanding (multiplied by 100); *CSR Score* is corporate social responsibility scores, available at Hexun.com; *Book/Market* is the book value of equity divided by market value of equity; *ROA* is net income divided by total assets; *Leverage* is book leverage, measured as total liability over total assets; *Total Assets* are book assets measured in millions of RMB; *Indep Directors* is the fraction of outside directors on a board; *Duality* is a dummy which equals one if the CEO and Chairman of the Board are the same person and zero otherwise; *Board Size* is measured as the number of directors on a board; *Ownership* is the percentage of stocks owned by the largest shareholder; *Ex Holding* is the percent of shares owned by executives; *SOE* is a dummy which equals one if a firm is state-owned, and zero otherwise. Panel A and C also presents the partial F-statistic on the instrument. Robust standard errors that are clustered at the firm level are in parenthesis. *, **, and *** mark statistical significance at the 10%, 5% and 1% levels, respectively.

Panel A: First-stage regressions, predicting CSR score

	Dependent Variable: CSR score			
VARIABLES	(1)	(2)	(3)	(4)
Ln(natural hazards)	11.598***			
	(0.415)			
Ln(geologic hazards)		8.748***		
		(0.330)		
Ln(earthquake)			1.415***	
			(0.085)	
Ln(total deaths)				9.635***
				(0.356)
Book/Market	0.774	0.898	-1.807**	0.673
	(0.734)	(0.761)	(0.781)	(0.743)
ROA	87.590***	89.923***	91.417***	88.163***
	(3.158)	(3.183)	(3.292)	(3.166)
Leverage	-7.250***	-5.805***	-5.595***	-6.928***
	(1.430)	(1.441)	(1.488)	(1.434)
Ln(total assets)	3.200***	2.802***	3.066***	3.117***
	(0.251)	(0.254)	(0.262)	(0.252)
Indep Directors	5.841	7.248	9.740*	6.475
	(4.929)	(5.012)	(5.178)	(4.954)
Duality	0.840	0.855	0.853	0.843
	(0.579)	(0.590)	(0.614)	(0.582)
Board Size	0.288*	0.380**	0.530***	0.320*
	(0.166)	(0.168)	(0.173)	(0.167)
Ownership	0.018	0.027	0.029	0.020
	(0.017)	(0.018)	(0.018)	(0.017)
Ex Holding	-4.518**	-4.866**	-7.434***	-4.767**
	(2.298)	(2.327)	(2.401)	(2.305)
SOE	2.080***	2.226***	2.884***	2.152***
	(0.574)	(0.581)	(0.597)	(0.576)
Constant	-95.916***	-61.672***	-21.949***	-84.568***
	(4.369)	(3.894)	(3.806)	(4.220)
Industry	Yes	Yes	Yes	Yes
Observations	8,976	8,976	8,976	8,976
F-statistics	782.95	701.49	274.33	732.64

Panel B: Second-stage regressions

	Dependent Variable: Short Ratio			
	(1)	(2)	(3)	(4)
VARIABLES	natural hazards	geologic hazards	earthquake	total
CSR Score	0.065***	0.042***	0.220***	0.075***
	(0.005)	(0.004)	(0.015)	(0.005)
Book/Market	-0.949***	-1.030***	-0.407**	-0.915***
	(0.094)	(0.093)	(0.186)	(0.097)
ROA	-5.775***	-3.572***	-20.444***	-6.696***
	(0.604)	(0.561)	(1.589)	(0.648)
Leverage	-0.135	-0.224	0.456	-0.098
	(0.218)	(0.211)	(0.370)	(0.222)
Ln(total assets)	0.240***	0.306***	-0.200**	0.213***
	(0.040)	(0.039)	(0.078)	(0.042)
Indep Directors	0.521	0.802	-1.354	0.403
	(0.601)	(0.575)	(1.193)	(0.620)
Duality	-0.037	-0.018	-0.163	-0.045
	(0.071)	(0.070)	(0.133)	(0.072)
Board Size	0.056**	0.072***	-0.055	0.049**
	(0.024)	(0.024)	(0.042)	(0.025)
Ownership	-0.014***	-0.013***	-0.021***	-0.015***
	(0.002)	(0.002)	(0.004)	(0.002)
Ex Holding	0.901***	0.682**	2.358***	0.992***
	(0.329)	(0.330)	(0.544)	(0.333)
SOE	0.192***	0.271***	-0.332**	0.159**
	(0.074)	(0.072)	(0.143)	(0.076)
Constant	-1.789***	-2.239***	1.206	-1.601***
	(0.483)	(0.466)	(0.952)	(0.500)
Industry	Yes	Yes	Yes	Yes
Observations	8,976	8,976	8,976	8,976

Panel C: Alternative IV for CSR score

	(1)	(1)	(1)	(1)
VARIABLES	1st stage	2nd stage	1st stage	2nd stage
Member	11.203***			
	(0.533)			
CSR (Ind)			1.700***	
			(0.063)	
CSR Score		0.038***		0.040***
		(0.007)		(0.004)
Book/Market	0.588	-1.390***	-0.907	-1.038***
	(0.713)	(0.106)	(0.684)	(0.089)
ROA	76.839***	-3.885***	79.791***	-3.343***
	(2.831)	(0.668)	(3.162)	(0.535)
Leverage	-7.309***	-0.797***	-9.620***	-0.234
	(1.318)	(0.228)	(1.479)	(0.210)
Ln(total assets)	1.881***	0.500***	3.909***	0.313***
	(0.253)	(0.052)	(0.256)	(0.037)
Indep Directors	-3.511	0.931*	1.344	0.832
	(4.181)	(0.554)	(4.847)	(0.569)
Duality	0.603	-0.020	0.678	-0.016
	(0.486)	(0.068)	(0.572)	(0.070)
Board Size	-0.098	0.061***	0.103	0.074***
	(0.137)	(0.023)	(0.164)	(0.024)
Ownership	0.016	-0.017***	0.005	-0.013***
	(0.015)	(0.002)	(0.017)	(0.002)
Ex Holding	-2.283	0.514*	-3.779*	0.659**
	(2.092)	(0.309)	(2.268)	(0.329)
SOE	0.107	0.315***	1.970***	0.279***
	(0.496)	(0.071)	(0.573)	(0.072)
Constant	15.197***	-5.392***	-43.792***	-2.285***
	(3.279)	(0.498)	(3.679)	(0.451)
Industry	Yes	Yes	Yes	Yes
Year	Yes	Yes	No	No
Observations	8,976	8,976	8,976	8,976
F-statistics	441.34		721.64	

Table V: Using international events hosted in Chinese cities as a quasi-natural experiment

This table presents regression results using international events hosted in Chinese cities as an exogenous shock. The dependent variable is *Short Ratio*$_{t+1}$, which is measured as the number of shares sold short divided by the average shares outstanding (multiplied by 100); Column (1) and (2) present two cases: Wuhan and Hangzhou. Column (1) consists of all public firms headquartered in Wuhan for 2018 and 2019; *After*$_{2019}$ is a dummy variable which equals one for the event year 2019, and zero otherwise; In Column (2), the sample is all public firms headquartered in Hangzhou for 2015 and 2016; *After*$_{2016}$ is a dummy variable which equals one for the event year 2016, and zero otherwise; Column (3) presents the difference-in-differences (DiD) regression analysis estimating equation (4). The sample consists of Chinese public firms that are eligible for selling short during 2010-2021. *Treat* is a dummy variable which equals one if a firm is located in the host city in event year *t*, and zero otherwise; *Book/Market* is the book value of equity divided by market value of equity; *ROA* is net income divided by total assets; *Leverage* is book leverage, measured as total liability over total assets; *Total Assets* are book assets measured in millions of RMB; *Indep Directors* is the fraction of outside directors on a board; *Board Size* is measured as the number of directors on a board; *Ownership* is the percentage of stocks owned by the largest shareholder; Robust standard errors that are clustered at the firm level are in parenthesis. *, **, and *** mark statistical significance at the 10%, 5% and 1% levels, respectively.

VARIABLES	(1) Wuhan	(2) Hangzhou	(3) All
$After_{2019}$	1.267**		
	(0.611)		
$After_{2016}$		0.215**	
		(0.093)	
Treat			0.129*
			(0.076)
Book/Market	-2.189	-0.270	-1.321***
	(2.173)	(0.697)	(0.140)
ROA	-0.164**	-0.009	-0.007
	(0.075)	(0.013)	(0.006)
Leverage	-9.812*	0.564	-0.801*
	(5.115)	(0.638)	(0.435)
Ln(total assets)	1.254	0.012	0.594***
	(2.626)	(0.543)	(0.147)
Indep Directors	-55.351	-0.105	0.805
	(32.531)	(3.132)	(0.979)
Board Size	-3.143*	0.106	0.011
	(1.589)	(0.063)	(0.044)
Ownership	0.211	0.016	-0.021***
	(0.268)	(0.016)	(0.007)
Constant	37.623	-1.555	-4.404***
	(39.818)	(4.242)	(1.327)
Firm	Yes	Yes	Yes
Year	No	No	Yes
Observations	41	52	8,095
R-squared	0.735	0.472	0.357

Table VI: Corporate Social Responsibility and Earnings Management

This table reports the regression results of corporate social responsibility on earnings management (EM) during 2010-2021, using OLS (columns (1)), firm fixed-effects (column (2)), and instrumental variable (Column (3)), where the instrument is a dummy variable which equals 1 if a firm is included in the "Corporate Governance Sector," has stocks listed overseas (Shanghai Stock Exchange or SSE), or is on the list of the "Shenzhen 100 Index". Column (4) is estimated using firm fixed-effects on the expanded sample where the restriction on the availability of short sale data is removed. Earnings management is measured as discretionary accruals using the modified Jones model (Dechow et al., 1995). All the independent variables are lagged by one year. *CSR Score* is corporate social responsibility scores provided by Hexun.com; *Total Assets* are book assets measured in millions of RMB; *Leverage* is book leverage, measured as total liability over total assets; *Market-to-book* is market value of equity divided by book value of equity; *ROA(adj)* is industry-adjusted ROA; *Indep Directors* is the fraction of outside directors on a board; *Duality* is a dummy which equals one if the CEO and Chairman of the Board are the same person and zero otherwise; *Ex Holding* is the percent of stocks owned by executives; *Ownership* is the percentage of stocks owned by the largest shareholder; *Big 4* is a dummy variable which equals one if the firm is audited by a Big 4 auditor, zero otherwise; *SOE* is a dummy which equals one if a firm is state-owned, zero otherwise. Robust standard errors that are clustered at the firm level are in parenthesis. *, **, and *** mark statistical significance at the 10%, 5% and 1% levels, respectively.

	OLS	FE	IV	FE
VARIABLES	(1)	(2)	(3)	(4)
CSR Score	0.049***	0.038***	0.061*	0.074***
	(0.010)	(0.012)	(0.031)	(0.008)
Ln(total assets)	0.210	-1.051	0.155	0.297
	(0.158)	(0.814)	(0.220)	(0.335)
Leverage	-2.002**	4.316	-1.705	2.014*
	(0.968)	(3.414)	(1.296)	(1.205)
Market-to-book	0.162**	0.199	0.157**	0.240***
	(0.075)	(0.134)	(0.075)	(0.062)
ROA(adj)	-0.548	-1.226	-0.665	-0.655
	(2.943)	(3.061)	(2.959)	(2.255)
Indep Directors	-2.797	-1.526	-2.724	0.456
	(2.212)	(4.375)	(2.217)	(2.875)
Duality	-0.146	-0.161	-0.147	0.189
	(0.326)	(0.595)	(0.326)	(0.354)
Ex Holding	2.019	3.635	1.984	-1.056
	(1.935)	(4.832)	(1.927)	(1.624)
Ownership	0.007	0.019	0.006	0.065***
	(0.009)	(0.047)	(0.010)	(0.019)
Big 4	-0.816*		-0.836*	
	(0.428)		(0.437)	
SOE	0.116		0.112	
	(0.292)		(0.291)	
Firm Age	-0.005		-0.006	
	(0.026)		(0.027)	
Constant	4.532	13.586*	4.413	-7.359**
	(2.975)	(7.304)	(2.971)	(2.950)
Industry	Yes	No	Yes	No
Firm	No	Yes	No	Yes
Year	Yes	Yes	Yes	Yes
Observations	7,526	7,526	7,526	25,540
R-squared	0.029	0.023	0.029	0.010

Table VII: Corporate Social Responsibility and Investment Distortion

This table reports the multinomial logistic regression of investment distortion on corporate social responsibility during 2010-2021. Investment distortion is measured as the regression residuals from the following investment model as in Biddle et al. (2009).

$$investment_{i,t+1} = \beta_0 + \beta_1 sales\ growth_{it} + \varepsilon_{i,t+1}$$

Residuals are sorted into quartiles for each industry year. The top (bottom) quartile is defined as overinvestment (underinvestment), with middle quartiles serving as the benchmark. The dependent variable is a categorical variable that equals zero if the residuals are in the middle quartiles, one if in the top quartile (overinvestment group) and two if in the bottom quartile (underinvestment group). This model is estimated using the restricted sample (Columns (1) and (2)) and the expanded sample where the restriction on the availability of short sale data is removed (Columns (3) and (4)). *CSR Score* is corporate social responsibility scores provided by Hexun.com; *IO* is the percent of shares owned by institutional investors; *Total Assets* are book assets measured in millions of RMB; *Tangibility* is measured as fixed assets divided by total assets; *Slack* is the ratio of cash and cash equivalents over fixed assets; *Indep Directors* is the fraction of outside directors on a board; *Duality* is a dummy which equals one if the CEO and Chairman of the Board are the same person and zero otherwise; *Ownership* is the percentage of stocks owned by the largest shareholder; *SOE* is a dummy which equals one if a firm is state-owned, zero otherwise. All independent variables are measured with one-year lag. Standard errors are in parenthesis. *, **, and *** mark statistical significance at the 10%, 5% and 1% levels, respectively.

	Main Sample		All Firms	
	Overinvest	Underinvest	Overinvest	Underinvest
VARIABLES	(1)	(2)	(3)	(4)
CSR Score	0.005**	-0.015***	0.007***	-0.019***
	(0.002)	(0.002)	(0.001)	(0.001)
IO	-0.179	-0.413**	-0.204***	0.354***
	(0.179)	(0.180)	(0.075)	(0.078)
Book/Market	-1.225***	0.581***	-1.186***	0.273***
	(0.115)	(0.103)	(0.073)	(0.064)
Ln(total assets)	0.158***	-0.239***	0.037**	-0.157***
	(0.032)	(0.033)	(0.017)	(0.017)
Tangibility	3.017***	-1.110***	2.076***	-0.604***
	(0.221)	(0.228)	(0.118)	(0.119)
Slack	-0.008**	0.013***	-0.001	0.009***
	(0.004)	(0.003)	(0.002)	(0.001)
Indep Directors	0.640	0.738	0.504*	0.854***
	(0.531)	(0.517)	(0.289)	(0.286)
Duality	0.123*	0.112	0.185***	-0.118***
	(0.074)	(0.074)	(0.034)	(0.036)
Ownership	-0.003	0.002	0.005***	-0.006***
	(0.002)	(0.002)	(0.001)	(0.001)
SOE	-0.543***	0.243***	-0.633***	0.364***
	(0.069)	(0.065)	(0.040)	(0.036)
Constant	-3.054***	1.422**	-1.739***	0.464**
	(0.538)	(0.561)	(0.214)	(0.207)
Industry	Yes		Yes	
Year	Yes		Yes	
Observations	7686		27542	

Appendix A: Construction of the CSR score by Hexun

Shareholder responsibility (30%)	Profitability (10%)	ROE (2%) ROA (2%) Profit Margin (2%) Net income/total cost (1%) EPS (2%) Retained earnings per share (1%)
	Obligation (3%)	Quick Ratio (0.5%) Current Ratio (0.5%) Cash（0.5%) Equity/assets (0.5%) Liability/assets (1%)
	Return (8%)	Dividend payout/equity financing (2%) Dividend yield (3%) Dividend payout/retained earnings (3%)
	Information disclosure (5%)	Number of times fined by Exchanges (5%)
	Innovation (4%)	Development Cost (1%) Innovation initiatives (1%) Number of innovative projects (2%)
Employee Responsibility（15%）	Employee performance (5%)	Average employee wages (4%) Employee training (1%)
	Safety (5%)	Safety inspection (2%) Safety training (3%)
	Employee care (5%)	Employee visiting (1%) Visiting person (2%) Money paid during visit (2%)
Supplier, client and consumer responsibility (15%)	Product quality (7%)	Quality control consciousness (3%) Quality management system certification (4%)
	Product support (3%) Honesty and reciprocity (5%)	Survey on customer satisfaction (3%) Supplier fair play (3%) Training on anti-business bribe (2%)
Environmental responsibility (20%)	Environment protection (20%)	Environment protection consciousness (2%) Environment management system certification (3%) Investment in environment protection（5%) Number of pollution types (5%) Type of resources saved (5%)
Social responsibility (20%)	Contribution (20%)	income tax/net income (10%) Charitable donation (10%)

Source: http://stock.hexun.com/2013-09-10/157898839.html

Appendix B: Variable Definitions

Variables	Definition	Source
CSR Score	Corporate social responsibility score	hexun.com
CSR(shareholder)	CSR Scores for shareholder responsibility subcategory	hexun.com
CSR(employee)	CSR Scores for employee responsibility subcategory	hexun.com
CSR(S&C)	CSR Scores for suppliers and customers responsibility subcategory	hexun.com
CSR(environmental)	CSR Scores for environment responsibility subcategory	hexun.com
CSR(social)	CSR Scores for social responsibility subcategory	hexun.com
Short Ratio	The number of shares sold short divided by average shares outstanding	WIND
Book/Market	book value of equity divided by market value of equity	CSMAR
ROA	Net income divided by total assets	CSMAR
Leverage	Total liability over total assets	CSMAR
Total Assets	Total book assets	CSMAR
Indep Directors	Fraction of independent directors	CSMAR
Duality	A dummy variable that equals one if CEO and Chairman are the same	CSMAR
Ex Holding	Percent of stocks owned by executives	CSMAR
Ownership	Percentage of stocks owned by the largest shareholder	CSMAR
IO	Percent of stock owned by institutional investors	WIND
Tangibility	Fixed assets divided by total assets	CSMAR
Slack	Cash and cash equivalents divided by total assets	CSMAR
Big 4	A dummy variable that equals one if the firm is audited by a Big 4 auditor	CSMAR
SOE	A dummy variable that equals one if the firm is a state-owned enterprise	CSMAR

Appendix C: Number of deaths caused by disasters

year	natural disaster	geologic hazard	forest fire	earthquake
2010	6541	2244	65	2705
2011	1014	244	45	32
2012	1530	293		86
2013	2284	482		294
2014	1818	360		623
2015	967	226		30
2016	1706	362		1
2017	979	329		38
2018	589	105		0
2019	909	211		17
2020	591	117		5

Data Source: Chinese National Bureau of Statistics

Appendix D: International Events Held in China from 2010 to 2020

Event	Year	City	Province
The Fifth Ministerial Conference of the Forum on China-Africa Cooperation	2012	Beijing	Beijing
APEC Ministerial Meeting	2014	Beijing	Beijing
The 2015 IAAF World Championships	2015	Beijing	Beijing
The First Belt and Road Forum for International Cooperation	2017	Beijing	Beijing
The Second Belt and Road Forum for International Cooperation	2019	Beijing	Beijing
Beijing International Horticultural Exhibition	2019	Beijing	Beijing
The Conference on Dialogue of Asian Civilizations	2019	Beijing	Beijing
The BRICS Summit	2017	Xiamen	Fujian
The 16th Asian Games	2010	Guangzhou	Guangdong
The 26th Summer Universiade	2011	Shenzhen	Guangdong
Tangshan International Horticultural Exhibition	2016	Tangshan	Hebei
The 7th CISM Military World Games	2019	Wuhan	Hubei
The 2014 Summer Youth Olympic Games	2014	Nanjing	Jiangsu
The Qingdao International Horticultural Exhibition	2014	Qingdao	Shandong
The Shanghai Cooperation Organization Summit	2018	Qingdao	Shandong
The Xi'an International Horticultural Exhibition	2011	Xi'an	Shanxi
The World Exposition 2010 Shanghai China	2010	Shanghai	Shanghai
The 1st China International Import Expo	2018	Shanghai	Shanghai
The 2nd China International Import Expo	2019	Shanghai	Shanghai
The 3rd China International Import Expo	2020	Shanghai	Shanghai
The 2016 G20 Summit	2016	Hangzhou	Zhejiang

Appendix E: Using Tobin's q as proxy for investment opportunity

This table reports the multinomial logistic regression of investment distortion on corporate social responsibility during 2010-2021. Investment distortion is measured as the regression residuals from the following investment model:

$$investment_{i,t+1} = \beta_0 + \beta_1 Q_{it} + \varepsilon_{i,t+1}$$

Q_{it} is Tobin's q, calculated as the market value of total assets over the book value of total assets for firm i in year t. Residuals are sorted into quartiles for each industry year. The top (bottom) quartile is defined as overinvestment (underinvestment), with middle quartiles serving as the benchmark. The dependent variable is a categorical variable which equals zero if the residuals are in the middle quartiles, one if in the top quartile (overinvestment group) and two if in the bottom quartile (underinvestment group). The Main sample is restricted by the availability of short sale data. The control variables are the same as those in Table VII. All independent variables are measured with one-year lag. Standard errors are in parenthesis. *, **, and *** mark statistical significance at the 10%, 5% and 1% levels, respectively.

	Main Sample		All Firms	
	Overinvest	Underinvest	Overinvest	Underinvest
VARIABLES	(1)	(2)	(3)	(4)
CSR Score	0.004**	-0.009***	0.006***	-0.013***
	(0.002)	(0.002)	(0.001)	(0.001)
Instown	0.012	0.150	-0.194**	0.587***
	(0.178)	(0.182)	(0.075)	(0.078)
Book/Market	-0.853***	-0.109	-0.713***	-0.548***
	(0.103)	(0.109)	(0.067)	(0.071)
Ln(total assets)	0.198***	-0.320***	0.059***	-0.264***
	(0.032)	(0.035)	(0.017)	(0.018)
Tangibility	2.951***	-1.425***	2.165***	-1.074***
	(0.215)	(0.246)	(0.115)	(0.126)
Slack	-0.011***	0.004*	-0.004**	0.005***
	(0.003)	(0.002)	(0.002)	(0.001)
Indep Directors	1.150**	1.489***	0.674**	1.235***
	(0.522)	(0.539)	(0.286)	(0.291)
Duality	0.075	0.162**	0.157***	-0.106***
	(0.074)	(0.074)	(0.034)	(0.036)
Ownership	-0.005**	-0.001	0.003***	-0.005***
	(0.002)	(0.002)	(0.001)	(0.001)
SOE	-0.563***	0.222***	-0.576***	0.341***
	(0.068)	(0.066)	(0.039)	(0.037)
Constant	-3.516***	1.805***	-1.908***	1.174***
	(0.528)	(0.572)	(0.211)	(0.212)
Industry	Yes		Yes	
Year	Yes		Yes	
Observation	7664		27447	