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The effects of reputational sanctions on culpable firms: Evidence from China's stock markets☆

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ABSTRACT

We examine an important yet understudied form of reputational sanction in China, namely public criticisms imposed on culpable firms by the Chinese stock exchanges from 2013 to 2018. We find significantly negative cumulative abnormal returns around the announcement date, and they were affected by several factors, including financing propensity, governance mechanism, and equity nature. However, the market reaction is significantly negative only for firms relying on external financing and non-state enterprises, and importantly, becomes insignificant in cases where the firm had self-exposed misconduct before the official announcement of public criticism. Further, we examine other effects of public criticism, finding that public criticism does not improve firms' long-term values, nor produce strong deterrence to change their behaviour. Overall, the evidence of the effects of public criticism on culpable firms is mixed, suggesting that reputational sanction is a weak, if not ineffective, instrument of market regulation in China.

1. Introduction

Governments in many jurisdictions face an important question to what extent reputational sanctions are effective in reducing information asymmetry and deterring fraud. The role of reputational sanctions, particularly in punishing financial misconduct, has been an important research topic in recent years. Existing studies on reputational sanctions, however, are mostly focused on developed economies such as the United States (U.S.) (Deng et al., 2015; Karpoff et al., 2008) and the United Kingdom (U.K.) (Armour et al., 2017). Hence, one of the leading scholars in this field has long called for empirical research into the efficacy of reputational sanctions in emerging markets, particularly where the formal legal protection is weak (Karpoff, 2012). Given the high incidence of corporate fraud in developing countries like China, there is a great need to strengthen the regulatory monitoring role and corporate governance in their specific economic climate (Dahya et al., 2003; Huang, 2013). China, with a comparatively underdeveloped legal system and an increasingly important securities market, thus offers an ideal setting to examine the role of reputational sanctions.

It has been argued that reputational mechanisms may have a larger role to play in jurisdictions such as China. Where the formal legal mechanisms are less developed, regulations may not be enforced or may be enforced selectively (Berkman et al., 2010). Hence, more reliance may have to be placed on reputational mechanisms in countries where the ability to use litigation is less available (Coffee, 2006a). Allen et al. (2005) also emphasize the role of reputational mechanisms in buttressing poorly developed formal governance institutions to support economic growth in China. However, China's unique political and institutional infrastructure may cast doubt on such a straightforward argument. At the core of the reputational mechanism lies the engagement and value-judgment of the relevant counterparties of the perpetrators. Arguably, due to the transitioning of social norms and the lack of a robust social credit system in China, reputational sanctions may not be able to function properly. Which side of the debate is closer to the

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real-world situation? Indeed, as an emerging and transition economy, China's experience has a lot to contribute to the international debate on the role of reputational sanctions.

In this paper, we choose to examine an important yet understudied form of reputational sanctions in China's stock market, namely public criticisms (also known as public censure) imposed by its two major stock exchanges in Shanghai and Shenzhen. This form of reputational sanction presents a very good opportunity to quantitatively measure the scale of reputational damage, due to its two unique features. Firstly, as a free-standing reputational sanction, public criticisms are usually imposed separately, without complicated entanglement with other types of legal enforcement. The stock exchanges tend not to use public criticisms in tandem with other types of sanctions, such as monetary sanctions (Huang, 2022). And importantly, public criticisms by stock exchanges will not be followed by private securities litigation brought by the aggrieved investors. In China, the bringing of private securities litigation generally requires a prior sanction from the governmental regulator, namely the China Securities Regulatory Commission (CSRC), and public criticisms cannot trigger private securities litigation (Huang, 2013, 2018). Moreover, if the CSRC has already imposed administrative penalties on a company, the exchanges will rarely follow up by criticizing the company, because under the so-called co-regulatory regime, the CSRC and the stock exchanges usually coordinate their regulatory activities to target different types of misconduct (Liebman and Milhaupt, 2008; Huang, 2022).

The above unique feature of public criticisms provides a significant advantage for measuring the reputational damage. There is no need to deal with the difficult tasks of estimating the future compensation resulting from possible private litigation, and then subtracting it (and exchange-imposed financial payments) from the market reaction to public criticisms (Huang, 2013). It thus avoids the methodological difficulty of distinguishing legal penalty from reputational penalty. By contrast, existing studies overseas mostly examine the formal enforcement of securities regulation by regulatory authorities such as the Securities and Exchange Commission (SEC) in the U.S. (Karpoff et al., 2008) and the Financial Services Authority (FSA) in the U.K. (Armour et al., 2017). As the formal enforcement usually involves monetary fines, those studies need to subtract them from the firm value impacts of relevant announcements made by the regulatory authorities. In the U.S. where securities class action is prevalent, there is a further need to subtract the class-action claims, which can be a very challenging task and brings uncertainty to the final result.

The second feature lies in the way in which public criticisms are announced. In China, the stock exchanges make only one public announcement when deciding to impose public criticism on the misbehaving firms. In the U.S., however, information about the SEC regulatory enforcement may stretch over an extended period with multiple announcements made at different stages, including the beginning, the evolution and the conclusion, of the investigation and enforcement action, and hence market-value impacts across the announcements need to be accumulated (Karpoff et al., 2008). Further, as will be shown later, in many cases, public criticisms are usually imposed after the firm self-exposed its misconduct. This means that the market would have already reacted to reflect the value readjustment effects, namely the price adjusting to the intrinsic value that the firm would have had without the occurrence of the misconduct. Hence, the price reaction to the announcement of public criticism can be a clean metric to measure the reputational damage. By contrast, as there is usually only one announcement of regulatory action made by the FSA in the U.K., the share price reaction to the announcement may be partly attributable to the value readjustment effects, and thus there is a need to deal with this difficult issue when measuring the reputational losses resulting from the regulatory announcement (Armour et al., 2017).

In sum, compared to the CSRC's enforcement action which usually combines monetary and reputational sanctions and may lead to private securities litigation, public criticisms by China's stock exchanges provide a better opportunity to measure the reputational damage to the criticized firm. We first use the event study methodology to calculate the market price effects of public criticisms in the short term. Exogenous to the firm's agenda, the announcements of public criticisms are revealed by the stock exchanges. Therefore, there is no self-selection nor optimization process made by the sanctioned companies, making it suitable for event study. We construct a unique dataset of all public criticisms announced by the two Chinese stock exchanges from 2013 to 2018. The results of the event study indicate, on average, statistically significant negative reactions to public criticisms.

In order to understand the channels through which reputational losses occur, we develop a cross-sectional model to explore the potential factors that affect the market reaction to public criticisms. This will be conducted through multi-variate regression analysis, using the market price effects of public criticisms as a dependent variable with relevant factors as independent variables. It is shown that reputational sanctions in China are more punitive for firms without state ownership. In addition, external auditors, the size of the supervisory board, and the seriousness of the violation also affect reputational losses.

However, further tests show that the significant negative market reaction to public criticism only appears in the firms relying on external financing and those not controlled by state ownership. Importantly, the market reaction is not significant in cases where the firm had already self-exposed misconduct before the announcement of public criticisms by the stock exchange. To have a more complete picture of the effectiveness of public criticism, we also examine other effects of public criticism, finding that it does not improve firms' long-term values, nor produce strong deterrence to change their behaviour. Hence, the overall evidence of the effects of public criticism on culpable firms is mixed.

The remainder of this article is organized as follows: Section II outlines the previous studies relevant to this paper and develops hypotheses. Information on the research design, data, models, and definitions of variables are presented in Section III. Section IV presents the empirical results of stock price effects, its determinant factors and other effects. and Section V concludes the paper.

2. Literature review and hypothesis

2.1. Measuring reputational damage

The role of reputational sanctions in deterring misconduct, relative to legal sanctions, has long been the subject of debate in the law and economics literature. There have been some conflicting studies on the existence and size of reputational costs to the sanctioned firm in the financial markets for various types of misconduct among different judications. For instance, Tanimura and Okamoto (2013) investigate the impact of corporate scandals in Japan and find the magnitude of reputational losses is large (stock price drops 5.1%) and significant. This is consistent with the belief that reputation and trust play a major role in Japanese society. By contrast, de Batz (2020) empirically examines the regulatory action by the French Financial Market Authority on sanctioned firms, finding no evidence of significant reputational damage. In the U.S., (Engelen, 2012) estimates the reputational costs of CEOs committing inside trading are equivalent to a 2.17% decline in stock prices. Karpoff et al. (2005) find that environmental violations are disciplined largely through legal and monetary penalties, but not through reputational penalties. On the contrary, Liu et al. (2020) argue that the existing environmental reputation of a firm plays an important role in determining the market returns upon environmental lawsuit filings. Haslem et al. (2017) prove the existence of reputational loss through indirect evidence such as sales and profit reduction, top manager turnover, a decline in institutional ownership, and an increase in the proportion of independent directors following the revelation of the relevant misconduct.

The above controversy stems from the intangible and multidimensional nature of reputational loss, which makes it difficult to directly

measure the magnitude of the reputational loss. One common way to calculate reputational loss is to deduct, from the total market value loss of the relevant firm, the components that are attributable to legal penalties and value re-adjustments. For example, financial misrepresentation is one common type of misconduct which normally causes a decline in share value. This value decline can be partly caused by value re-adjustments: after investors realize that they had been relying on incorrect financial information to forecast the firm's future cash flows, they will re-adjust their valuation of the firm on the basis of the true information. Thus, a portion of the negative market reaction can be the reversal of the share price inflation caused the false information disclosed previously. Karpoff et al. (2008) examined firms sanctioned by the SEC for financial misrepresentation, finding that 24.5% of the total market value losses of sanctioned firms reflects the value re-adjustment effect, 8.8% is attributable to legal penalties and the remaining 66.6% represents reputational losses. Similarly, Armour et al. (2017) report that sanctioned firms in the U.K. stock market suffer significant reputational losses, approximately nine times the fines actually paid.

As noted earlier, public criticisms imposed by China's stock exchanges provide a unique opportunity for measuring reputational damage. There have been some early studies in this area, but more research is needed. To start with, the existing studies simply calculate the cumulative abnormal returns (CARs) of Chinese listed firms subject to public criticisms, without properly considering whether, and if so, to what extent the CARs can be reflective of reputational loss. For instance, Chen (2005) examined various types of enforcement actions taken by the CSRC and the stock exchanges in China from 2001 to 2002, including public criticisms, reporting that criticised firms had a $1-2\%$ drop in their stock prices during a five-day window surrounding the event. Wan and Song (2012) examine the stock price effects of public criticisms over a longer period of $2005-2010$ in China, finding that only the criticisms imposed by the Shanghai Stock Exchange have significantly negative effects on stock prices. These studies, however, did not go further to investigate whether the stock price effects of public criticism can be treated as reputational loss.

Further, Liebman and Milhaupt (2008) conducted a more detailed examination of public criticisms imposed by China's stock exchanges from 2001 to 2006, evaluating its effectiveness as a form of reputational sanction. It finds that public criticisms produce significantly negative CARs and represent an effective mechanism of reputational sanction. This often-cited research makes a significant contribution to the literature on the effects of public criticisms in China's stock market, but suffers from several problems (Huang, 2022). For instance, it only selects those 'most serious' public criticisms, which would have the effect of inflating the CARs. Moreover, even for those most serious cases, the CARs may not be fully attributed to the effect of public criticism as a form of reputational sanction. In the cases where the misconduct is the failure to disclose material information or conduct related party transactions according to required procedures, the value of the firm would have been inflated before the exposure of misconduct. Hence, when measuring the price effects of public criticisms, there is a need to consider the value readjustment effects, namely the portion of the observed loss in share prices that may reflect an adjustment to the true value of the firm. Last but not least, the research is focused on stock price effects of public criticism, without paying adequate attention to other effects. In order to evaluate the effectiveness of public criticism in a more comprehensive way, we will fill the gap by going beyond stock price effects to examine other effects, particularly in relation to the operation and value of the criticised firm.

2.2. B. Hypotheses development

As discussed earlier, although reputational sanctions such as public criticisms may generally seem intangible and mild, they could have a larger role to play in jurisdictions like China where the formal legal institutions are less developed. Hence, we hypothesize that there is a "reputational loss" for the firms when they receive criticisms:

H1. : Companies suffer a loss in market value when publicly criticized by stock exchanges in China.

The reputational penalty is actually an aggregation of the penalties that stakeholders impose on the company through different channels on the corporate bottom line (Engelen, 2012). Good reputation can help firms to achieve high credit ratings which can in turn lower the cost of capital (Diamond, 1991).

In developing countries, the access to the financial markets is a crucial determinant for the growth and survival of firms. To ensure efficiency in resource allocation, regulators establish follow-on consequences, explicit or implicit, to a firm receiving a public criticism by a stock exchange in China (Huang, 2022). For instance, the CSRC issued a regulation to impose financing restrictions on companies that are subject to public criticisms in 2006. Specifically, if a listed company has been publicly criticized by a stock exchange in the past twelve months, it will not be permitted to publicly offer new securities. If a firm relies more on internal financing, it would care less about reputational sanctions. Conversely, firms with severe financial constraints will arguably be more sensitive to such sanctions, and thus reputational sanctions would have more impact on firms with higher demand for external funds. As the restriction on external financing would lead to the loss of profitable investment opportunities, we construct the following hypothesis:

H2. : Abnormal losses associated with the announcement of criticisms are larger for firms relying more on external financing.

Literature shows that state-owned enterprises (SOEs) receive preferential treatment from regulatory agencies (Liu et al., 2018). Even if SOEs are sanctioned by the regulators, the enforcement of the sanctions may not be rigorous due to their strong political clout. Berkman et al. (2010) examine the stock price effects of the promulgation of three laws that are intended to protect minority shareholders in the Chinese securities market, finding that companies with poorer corporate governance had more pronounced price effects, but the stock price of politically-connected companies did not react significantly, presumably because the market did not expect rigorous law enforcement against them.

Further, as a form of reputational sanction, public criticism works only when the sanctioned company relies on and thus values its reputational capital. The SOEs have political connections as their competitive advantages and are usually less reliant on reputational capital. In a sense, the SOEs get their reputational capital from their political connection and thus the effects of bad news such as regulatory sanctions on their share prices tend to be smaller (Chen, et al., 2005). Hence, reputational sanctions would have less deterrence for SOEs, and we hypothesize that.

H3. . Abnormal losses associated with the announcement of criticisms are smaller for SOEs.

External auditors are important gatekeepers in deterring corporate misconduct. The well-known Big 4 auditors are considered more effective gatekeepers than non-Big 4 auditors and therefore are rewarded with a fee premium. (Dye, 1993; Craswell et al., 1995). If an auditor fails to detect and report financial misstatements, investors can sue the auditor to recoup their investment losses. Thus, investors view the audit as a form of insurance protecting them from potential losses caused by erroneous or fraudulent financial reporting. However, it is largely left to reputation to compel auditors to prevent financial misstatements in jurisdictions where it is difficult for investors to sue and recover damages from auditors for their defective auditing work (Coffee, 2006b; Guedhami and Pittman, 2006).

Evidence shows that investors assign certain value to firms audited by credible auditors and this auditor-based value will evaporate if the auditor is later found to be less credible (Chaney and Philipich, 2002; He et al., 2016). When public criticism is imposed on a company which is

audited by Big 4 auditors, its reputational loss should reflect not only the value loss stemming from the company's own misbehavior, but also the value loss attributable to the failure of its auditor. Indeed, if a company audited by Big 4 auditors still receives public criticism, investors may lose more confidence in the company and become more pessimistic, fearing that even Big 4 auditors are not able to prevent the wrongdoings of the company and there is little hope of solving the issue by engaging a different auditor. Hence, assuming that Big 4 auditing is positively priced by investors (El Ghoul et al., 2016), we predict that.

H4. : Reputational loss is larger if criticized firms are audited by Big 4 accounting firms.

Although China has borrowed overseas experiences to establish its corporate and securities legal regimes, the institutional setting and corporate governance mechanisms in China remain quite different from those in other jurisdictions. For example, Chinese companies have a special governance system that incorporates features of both the Common-Law-style single board and the Civil-Law-style two-tier board. They thus have both a board of directors with independent directors and a supervisory board (Jia et al., 2009).

There is a longstanding debate in the literature over the efficacy of the supervisory board. For example, supervisory boards are perceived as dysfunctional in their monitoring roles (Guo, 2016) and unable to improve firm performance in China (Hu et al., 2010). Other studies, however, show the opposite evidence. It is found that larger and more active supervisory boards "improve the earnings-returns association, reduce absolute discretionary accruals, and have higher quality financial statements" (Firth et al., 2007, p. 493). Supervisors with an accounting or academic background play an active role to improve the quality of accounting information in Chinese firms (Ran et al., 2015). Dahya et al. (2003) show that investors value the supervisory board, and a company's failure to provide a supervisory board report in its 1998 annual report led to negative market reactions. Based on this line of literature, it would seem to follow that the smaller size the supervisory board is, the more likely the board of directors and senior managers are not effectively monitored. Hence, when misconduct is exposed, investors may be more disappointed, putting more blame on firms with a smaller size of supervisors, as they believe that the misconduct could have been prevented if the firm had adopted a larger supervisory board. We develop the following hypothesis that.

H5. Reputational loss is larger for firms with smaller supervisory boards.

3. Research methods

3.1. Event study design

This section explains how to use the standard event study to capture the abnormal movement of the stock price of listed firms when they receive public criticism from Shanghai and Shenzhen Stock Exchange. Fig. 1 demonstrates the standard estimation procedure. In the event study approach, the stock prices of a firm are explained by controlling for trends and volatility before the event, known as the estimation window. The period of interest for which we observe the event is known as the event window. The smallest event window is one day (Day '0'). Based on our interviews with relevant exchange officials, the announcement of public criticisms is normally made after the market is closed.[1] Therefore, public criticisms will not usually be reflected in the market price of the relevant stock on the day of the announcement, but rather on the following trading day. Hence, we choose the trading day immediately after the announcement day as Day '0' for the following analysis.

[1] Telephone Interviews with two stock exchange officials, 12 April 2020.

Through the estimation window (T0 to T1), we perform an ordinary least square (OLS) regression of R*i,t* on R*m,t* in the market model (model 1), where R*i,t* and R*m,t* are the returns on firm i's common stock on day t and the index of market returns[2] on day t, respectively.

$$R_{i,t} = \alpha_i + \beta_i R_{m,t} + \varepsilon_{i,t} \tag{1}$$

The next equation is to use the estimated intercept $\hat{\alpha}_i$ and the coefficient $\hat{\beta}_i$ from model 1 as a benchmark to calculate the normal return for each firm i on each day t during the event window (T1 to T2). The abnormal return for firm i on day t (AR*i,t*) is the difference between the firm's return and its estimated return.

$$AR_{i,t} = R_{i,t} - \alpha_i - \beta_i R_{m,t} \tag{2}$$

Following Liebman and Milhaupt (2008), we examine two event windows: a three-day event window (−1,1) and a five-day event window (−2,2) relative to the announcement day.[3] The average abnormal return for firms criticized each day t in the event window is computed as

$$AR_t = \frac{\sum_{i=1}^{N} AR_{i,t}}{N} \tag{3}$$

where N is the number of firms over which abnormal returns are averaged on day t. To exam whether each AR calculated in Eq. (3) is significantly different from 0, parametric t-statistics and nonparametric Wilcoxon signed-rank tests are calculated.

The abnormal return observations must be aggregated in order to draw overall inferences for the event of interest. The average cumulative abnormal return (CAR) is the sum of the abnormal returns over the event window (T1, T2). It is defined as

$$CAR(t_1, t_2) = \sum_{t=t_1}^{t_2} AR_t \tag{4}$$

The statistical significance of the CARs is tested using parametric t-tests and nonparametric Wilcoxon signed-rank tests. Returns relating to criticized firms and the market are inclusive of dividends. Firm daily returns and market daily returns are collected from the CSMAR[4] financial and trading database.

3.2. Specification of factors of reputational loss

As event study analysis reflects the combined effects of different channels, this section tries to disentangle some specific channels to the overall measured effect. To test H2-H5, we employ the cross-sectional multivariate regression analysis to examine the determinants of the reputational loss. As Eq. (5) shows below, the dependent variable is the reputational loss as defined in Eq. (4). For OLS regressions, dependent variables are three-day window *CAR[− 1,1]* and five-day window *CAR [− 2,2]*, respectively. Since negative *CAR[− 1,1]* and *CAR[− 2,2]* represent reputational loss, the independent variable with a positive coefficient is interpreted as decreasing the incidence of reputational loss.

$$\begin{aligned} CAR_i =& \alpha + \beta_1 EFin_{i,t-1} + \beta_2 SOE_{i,t-1} + \beta_3 Size_{i,t-1} + \beta_4 Big4_{i,t-1} \\ &+ \beta_5 Supervisory_{i,t-1} + \beta_6 Violations_{i,t} \end{aligned}$$

[2] We used the comprehensive index of A-shares, GEM and SME to control for the effect of market-related variation on a given stock return.

[3] The estimation window dates from − 250 to − 7 for the three-day event window and from − 250 to − 8 for the five-day event window, following Liebman and Milhaupt (2008)

[4] The CSMAR database, developed by GTA Information Technology, is widely regarded as one of the most comprehensive databases covering Chinese listed firms, and has been used in scholarly research published in leading journals. http://www.gtarsc.com/#/index

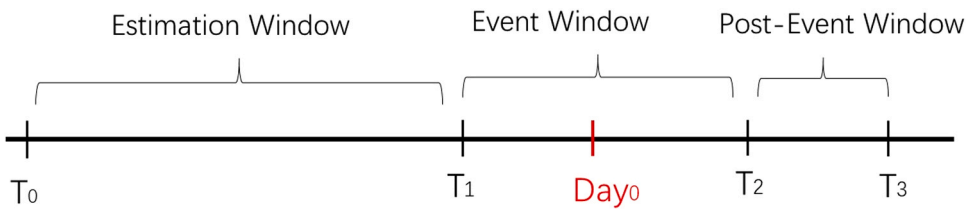

Fig. 1. Estimation procedure.

$$+\beta_7 IfCompany_{i,t}+\beta_8 Self_{i,t}+\beta_9 Market_i+\beta_{10-14} Industry+\beta_{15-19} Year \quad (5)$$

All independent variables associated with firms are measured at the previous fiscal year and variables about public criticisms are measured at the same year with the dependent variable. To test H2, we construct the main explanatory variable *EFin* which denotes high reliance on external financing. It equals 1 for firms whose cost of borrowing is above the yearly cross-sectional median and 0 otherwise. The cost of borrowing is calculated as the financial expense over total liabilities. Its coefficient β_1 indicates the relationship between reputational loss and the cost of external financing. If this coefficient > 0 and statistically significant, it will indicate that firms relying on borrowing will experience more loss on market value when criticized. In other words, public criticism incidence increases the difficulty of borrowing for firms relying on external financing, which is reasonably expected by investors.[5] To test H3, we include a dummy variable *SOE*, coded 1 if the criticized firm is a state-owned enterprise and 0 for private or foreign ownership. In this study, we test whether auditors' reputation affects the reputation of criticized firms, which literature provides scant support. In H4, we hypothesize that market loss would increase with the engagement with Big 4 auditors. *Big4* is a dummy variable with a value of one when the accounting firm is one of the Big Four (and zero otherwise) for the previous fiscal year before public criticisms. As H5 predicts, the larger size of the supervisory board, the more deterrence power and consequently less reputational loss. The variable *Supervisory* is the relative size of the supervisory board of a firm. It is the number of people in the supervisory board divided by the sum of board directors, managers, and supervisory board.

We also include a number of control variables. Investors may react more negatively to more serious violations. To measure the seriousness, we use the variable *Violations* which calculates the number of allegations listed by stock exchanges in their announcements to support the criticism decision. The variable *IfCompany* is a dummy variable equalling 1 if the listed firm is criticized and 0 if employees are criticized only. The dummy variable *Self* equalling 1 indicates that criticized firms have already self-disclosed violation facts before public criticisms and 0 otherwise. As larger firms normally are paid more attention by investors and are under greater scrutiny by regulators, we include the variable *Size* to control for its effect. *Size* is measured as the natural logarithm of market capitalization. To control for the potential institutional differences in Shanghai and Shenzhen markets, we add a dummy variable *Market* coded 1 for firms listed on the Shanghai Stock Exchange, and 0 for the Shenzhen Stock Exchange. Finally, we add year dummies into the regression and control for industry effect by clustering standard errors by industry.[6]

3.3. Data

The sample selection procedure is shown in Panel A of Table 1. The event data employed is a hand-collected dataset of public criticisms announced by Shanghai and Shenzhen Stock Exchange from 2013 to 2018. This research period is chosen for the following reasons. First, the existing studies mostly examine the regime for public criticism before 2013 (Liebman and Milhaupt, 2008; Wan and Song, 2012). As there have since been some new regulatory developments (Huang, 2022), it is important to examine the post-2013 period. Second, an influential earlier study covered a six-year research period from 2001 to 2006 (Liebman and Milhaupt, 2008), and to facilitate comparison, this paper similarly examines a six-year period of 2013–2018. Last but not least, the Shanghai Stock Exchange has only made post-2013 cases available on its website.

We use relevant keywords such as "Public Criticism (*qian ze*)" and "Sanction (*chu fen*)" to search for announcements of public criticisms on the websites of the two exchanges. The CSMAR database is used to complement the dataset, because the announcements do not contain some important information, particularly stock prices. As our study aims to measure the reputational damage caused by public criticisms through the abnormal movements of stock prices, we select public criticisms which were imposed upon publicly listed companies and/or their employees. Then, we exclude 76 cases in which the trading of the criticized company was suspended within the five-day window, there is a lack of sufficient observations for regression, or the company was also sanctioned by the CSRC.

As noted earlier, there is little overlap between the regulatory efforts of the stock exchanges and the CSRC, as they usually coordinate their regulatory activities to target different types of misconduct.[7] Out of the total 245 cases in our sample, there are only two cases where both the CSRC and the stock exchanges took action against the same company. We exclude these two cases to ensure that the share price effect of the public criticism will not be affected by the CSRC's regulatory sanction.

As Table 1 shows, the final sample size is 169, comprised of 67 observations from the Shanghai Stock Exchange and 102 observations from the Shenzhen Stock Exchange. Panel B shows the distribution of firms under the classification of financing propensity and six industry sectors. The majority of our sample firms are from the manufacturing sector (65.68%). Panel C lists the allegations for which firms were criticized according to the rules issued by the stock exchanges. Except for other serious circumstances as decided by the stock exchange (50.30%), failure to disclose major corporate matters is the major type of violation (20.78%), followed by inaccurate financial and accounting reports (9%) and disclosure problems with profit forecasts (8.39%).

4. Empirical results

4.1. A. The stock price effects of public criticism

The first step of event study is to calculate abnormal return (AR) which is the difference between the return of the day in the window and

[5] Investors may also take into consideration the impact on equity financing, which is more difficult to measure. We do not measure this separately in the regression, but the robustness check in section IV demonstrates that the variable *EFin* can reflect the overall cost of debt and equity financing.

[6] We classify industry into six groups: finance, utilities, properties, conglomerate, industrials and commerce, based on rules defined by CSMAR.

[7] Above Part I.

Table 1
Sample description.

Panel A: Sample selection process

	Year	SH	SZ	Total
	2013	5	8	13
	2014	12	9	21
	2015	9	22	31
	2016	10	30	40
	2017	20	40	60
	2018	34	46	80
	Total			245
Excluded	No sufficient data for regression			(40)
	Suspended in the event window			(34)
	Also sanctioned by the CSRC			(2)
	Total deduction			(76)
	Sample used			169

Panel B: Industry distribution

Sectors	Rely on internal financing (*EFin*=0)	Rely on external financing (*EFin*=1)	Total	Percentage (%)
Industrials	53	58	111	65.68%
Utilities	17	6	23	13.61%
Conglomerates	6	8	14	8.28%
Commerce	4	7	11	6.51%
Properties	3	4	7	4.14%
Finance	2	1	3	1.78%
Total	**86**	**85**	**169**	100.00%

Panel C: Frequency of allegations for public criticisms

Allegations for public criticisms	**Absolute count**	**Pct.**
1. **violation of disclosure rules**		
1.1 failure to disclose periodical reports on time	6	2.68%
1.2 disclosure problems with financial and accounting reports;	29	9.00%
1.3 disclosure problems with profit forecasts;	24	8.39%
1.4 disclosure problems with reports of major corporate matters, such as major transactions and related party transactions;	49	20.78%
2. **violation of operation rules**		
2.1 the controlling shareholder or actual controller misappropriates the company's funds;	16	5.87%
2.2 the company illegally provides guarantee for others;	6	0.89%
2.3 the company misuses the fund raised;	2	0.28%
2.4 the company fails to honor its major promises;	5	1.56%
2.5 the company illegally convenes or holds its shareholder meeting;	1	0.12%
2.6 the company refuses to cooperate with others to perform disclosure duties.	1	0.12%
3. **Discretionary circumstances**		0.00%
3.1 other serious circumstances as decided by the stock exchange	85	50.30%
Total		100%

Note: Panel A of Table 1 reports the number of cases criticized by the Shanghai Stock Exchange and the Shenzhen Stock Exchange over the year 2013–2018. The sample consists of 169 cases obtained after deleting 76 cases in which criticized firms are suspended in and around the event window, thus lacking sufficient data for regression. Panel B depicts the distribution of firms under the classification of financing propensity among six sectors. Panel C shows the frequency of allegations for public criticisms by stock exchanges.

predicted return based on the market model. Table 2 shows the average ARs, the associated t-statistics, and nonparametric z-statistics for the two groups with different financing propensity. For the group relying on internal funds (*EFin*=0), ARs are generally not significantly different from 0 except for AR(−2). Firms rely on external financing (*EFin*=1), on the contrary, have significant negative AR(−2), AR(−1), and AR(0). Importantly, on Day 0, the relevant companies experience the most negative impact, reflecting the practice that the announcements of public criticisms are usually made after the markets are closed.[8] The significant AR(−2) and AR(−1) imply a leakage of information one day before the official announcement to informed investors. It seems that investors do react to the announcement of public criticisms by quickly adjusting their investment decisions accordingly. The last column calculates the average ARs for all criticized firms, which show a similar trend to those firms relying on external financing. Overall, these results are consistent with H1 that firms generally experience negative returns when criticized by stock exchanges and H2 that the firms relying on external financing experience more negative returns.

The second step is to calculate cumulative abnormal returns (CARs) by aggregating the abnormal returns of each firm i during the event window. Table 3 shows the mean of CARs for the total sample and by various classification of the sample. It shows CARs in the event windows (−1,1) and (−2,2) with the associated t-statistics and nonparametric z-statistics. The results tend to be very similar across the cumulation periods of five-day and three-day models. In panel A, we see significant cumulative abnormal returns that range from − 0.62% to − 1.06% for the overall sample. The three-day average cumulative abnormal return is − 0.62% for all firms and statistically significant (the t-statistics −1.64, and the Wilcoxon signed-rank z-statistic is −1.94). The average CAR for the five-day window is more negative and statistically significant (the t-statistics is −1.94, and the Wilcoxon signed-rank z-statistic is −2.58). Overall, it is consistent with H1 that as reputational sanctions, public criticisms have significant effects on stock prices, which makes sanctioned firms suffer reputational loss for being publicly criticized by stock exchanges. However, it is worth noting that the magnitude of reputational damage is much smaller than that found by Liebman and Milhaupt (2008).

Panel A decomposes the sample into groups with different financing

[8] As noted in Part III.A, Day '0' is defined as the first trading day after the announcement day, because under the usual practice, the announcement of public criticisms is made after the market is closed and the announcement can only affect the share price of the criticized company on the following day.

Table 2
Abnormal returns among the five-day window.

	Rely on internal financing (*EFin*=0) (85 cases)			Rely on external financing (*EFin*=1) (84 cases)			Total (169 cases)		
Daily abnormal return	average AR	*t*-Stat.	*z*-Stat.	average AR	*t*-Stat.	*z*-Stat.	average AR	*t*-Stat.	*z*-Stat.
AR(−2)	-0.0035	-1.42 * *	-1.71 *	-0.0060	-2.14 * *	-2.02 * *	-0.0047	-2.55 * **	-2.65 * **
AR(−1)	0.0005	0.1970	-0.72	-0.0070	-2.64 * **	-2.33 * *	-0.0032	-1.71 * *	-2.15 * *
AR(0)	0.0020	0.7315	0.31	-0.0080	-2.51 * **	-3.55 * **	-0.0030	-1.41 *	-2.46 * *
AR(1)	0.0035	1.3539	0.37	-0.0027	-0.96	-0.76	0.0004	0.2051	-0.283
AR(2)	0.0013	0.4886	-0.29	0.0000	-0.03	-1.52	0.0006	0.3489	-1.247

Note: Table 2 calculates the abnormal returns among the five-day window for groups with different financing propensity with t-statistics and Wilcoxon signed-rank z-statistics.

Table 3
CARs around the criticism event.

Panel A: total sample and by financing propensity of the criticized firm

Sample	No. of observations	Market reaction		*t*-Stat.		*z*-Stat.	
		(−1,1)	(−2,2)	(−1,1)	(−2,2)	(−1,1)	(−2,2)
All	169	-0.0062	-0.0106	-1.64 *	-1.94 * *	-1.82 *	-2.58 * *
EFin= 0	85	0.0053	0.0018	1.19	0.25	0.37	-0.62
EFin= 1	84	-0.0180	-0.0231	-3.04 * **	-2.91 * **	-2.80 * **	-2.96 * **
Diff		0.0233	0.0249	3.13 * *	2.31 * *	2.38 * *	1.89 *

Panel B: by the type of violation that leads to public criticisms

Sample	No.	Market reaction		*t*-Stat.		*z*-Stat.	
		(−1,1)	(−2,2)	(−1,1)	(−2,2)	(−1,1)	(−2,2)
1.1 Failure to disclose periodical reports on time	6	0.0212	0.0260	0.64	0.50	0.94	0.73
1.2 Disclosure problems with financial and accounting reports;	29	-0.0018	-0.0035	-0.21	-0.37	-0.88	-0.64
1.3 Disclosure problems with profit forecasts	24	-0.0040	-0.0032	-0.70	-0.56	-0.77	-0.89
1.4 Disclosure problems with reports of major corporate matters	49	-0.0103	-0.0205	-1.37 *	-2.02 * *	-0.99	-1.33
2.1 The controlling shareholder misappropriates the company's funds	16	-0.0001	-0.0029	-0.01	-0.14	0.10	-0.10
2.2 the company illegally provides guarantee for others	6	0.0329	0.0299	1.48 *	1.77 *	1.15	1.36
2.3 the company misuses the fund raised	2	0.0444	0.0456	2.42	2.59	1.34	1.34
2.4 the company fails to honour its major promises	5	-0.0091	0.0251	-0.28	0.66	0.14	0.67
2.5 the company illegally convenes or holds its shareholder meeting	1	0.0742	0.0785				
2.6 the company refuses to cooperate with others to perform disclosure duties	1	0.0742	0.0785				
3.1 other serious circumstances as decided by the stock exchange	85	-0.0001	-0.0051	-0.14	-0.70	-0.61	-1.65

Panel C: by the type of controlling ownership of the criticized firm

Sample	No.	Market reaction		*t*-Stat.		*z*-Stat.	
		(−1,1)	(−2,2)	(−1,1)	(−2,2)	(−1,1)	(−2,2)
Central SOE	12	0.0156	0.0045	1.47 *	0.48	1.33	1.10
Non-Central SOE	33	-0.0034	-0.0105	-0.37	-0.93	-0.06	-0.90
Private firms	114	-0.0063	-0.0078	-1.40 *	-1.13	-1.73 *	-1.89 *
Foreign	10	-0.0406	-0.0605	-2.67 * *	-2.64 * *	-2.60 * **	-2.50 * *

	Market reaction difference		Tukey's t	
	(−1,1)	(−2,2)	(−1,1)	(−2,2)
Central SOE vs. Foreign	0.056	0.065	2.69 * *	2.16
Private vs. Foreign	0.034	0.052	2.13	2.28

Panel D: by objects of criticisms

Sample	No.	Market reaction		*t*-Stat.		*z*-Stat.	
		(−1,1)	(−2,2)	(−1,1)	(−2,2)	(−1,1)	(−2,2)
Companies involved	75	-0.0100	-0.0144	-1.68 * *	-1.82 * *	-1.80 *	-1.86 *
Only individuals	94	-0.0032	-0.0075	-0.66	-1.00	-0.84	-1.76 *

Panel E: by self-disclosure

Sample	No.	Market reaction		*t*-Stat.		*z*-Stat.	
		(−1,1)	(−2,2)	(−1,1)	(−2,2)	(−1,1)	(−2,2)
Self-disclosure	82	-0.0017	-0.0025	-0.27	-0.27	-0.50	-0.76
No self-disclosed	87	-0.0105	-0.0183	-2.40 * **	-2.97 * **	-2.21 * *	-2.92 * **

Note: Table 3 calculates the cumulative abnormal returns among the three-day and five-day windows for different groups with t-statistics and Wilcoxon signed-rank z-statistics.

Table 4
Summary statistics of variables.

Variables	Mean	Standard deviation	Min	p25	Median	p75	Max	N
CAR[− 1,1]	-0.006	0.049	-0.169	-0.025	-0.005	0.014	0.182	169
CAR[− 2,2]	-0.011	0.068	-0.243	-0.041	-0.008	0.019	0.246	169
Efin	0.497	0.501	0	0	0	1	1	169
SOE	0.266	0.443	0	0	0	1	1	169
Size	22.225	0.698	20.774	21.740	22.175	22.735	23.532	169
Big4	0.012	0.108	0	0	0	0	1	169
Supervisory	0.197	0.048	0.107	0.167	0.188	0.222	0.364	169
Violations	1.325	0.863	1	1	1	1	7	169
IfCompany	0.444	0.498	0	0	0	1	1	169
Self	0.485	0.501	0	0	0	1	1	169
Market	0.396	0.491	0	0	0	1	1	169

Note: Table 4 describes variables with summary statistics. *CAR[− 1,1]* and *CAR[− 2,2]* are dependent variables calculated in Section III. The independent variable *EFin* is a dummy variable of whether the firm relies on external financing. *SOE* is a dummy variable being 1 if the firm is owned by the state and 0 otherwise. *Size* is calculated as the natural logarithm of market value at the end of the previous year before the public criticisms. *Big4* is a dummy variable coded 1 if the criticized firm is audited by one of the Big Four accounting firms. *Supervisory* is calculated as the number of supervisors divided by the sum of the Board of directors and supervisors. *Violations* denotes the number of allegations listed by stock exchanges in the announcements. *IfCompany* is a dummy for whether the criticisms are launched to firms rather than capable employees. *Self* is a dummy for self-disclosure before the public criticisms. *Markets* is coded 1 if firms are listed on the Shanghai Stock Exchange and 0 on the Shenzhen Stock Exchange. The sample consists of the 169 cases obtained after applying the filters described in Section III.

propensity to test if the negative impact differs between the two groups. We observe that firms relying on internal cash flow (*EFin*=0) on average have 0.18 − 0.53% increase in stock prices, but not statistically significant for both three-day and five-day windows. Whereas negative effects are significant for the firms relying on external financing (*EFin*=1). These companies are associated with 1.80% decline in share prices which is significant at the 1% level during the three-day window. The difference of *CAR [− 1,1]* for the two groups is 2.233% which is significant at the 1% level with the t-statistics being 3.04. Similar results are found for the five-day window. It suggests that reputational loss is confined to the firms relying on external financing, as H2 predicts.

Next, panel B lists CARs according to the type of violation. In the vast majority of cases, the CARs are found negative. The allegation associated with the most negative market reaction is disclosure problems with the reports of major corporate matters. The price decline is between 1.03 − 2.05%, which is significant with t-statistics. There are six cases rising 2.99 − 3.29% when criticized for illegally providing guarantee for others. Due to the small sample sizes for each category of allegations, statistical significances are low. Since Panel B does not reflect the seriousness of public criticisms by the nature of the misconduct, later sections measure seriousness by counting the number of violations mentioned by stock exchanges.

Panel C lists the CARs according to the controlling ownership of the listed company subject to public criticisms. In general, central SOEs, namely SOEs controlled by the Chinese central government, do not suffer market loss. Local SOEs experience a slight price decline ranging from 0.34% to 1.05%. Private firms decline 0.63 − 0.78% which is significant at the 10% level and only for the three-day window. Foreign firms have the largest decline (4.06 −6.05%) at the 1% level with both t-statistics and z-statistics. The difference of *CAR [− 1,1]* between Central SOE and foreign firm is significantly different through Turkey's t test. In sum, public criticisms are most punitive among foreign firms, followed by private firms and local SOEs. Central state-owned enterprises seem insensitive to public criticisms. This finding is consistent with H3 which predicts SOEs to have less abnormal loss associated with the announcement of public criticisms.

Panel D shows the CARs according to the type of objects of public criticisms. The stock exchanges imposed public criticisms on 75 list companies alone or together with their employees. These firms experience 1.00 − 1.44% decline in stock price, statistically significant. In contrast, for the 94 cases where only employees of the firm are publicly criticized, the market value loss seems smaller, ranging from 0.32% to 0.75%.

Panel E compares the CARs between companies which disclose their misconduct before public criticisms and companies which do not make any disclosure. For 82 cases which involve self-disclosure of misconduct, companies only experience 0.17%− 0.25% decline in stock price when public criticisms are announced. In contrast, 87 "silent" companies suffer a much larger 1.05–1.83% decline in stock price at the time of announcement of public criticism.

4.2. Factors affecting the stock price effects of public criticisms

As Part A and B shows, there are mixed CAR results on the effects of public criticisms, suggesting that public criticisms may not always be effective as a form of reputational sanction in the short term. The change in market value can be attributed to hypothesized explanations. Part C, D and E thus take a further step by testing these relevant factors that can explain the market reaction of public criticisms. Table 4 presents the summary statistics of the variables used in the following cross-sectional regression analysis. The dependent variable are *CAR[− 1,1]* and *CAR [− 2,2]* for OLS regression as generated in the previous section. Within the sample, the average three-day CAR is negative 0.006 and the five-day CAR is negative 0.011. SOEs account for 26.6% of the total sample firms. The average firm size based on the natural logarithm of market capitalization is over 4.4 billion. Only 2 firms (1.2%) are audited by big-four auditing firms. Around 19.7% of top managers (directors, senior managers, and supervisors) are supervisors among sample firms. The number of reasons listed by stock exchanges ranges from 1 to 7, with the mean being 1.33. More than half of the criticisms are due to only one violation of rules. About 46.2% of firms are criticized by the exchanges while the rest only involves employees and other parties. Around 44.4% of firms had already disclosed their misconduct before the announcement of public criticisms. 39.6% of the sample firms were listed in the Shanghai Stock Exchange.

Table 5 presents the Pearson and Spearman correlation matrixes of the variables used in the study. The purpose is to measure the strength of the linear relationship (correlation) between two variables. The lower left value corresponds to the Pearson correlation coefficients while the upper-right value represents the Spearman's coefficients between variables. The directions of the correlations between key variables are generally consistent with expectations. Firstly, the market reaction has a significantly negative correlation with the *EFin*, suggesting that the firms with a heavier reliance on external finance will suffer more reputational losses when criticized. Secondly, the market reaction has a strong positive correlation with the size of the supervisory board, implying that firms with more supervisors are less affected when criticized. There is a negative correlation between market reaction and Big 4 auditing firm. The above signs are consistent with H2-H5. The enforcement variables show a strong correlation with each other. Our explanation is that stock

Table 5
Correlation analysis.

	CAR[− 1,1]	CAR[− 2,2]	EFin	SOE	Size	Big 4	Supervisory	Violations	IfCompany	Self	Market
CAR[− 1,1]	1.00	0.79 * **	-0.18 * *	0.14 *	-0.00	-0.09	0.11	0.07	-0.06	0.09	0.02
		(0.00)	(0.02)	(0.06)	(0.97)	(0.22)	(0.16)	(0.37)	(0.43)	(0.24)	(0.76)
CAR[− 2,2]	0.88 * **	1.00	-0.15 *	0.08	-0.00	-0.05	0.14 *	0.11	-0.00	0.11	0.03
	(0.00)		(0.06)	(0.28)	(0.96)	(0.54)	(0.07)	(0.15)	(0.97)	(0.17)	(0.67)
EFin	-0.24 * **	-0.17 * *	1.00	0.04	0.02	0.00	-0.07	0.14 *	0.23 * **	0.17 * *	0.04
	(0.00)	(0.02)		(0.57)	(0.79)	(0.99)	(0.36)	(0.07)	(0.00)	(0.03)	(0.60)
SOE	0.10	0.04	0.04	1.00	0.11	0.06	0.09	0.13 *	0.08	0.08	0.25 * **
	(0.21)	(0.59)	(0.57)		(0.16)	(0.45)	(0.25)	(0.08)	(0.29)	(0.27)	(0.00)
Size	-0.03	-0.00	0.01	0.12	1.00	0.09	-0.09	-0.06	-0.03	-0.09	0.13 *
	(0.74)	(0.96)	(0.88)	(0.11)		(0.22)	(0.23)	(0.44)	(0.70)	(0.24)	(0.09)
Big 4	-0.15 *	-0.15 * *	0.00	0.06	0.10	1.00	0.08	-0.05	0.01	0.00	0.02
	(0.05)	(0.05)	(0.99)	(0.45)	(0.19)		(0.27)	(0.51)	(0.87)	(0.97)	(0.76)
Supervisory	0.08	0.15 * *	-0.03	0.07	-0.08	0.08	1.00	0.01	0.05	0.07	0.14 *
	(0.28)	(0.05)	(0.65)	(0.40)	(0.32)	(0.28)		(0.85)	(0.50)	(0.37)	(0.08)
Violations	0.17 * *	0.15 *	0.19 * *	0.07	-0.02	-0.04	-0.00	1.00	0.52 * **	0.42 * **	0.27 * **
	(0.03)	(0.05)	(0.01)	(0.38)	(0.80)	(0.59)	(0.96)		(0.00)	(0.00)	(0.00)
IfCompany	-0.07	-0.04	0.23 * **	0.08	-0.03	0.01	0.05	0.42 * **	1.00	0.47 * **	0.23 * **
	(0.38)	(0.59)	(0.00)	(0.29)	(0.71)	(0.87)	(0.53)	(0.00)		(0.00)	(0.00)
Self	0.09	0.11	0.17 * *	0.08	-0.09	0.00	0.05	0.36 * **	0.47 * **	1.00	0.30 * **
	(0.25)	(0.17)	(0.03)	(0.27)	(0.25)	(0.97)	(0.54)	(0.00)	(0.00)		(0.00)
Market	-0.00	-0.01	0.04	0.25 * **	0.17 * *	0.02	0.17 * *	0.27 * **	0.23 * **	0.30 * **	1.00
	(0.97)	(0.87)	(0.60)	(0.00)	(0.03)	(0.76)	(0.03)	(0.00)	(0.00)	(0.00)	

Note: Table 5 shows the correlation matrixes of the variables with the lower-left value corresponding to the Pearson correlation coefficients while the upper-right value being the Spearman's coefficients between variables. *CAR[− 1,1]* and *CAR[− 2,2]* are dependent variables calculated in Table 3. The independent variable *EFin* is a dummy variable of whether the firm relies on external financing. *SOE* is a dummy variable being 1 if owned by the state and 0 otherwise. *Size* is calculated as the natural logarithm of market value at the end of the previous year before the public criticisms. *Big4* is a dummy variable coded 1 if the criticized firms are audited by one of the Big Four accounting firms. *Supervisory* is calculated as the number of supervisors divided by the sum of the Board of directors and supervisors. *Violations* denotes the number of allegations listed by stock exchanges in the announcements. *IfCompany* is a dummy for whether the criticisms are launched to firms rather than capable employees. *Self* is a dummy for self-disclosure before the public criticisms. *Markets* is coded 1 if firms are listed on the Shanghai Stock Exchange and 0 on the Shenzhen Stock Exchange. The sample consists of the 169 cases obtained after applying the filters described in Section III. P-values are reported in parentheses. * $p < 0.1$, * * $p < 0.05$, * ** $p < 0.01$

exchanges will easily target firms voluntarily disclose misconduct and those with a long list of crimes. These companies are specifically criticized (with or without employees criticized) to emphasize the severity of the criticisms. Except for dependent variables, there are no correlations significantly greater than 0.6 between pairs of independent variables, suggesting that multicollinearity is not a serious issue in the empirical model.

Table 6 presents the results of the cross-sectional determinants of the effects of public criticisms. In the two OLS models, the dependent variables are *CAR[− 1,1]* and *CAR[− 2,2]* respectively. Our results suggest that reputational sanctions may only work for firms with certain characteristics. The negativeand statistically significant coefficient of *EFin* suggests that the stock market reacts more negatively to the public criticism announcements made against firms which rely on external financing, consistent with H2. The coefficients of *EFin* among the three-day and five-day windows indicate that firms relying on external financing averagely decline 2.7–2.9% more in stock price than internally financed firms, holding other variables constant. In conclusion, financing propensity is one concrete explanation for the mechanism of reputational sanction with China's situation of credit constraints. As H3 predicts, SOEs suffer less loss when criticized than private and foreign firms. The coefficients show SOEs suffer 2.0 − 2.1% less decline of returns than non-SOEs. This result implies that state ownership provides a strong shield for the sanctioned firms from the force of public criticisms, lending support to the findings in Table 3 of Part A. *Size* in this study is not statistically significant, providing no explanatory power for the reputational loss.

For corporate governance characteristics, the coefficient of *Big4* is negative and significant. Specifically, firms with Big 4 auditors will suffer 8.3 − 12.9% more loss in cumulative returns. The reaction is consistent with investors assigning a reputational penalty since even Big 4 auditors fail to ensure satisfactory control for the criticized firms. In general, the firms hiring Big 4 auditors enjoy more reputational capital and the market has a higher expectation of their integrity. Hence, reputational sanctions function better towards the firms with more reliance on reputational capital, confirming the findings in Table 3 of Part A, as H4 predicts. The coefficients of *Supervisory* suggest that the size of the supervisory board reduces reputational loss and its impact is statistically significant. It is consistent with H5 that supervisory board members are assigned with great value by investors to act as watchdogs and prevent fraudulent activities. From this perspective, supervisory boards enhance monitoring and therefore reduce the possibility of more severe punishment. Our study provides empirical evidence that supervisors can provide insurance-like protection against reputational sanctions.

The seemly contradiction between H4 and H5 can be explained that Big 4 represents the highest level of scrutiny from external auditors. Therefore, higher expectations cause more disappointment, which in turn leads to negative reactions. For investors, there is no hope to improve the situation by asking the firm to engage better auditors. By contrast, under H5, less negative reaction is related to firms with a large supervisory board, because the adoption of a large supervisory board is a sign of the firm's commitment to corporate governance, and importantly, there is room for the firm to further improve by increasing the size of the supervisor board.

The enforcement process is the showcase of the integrity, independence, and competence of regulators. Investors concern about not only who is punished but also how. The coefficient of *IfCompany* is negative and statistically significant for the three-day window. It means that reputational sanctions have more price effects if public criticisms are made against the firms rather than just employees. Surprisingly, the coefficients of *violations* are positive and significant, indicating that investors assign a negative value to a single accusation but are reluctant to punish firms criticized with a long list of crimes. In our sample, firms accused with more than three allegations are all consecutive loss-makers under special treatment.[9] There is an absence of anticipated possibility

[9] In China, firms with chronic losses for two years will receive a special treatment (ST) designation.

Table 6
OLS regression for the determinants of reputational loss.

	Model 1	Model 2
Dependent variable	CAR[− 1,1]	CAR[− 2,2]
Independent variables		
Firm Characteristics		
EFin	-0.027 * **	-0.029 * **
	(−5.91)	(−4.88)
SOE	0.020 * **	0.021 *
	(4.35)	(2.17)
Size	-0.007 *	-0.009
	(−2.54)	(−1.42)
Corporate governance		
Big4	-0.083 * **	-0.129 * *
	(−9.85)	(−3.12)
Supervisory	0.153 * **	0.323 * **
	(4.80)	(8.26)
Enforcement process		
Violations	0.014 * **	0.015 * **
	(4.82)	(4.04)
IfCompany	-0.018 * *	-0.022 *
	(−3.12)	(−2.24)
Self	0.015 * *	0.023 * **
	(3.44)	(5.49)
Market	-0.010 * **	-0.015 * *
	(−6.22)	(−3.46)
Cons	0.115	0.105
	(1.69)	(0.77)
Year	Controlled	
Industry	Controlled	
N	169	169
adj. R^2	0.169	0.179

Note: Table 6 reports cross-sectional ordinary least squares (OLS) regressions using the market model with the reputational losses as a dependent variable. *CAR[− 1,1]* and *CAR[− 2,2]* are dependent variables calculated in Section III. The independent variable *EFin* is a dummy variable of whether the firm relies on external financing. *SOE* is a dummy variable being 1 if owned by the state and 0 otherwise. *Size* is calculated as the natural logarithm of market value at the end of the previous year before the public criticisms. *Big4* is a dummy variable coded 1 if the criticized firms are audited by one of the Big Four accounting firms. *Supervisory* is calculated as the number of supervisors divided by the sum of the Board of directors and supervisors. *Violations* denotes the number of allegations listed by stock exchanges in the announcements. *IfCompany* is a dummy for whether the criticisms are launched to firms rather than capable employees. *Self* is a dummy for self-disclosure before the public criticisms. *Markets* is coded 1 if firms are listed on the Shanghai Stock Exchange and 0 on the Shenzhen Stock Exchange. The sample consists of the 169 cases obtained after applying the filters described in Section III. t-values are reported in parentheses. * , * *, and * ** indicate significance at the 10%, 5%, and 1% levels, respectively.

that they will follow the rules in difficult situations. What's worse, investors may even reward these firms with multiple accusations because they are able to get away with substantial legal penalties and only receive criticisms. Consistent with Table 4, the variable *Self* is significant with positive coefficients, showing that investors' reaction to reputational sanctions may contain adjustment to the released information itself if the company did not disclose it before the sanction. Therefore, it is important to tease out its effect before measuring the pure effect of reputational sanctions. The coefficients of *Market* are not statistically significant in this study, implying no significant enforcement differences exist between the two stock exchanges. In summary, the financing propensity, characteristics of the corporate governance, and enforcement process have a significant impact on the market reaction of public criticisms as a form of reputational sanctions.

4.3. Self-disclosure and readjustment effects

As noted earlier, however, the CARs calculated above may not be attributed wholly to, or seen as a direct measurement of, the effect of public criticism, because there is a need to disentangle the so-called readjustment effects, namely the portion of the observed loss in share values that reflects an adjustment to the true value of the firm unaffected by the misconduct of the firm (Karpoff et al., 2008). Indeed, if an announcement of public criticisms by the stock exchange is the first time that the misconduct of the sanctioned company has been revealed, the price reaction will reflect not only the effects of the public criticism itself but also the readjustment effects. In other words, the market value decline of the criticized firm may represent both reputational loss and a recognition that its value is lower than expected (for example, the firm's assets and profit are less than previously thought). Hence, the CARs would be an overstatement of the reputational damage.

We try to address the above issue by focusing on the cases where the sanctioned companies have made a self-disclosure of the relevant violation fact before the announcement of public criticisms by stock exchanges. For these firms, the information on the violation would have already been absorbed by the market before the announcement of public criticism. Therefore, the market reactions to the announcement of public criticisms should only reflect the reputational loss. We thus decide to delete the following cases from the sample: 1) cases where no prior self-disclosure of violation was made; 2) cases where the firm chose to self-disclose misconduct when the trading of its stock was suspended; 3) cases already deleted in calculating CARs in the criticism events. After this, there are 66 cases left in the new sample in which the firms have voluntarily exposed their misconduct before the announcement of public criticisms. We then calculated the CARs of the self-disclosure and the CARs of the public criticism announcement separately.

Table 7 lists the CARs of both self-disclosures and public criticisms in the event window (−1,1) and (−2,2) with the associated t-statistics and nonparametric z-statistics. On average, the firms lose 2.45% and 3.41% respectively when disclosing misconduct by themselves. This suggests that the investors punish those firms for violation of rules. Notably, the market losses of self-disclosure calculated in Table 7 are larger than public criticism events in Table 3, implying that the market reacts to the self-disclosure of misconduct more significantly than the announcement of public criticisms. Stated differently, the value-readjustment effects may be more significant than the effects of public criticisms. Hence, it is very likely that the CARs reported in Table 3 are mainly attributable to the readjustment effects rather than the effects of public criticisms. Having calculated the CARs around the event of self-disclosure, we then recalculate CARs around the announcement of public criticisms made after the self-disclosure. The results, however, do not show any more decline. Again, as noted above, it suggests that the CARs reported in Table 3 may not be used as reliable evidence of the effects of public criticisms, because they may reflect the readjustment effects more than the effects of public criticisms. From this perspective, H1 would no longer be acceptable, that is, the firms may experience no reputational loss when publicly criticized. This conclusion may need to be treated with caution, however, due to the small size of the sample examined. Further, there is a possibility that self-disclosure occurs very early in time relative to the public censure, and thus self-disclosure may be capturing all of the reputational effect itself, with no further reputational losses for the stock exchange to inflict. To test this possibility, we analyze the length of time interval between self-disclosure and public criticism. We find that the average and median length of the interval are 232 and 178 days, and that even the shortest interval is still 10 days long. This shows that public censure was usually imposed long after self-disclosure, confirming the possibility that public criticism may have price effects, but they could be impounded into the stock price beforehand during the long period after self-disclosure.

4.4. Other effects of public criticism

In the preceding part, we found significant abnormal returns for criticized firms, but they are stock price effects in nature and may only indicate investors' short-term reaction to public criticism. Hence, unlike the existing studies such as Liebman and Milhaupt (2008), we will further examine other effects of public criticism, particularly in relation to the operation and value of the criticised firm. This would shed light on

Table 7
Comparison of CARs around dates of self-disclosure and public criticisms.

Sample	No.	Market reaction		*t*-Stat.		*z*-Stat.	
		(−1,1)	(−2,2)	(−1,1)	(−2,2)	(−1,1)	(−2,2)
Self-disclosure	63	-0.0245	-0.0341	-2.46 * **	-2.56 * **	-2.65 * **	-2.58 * **
Public criticism	63	-0.0016	-0.0043	-0.23	-0.41	-0.40	-0.55

Note: Table 7 compares the cumulative abnormal returns of self-disclosure with those of public criticisms for a sample of 63 firms among the three- and five-day window.

Table 8
Long-term performance of criticized firms.

	ROA current	ROA next 2Y	Diff	ROA Industry adjusted Current	ROA Industry adjusted next 2Y	Diff
Total (N = 147)	-0.035	-0.047	-0.012	-0.061	-0.071	-0.010
Car3 > =0 (N = 63)	-0.057	-0.058	-0.001	-0.087	-0.085	0.002
Car3 < 0 (N = 84)	-0.019	-0.039	-0.020	-0.042	-0.060	-0.018
Criticized once (N = 110)	-0.025	-0.024	0.001	-0.052	-0.047	0.005
Criticized repeat (N = 37)	-0.066	-0.114	-0.048	-0.089	-0.142	-0.053

Table 9
Mean of changes in external financing between two groups.

	N	ΔLOAN (million yuan)	ΔBONDS (million yuan)	ΔLOAN&BONDS (million yuan)
Total	169	-134.97	-171.31	-300.29
Financial constrain (EFin=1)	84	-465.85	-40.20	-506.05
Financial constrain (EFin=0)	85	192	-300.88	-108.88
Diff		657.85	-260.68	397.17
t		2.53 * *	-0.75	0.90

the issue of whether public criticism is an effective mechanism to change firms' behaviour or increase their long-term values. In this aspect, our research is the first of its kind, which aspires to produce a more complete picture of the effectiveness of public criticism.

Firstly, we track the financial performance of the criticized firms in the following two years after they were criticized. ROA is selected as the metrics here, as it has been widely used in business research to measure corporate financial performance and return on investment.[10] ROA is calculated by using net income divided by total assets, representing firms' earnings controlled by total assets. We also calculate the industry average, using the 2012 Industry Classification as a benchmark to control the general market movement. After deducting some cases due to missing data, the sample size reduced from 169 to147. As Table 8 shows, the average ROA in the year of criticism is negative 3.5% (negative 6.1% after industry-mean adjustment), indicating that criticized firms were largely in trouble when receiving criticism. The average ROA of the post-criticism two years is negative 4.7% (negative 7.1% after industry-mean adjustment), suggesting that public criticism failed to improve the firm's performance. Then we divide the sample into two groups according to the abnormal return. The subgroups fail to show any improvement either. What's worse, firms with negative market reaction and with more than one criticism experienced more loss in the next two years (though not statistically significant). This suggests that the short-term stock price effects of public criticisms and the repeat criticism can somehow predict the firms' performance in the long term.

Secondly, we investigate the mechanism through which public criticism impacts on the operation and performance of the criticized firm. Table 9 calculates the changes in external financing after the company receives public criticism, so as to provide more information on the effects of public criticism. We use debt financing rather than equity financing to measure external financing, because the former is usually more frequent and thus has a much higher variation than the latter (Xu and Xu, 2020). Δ*LOAN* is calculated as the difference of cash flow from borrowing in the year after the public criticism (t + 1) year and the prior year of public criticism (t-1). ΔBONDS is calculated as the difference of cash flow from issuing bonds in the year after the public criticism (t + 1) year and the prior year of public criticism (t-1). Overall, the new loans and new bonds of the sanctioned firms decreased an average of 134.97 and 171.31 million yuan respectively in the following year after public criticism. For the firms with financial constraints, on average, their new loans and new bonds decreased 465.85 and 40.2 million yuan respectively. In contrast, for the firms without financial constraints, their bank loans increased by 192 million yuan on average and the difference between the two groups of firms is statistically significant. This suggests that public criticism has a significant impact on external financing for those firms with financial constraints, but the impact is less significant for other firms.

Thirdly, we examine whether public criticism can produce strong deterrent effects to force firms to behave better and thus avoid being criticised again. During the period of 2013–2018, Shanghai and Shenzhen stock exchanges made a total of 245 public criticisms. Amongst them, 157 firms were criticized once, 29 firms criticized twice and 10 firms criticized three times. Hence, 39 criticisms or up to 20% of all criticisms are repeaters. Further, the average time interval for being criticised again is 1.39 years and around half of them are criticized again within one year. Further, as Table 8 shows, for the companies that were repeatedly criticized, the average ROA in the year of criticism is negative 6.6% (negative 8.9% after industry-mean adjustment) and then drops to negative 11.4% (negative 14.2% after industry-mean adjustment) two years later, suggesting that multiple public criticisms fail to pressure the firms to perform better. In short, public criticism may not be really effective in changing firms' behaviour so as to deter them from misbehaving again and improve their economic performance.

Finally, public criticisms may lead to financing restrictions from the CSRC. In practice, if a listed company receives public criticism from the stock exchange, the CSRC would follow up by imposing financing restrictions on the criticised company. Hence, this follow-on financing

[10] In our case, many firms have negative equity, making ROE less comparable.

Table 10
CAR comparison with peer firms without public criticism.

Sample	No.	Market reaction		*t*-Stat.		*z*-Stat.	
		(−1,1)	(−2,2)	(−1,1)	(−2,2)	(−1,1)	(−2,2)
Full sample	169	-0.0062	-0.0106	-1.64 *	-1.94 * *	-1.82 *	-2.58 * *
Matched criticised	132	-0.0081	-0.0129	-1.88 *	-2.328 * *	-1.69 * *	-2.60 * **
Peer no criticism	132	0.0014	0.0018	0.35	0.32	-1.45	-1.25

Note: Table 10 calculates the cumulative abnormal returns among the three-day and five-day windows for matched groups with t-statistics and Wilcoxon signed-rank z-statistics.

restrictions can be reflected in the stock price reaction to the announcement of public criticisms (Huang, 2022). In a strict sense, the CSRC-imposed financing restriction is not the effect of reputational sanction per se. This casts doubt on the validity of measuring the reputational damage for the criticized firms by simply calculating the CARs, because the CARs may reflect both the reputational sanction and the financing restriction. In fact, anecdotal evidence suggests that in 2006, the CSRC issued a rule to impose financing strictions to follow up with public criticisms, largely because public criticisms were considered ineffective (Huang, 2022). As it is extremely difficult to separate the two effects, the event study results may not be reliable measures of reputational losses caused by public criticisms.

4.5. Robustness check

Table 3 only measures CARs of those firms subject to public criticism, but it is possible that the CARs were caused by industry-wide factors rather than public criticisms. Hence, Table 10 constructs a control sample of non-criticised firms using the predicted likelihood, or propensity score, of sanction. The propensity score method aims to produce two statistically similar sets of companies with and without public criticism. We first compute the predicted likelihood of public criticism, adapted by the fraud model of Chen et al. (2006) shown in the Appendix. Then we match each criticised firm to a non-criticised firm in the same industry with the closest predicted probability of sanction and end up with 132 comparable firms. We then calculate the CARs of the comparable firms when their matched firms were criticised. Overall, these results are consistent with Panel A of Table 3. The CARs in non-criticised firms were not significant, implying that there were not evident spill-over effects of public criticism.

We choose the market model which is the most popular one in event studies. To prove that the results are not biased, we rerun the event study and cross-sectional regression using alternative models. The market adjusted model is defined as

$$R_{i,t} = R_{m,t} + \varepsilon_{i,t} \tag{6}$$

The other alternative model is mean adjusted model, defined as follows. The $\overline{R_i}$is the simple average of firm *i*'s daily return in the estimation window. The *CAR[− 1,1]* and *CAR[− 2,2]* using these models are compared in Table 10.

$$R_{i,t} = \overline{R_i} + \varepsilon_{i,t} \tag{7}$$

As Table 11 shows both *CAR[− 1,1]* and *CAR[− 2,2]* calculated using the market adjusted model are the highest among the three models. It suggests that firms criticized loss 0.93%− 1.70% in the share price. Both t-statistics and z-statistics are significant at the 1% level. While the mean adjusted model reports the lowest CARs with no statistical significance. This comparison indicates that the market model reports CARs in between the highest and lowest ones, justifying its suitability.

Table 12 reports the cross-sectional regressions using alternative models. The results are generally consistent with Table 7. It confirms that the results do not vary with different models.

To ensure that the presence of outliers does not bias the results, CARs are winsorized for OLS regressions. Outliers are set to a 99th percentile of the data, meaning that all data below the 1st percentile are set to the 1st percentile, and data above the 99th percentile are set to the 99th percentile.

Previous studies normally assume that the market reacts on the announcement day and mark it as day 0. To improve comparability and robustness, we rerun the tests according to prior studies. The differences of CARs are negligible and regression results are almost unchanged. It implies that the news about the public criticism may leak to the market before it is formally announced. As the analysis shows similar results, we will use the trading day immediately after the announcement day as day 0 since it is consistent with the reality.

The criteria by which we classify financing propensity is based on the cost of debt and the known institutional context in China. But the cost of equity can also increase after the company receives public criticisms. To prove that the criteria of external financing is theoretically and empirically valid, we demonstrate that *EFin* indeed reflects financial constraints on both debt and equity. We examine the extent to which the firm's investment is affected by the availability of internal cash flow, following the financial constraints literature pioneered by Fazzari et al. (1988). Receiving punishment from regulators for corporate misbehavior can affect financing contracts between a firm and its investors, as both the firm's credit risk and information risk increase after punishment. It indicates that firms' investment will be restricted to their internal cash flow when facing financial constraints, according to Fazzari, Hubbard, and Petersen (1988) and H. Chen and Chen (2012), and this proxy of investment–cash flow sensitivity is calculated as follows in Eq. (6).

$$\frac{I_{it}}{K_{i,t-1}} = \beta_0 + \beta_1 \times q_{i,t-1} + \beta_2 \times \frac{CF_{i,t}}{K_{i,t-1}} + \varepsilon_{it} \tag{6}$$

where I*it* is the firm's fixed investment, deflated by its beginning-of-period capital stock, K it-1. qit-1 is a proxy for investment opportunities. CFit is the firm's internal cash flow, deflated by its beginning-of-period capital stock K it-1. β_1 is investment-q sensitivity. β_2 is

Table 11
CARs around the criticism event using alternative models.

Sample	N	Market reaction		*t*-Stat.		*z*-Stat.	
		(−1,1)	(−2,2)	(−1,1)	(−2,2)	(−1,1)	(−2,2)
Market adjusted model	169	-0.0093	-0.0170	-2.53 * **	-3.49 * **	-3.08 * **	-4.23 * **
Mean adjusted model	169	-0.0021	-0.0069	-0.46	-1.19	-0.48	-1.08

Note: Table 10 lists CAR[− 1,1] and CAR[− 2,2] with the marketed adjusted model and the mean adjusted model with t-statistics and Wilcoxon signed-rank z-statistics.

Table 12
CARs around the criticism event using alternative models.

	Market adjusted Model	Market adjusted Model	Mean adjusted Model	Mean adjusted Model
Dependent variables	CAR[− 1,1]	CAR[− 2,2]	CAR[− 1,1]	CAR[− 2,2]
Independent variables				
Firm Characteristics				
EFin	-0.025 * **	-0.028 * **	-0.024 * **	-0.024 * *
	(−3.62)	(−2.96)	(−2.63)	(−2.02)
SOE	0.017 * *	0.018	0.019 *	0.021
	(2.00)	(1.62)	(1.67)	(1.50)
Size	-0.007	-0.009	-0.008	-0.005
	(−1.14)	(−1.08)	(−0.97)	(−0.49)
Corporate governance				
Big4	-0.100 * **	-0.145 * **	-0.081 *	-0.129 * *
	(−2.88)	(−3.14)	(−1.78)	(−2.24)
Supervisory	0.159 * *	0.308 * **	0.109	0.265 * *
	(2.17)	(3.15)	(1.13)	(2.18)
Enforcement				
Violations	0.013 * **	0.011 *	0.010 *	0.011
	(2.69)	(1.73)	(1.68)	(1.35)
IfCompany	-0.021 * *	-0.024 * *	-0.015	-0.022
	(−2.57)	(−2.12)	(−1.34)	(−1.60)
Self	0.010	0.014	0.008	0.025 *
	(1.26)	(1.28)	(0.76)	(1.79)
Market	-0.008	-0.012	-0.002	-0.012
	(−0.97)	(−1.12)	(−0.18)	(−0.92)
Cons	0.105	0.112	0.130	0.026
	(0.76)	(0.61)	(0.71)	(0.11)
Year controlled	Controlled			
Industry controlled	Controlled			
N	169	169	169	169
adj. R^2	0.184	0.179	0.090	0.098

Note: Table 12 reports cross-sectional ordinary least squares (OLS) regressions using alternative models with the reputational losses as a dependent variable. Dependent variables are *CAR[− 1,1]* and *CAR[− 2,2]* calculated in Section III. The independent variable *EFin* is a dummy variable of whether the firm relies on external financing. *SOE* is a dummy variable being 1 if owned by the state and 0 otherwise. *Size* is calculated as the natural logarithm of market value at the end of the previous year before the public criticisms. *Big4* is a dummy variable coded 1 if the criticized firms are audited by one of the Big Four accounting firms. *Supervisory* is calculated as the number of supervisors divided by the sum of the Board of directors and supervisors. *Violations* denotes the number of allegations listed by stock exchanges in the announcements. *IfCompany* is a dummy for whether the criticisms are launched to firms rather than capable employees. *Self* is a dummy for self-disclosure before the public criticisms. *Markets* is coded 1 if firms are listed on the Shanghai Stock Exchange and 0 on the Shenzhen Stock Exchange. The sample consists of the 169cases obtained after applying the filters described in Section III. t-values are reported in parentheses. * , * *, and * ** indicate significance at the 10%, 5%, and 1% levels, respectively.

investment-cash flow sensitivity. A higher investment–cash flow sensitivity indicates that firms' growth relies more on internal cash. In other words, firms with strong external financing ability, either debt or equity, are not restricted to internal cash flow generated, and therefore have smaller investment–cash flow sensitivity. Using this model, we run the regression separately with two groups created in the previous section. The investment–cash flow sensitivity β_2 for external-financing firms (*EFin*=1) is 0.0078 while this coefficient for internal financing firms (*EFin*=0) is 0.0536. The larger coefficient for internal-financing firms (*EFin*=0) means they rely substantially on their own operating cash flow than their counterparts (*EFin*=1). This proves that the dummy variable *EFin* truly reflects financing differences in our sample and thus is a pronounced proxy.

5. Conclusion

This Article analyzes a unique dataset of 169 listed firms that were subject to public criticism imposed by China's two stock exchanges in Shanghai and Shenzhen from 2013–2018, in an attempt to evaluate the effectiveness of reputational sanctions in the Chinese stock markets. Owing to its distinctive features, public criticism provides a very good opportunity for studying the effects of reputational sanctions. Further, China, with a comparatively underdeveloped legal system and an increasingly important securities market, offers an ideal institutional setting to examine the role of reputational sanctions.

Overall, the evidence of the effects of public criticism on culpable firms is mixed, suggesting that reputational sanction is a weak, if not ineffective, instrument of market regulation in China.

1) The results of the event study show statistically significant negative reactions to public criticisms, but the negative price effect is not economically significant (0.62 −1.06%).
2) The multivariate regression analysis produces several important findings about the factors affecting the stock price effects of public criticisms. To start with, financing constraint is an important component in the total market reaction to the announcement of public criticisms. Moreover, the stock prices of firms hiring Big 4 auditors are more sensitive to public criticism, suggesting that reputational sanctions function better towards firms with more reliance on reputational capital. This view is further confirmed by the finding that the firms controlled by state ownership, particularly at the central level, are largely insensitive to public criticisms, presumably because they rely more on state ownership to do business and care less about public criticisms. Finally, supervisors play a valuable role in providing insurance for firms disciplined by regulators. This finding is of interest, as there has been a longstanding debate on the role of supervisory boards in China.
3) According to the multivariate regression analysis, the statistically significant negative market reaction to public criticism only appears in the firms relying on external financing and those not controlled by state ownership.
4) To highlight the value re-adjustment issue, we further focus on the cases where the sanctioned companies have made a self-disclosure of the relevant violation fact before the announcement of public criticisms by stock exchanges. The result shows that the stock price effect of public criticism is not significant in those cases.
5) To have a more complete picture of the effectiveness of public criticism, we also examine other effects of public criticism, finding that it

does not improve firms' long-term values, nor produce strong deterrent effects to change their behaviour.

This article enriches our understanding of the workings and effectiveness of reputational sanctions, but there are still several limitations which call for more research in this area. For instance, future studies will need to find a good way to isolate the value-re-adjustment effects from the market reaction to public criticism, and also segregate the effect of the follow-up regulatory measures on external financing. Further, apart from stock price effects, more efforts can be made to investigate whether public criticism is an effective mechanism to change firms' behaviour or increase their long-run values. It would be useful to examine more types of behavioural change, such as corporate risk-taking, investment decision-making and contracting.

Author statement

Declaration of generative AI in scientific writing: none.

We declare that the submitted paper has not been published previously, that it is not under consideration for publication elsewhere, that its publication is approved by all authors and tacitly or explicitly by the responsible authorities where the work was carried out, and that, if accepted, it will not be published elsewhere in the same form, in English or in any other language, including electronically without the written consent of the copyright-holder.

Declarations of interest

None

Data Availability

Data will be made available on request.

Appendix A. Logit regression of the attributes of public criticism

	Public criticism
Supervisor	-0.116 * **
	(−2.61)
Idbsameplace	0.296 * *
	(2.07)
TopShare	-0.038 * **
	(−6.62)
Big10	-0.481 * **
	(−3.41)
InstShare	-0.064 * **
	(−4.10)
SOE	-0.603 * **
	(−3.39)
Size	-0.119 *
	(−1.94)
ROA	-2.367 * **
	(−3.90)
Lev	1.955 * **
	(5.52)
Cons	0.064
	(0.05)
N	15148
Pseudo R2	0.1179

This appendix reports the estimates of the logit regression model for PSM. The estimations use the full sample that consists of 15148 firmyear observations. The dependent variable *Public criticism* is a dummy variable taking the value one if the firm is criticised by exchanges. *Supervisory* is calculated as the number of supervisors divided by the sum of the Board of directors and supervisors. *Idbsameplace* is a dummy variable if the independent directors are located in the same place with the firm. *Topshare* is percentage of shares held by the largest stockholder. *Big10* is a dummy variable coded one if the auditor is one of the 10 biggest auditors by market share. *InstShare* is the shareholding of institutional investors. *SOE* is a dummy variable being 1 if the firm is owned by the state and 0 otherwise. *Size* is calculated as the natural logarithm of market value at the end of the previous year before the public criticisms. *ROA* is calculated by using net income divided by total assets. Lev is the ratio of debt to total assets. t statistics in parentheses * $p < 0.1$, * * $p < 0.05$, * ** $p < 0.01$.

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