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## Article

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ARTICLE



## Punish one, teach a hundred? A study on the failure of the indirect deterrence effects of regulatory punishments

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### ABSTRACT

The supervision of listed firms plays an important role in improving the quality of listed firms and the efficiency of resource allocation in the capital market. We study the effectiveness and realisation mechanisms of the indirect deterrence effects of regulatory punishments from the perspective of executives' interlock. We find that the financial misstatement decreases for punished firms while increases for innocent firms which interlock with punished ones through punished executives after regulatory punishments. Further analyses indicate that punished executives are more likely to leave these innocent firms after being punished. But independent directors actively saying 'no' are more likely to resign from these innocent firms and auditors do not make adjustment to audit decisions for the rising engagement risk. Therefore, the aforementioned negative adjustments exceeding positive adjustments of corporate governance results in the failure of the indirect deterrence effects of regulatory punishments, finally leading to these innocent firms' value being impaired.

### KEYWORDS

Regulatory punishments; punish one, teach a hundred; indirect deterrence effects; executives' interlock; corporate governance

## 1. Introduction

The capital market is the bridge linking the real economy to capital and connecting financiers to investors and also the barometer of the real economy. Meanwhile, the quality of listed firms is the pillar and cornerstone that supports the capital market and also the micro foundation that promotes a virtuous cycle of finance and the real economy. The Central Economic Work Conference held at the end of 2018 pointed out that the capital market plays a pivotal role in China's financial operation. It is necessary to deepen reforms to create a standardised, transparent, open, dynamic and resilient capital market, which is of great significance to play the fundamental role of market in resource allocation and enhance the capability of finance to serve the real economy. Hence, strengthening the supervision of listed firms has become an important method to improve the quality of listed firms and then promote the high-quality development of the capital market and even the real economy.<sup>1</sup>

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<sup>1</sup>China Securities Regulatory Commission, 11 May 2019: 'Chairman Yi attended the 2019 Annual Meeting of China Association for Public Companies and made a speech'. [http://www.csrc.gov.cn/pub/newsite/zjhxwfb/xwdd/201905/t20190511\\_355618.html](http://www.csrc.gov.cn/pub/newsite/zjhxwfb/xwdd/201905/t20190511_355618.html).

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The supervision of listed firms theoretically stems from the market failure caused by the information asymmetry between listed firms as capital financiers and investors as capital suppliers. It plays an irreplaceable role in improving the allocation of resources in the capital market (Healy & Palepu, 2001). The literature of institutional economics holds that in addition to market discipline and private litigation, government regulation is another important mechanism to deal with the capital market disorder (Djankov et al., 2003; Shleifer, 2005). Especially for China's capital market that started late, various foundational institutions, such as law and finance, have not developed fully, neither do its investor protection. In such circumstances, strong government regulation has become a crucial mechanism to deal with misconducts in China's capital market. (G. Chen et al., 2005; Chu & Fang, 2016; Zeng & Zhang, 2009). With the establishment of the capital market in the early 1990s, China's securities regulatory system came into being and has made gradual perfection. After a period of multiple supervision, the institutional reform of the State Council and the promulgation of the Securities Law in 1998 established the leading position of China Securities Regulatory Commission (CSRC) in the securities regulatory system, with Shanghai Stock Exchange and Shenzhen Stock Exchange taking charge of front-line supervision under the leadership of CSRC. With the promulgation and amendment of securities laws and regulations, such as Administrative Measures for the Disclosure of Information of Listed Companies, Provisional Regulations on Issuing Stocks and Transaction Management and Interim Measures against Securities Fraud, regulatory punishments of the securities regulatory authorities on the illegal listed firms and their executives have become a sharp edge in fighting against misconducts in the capital market. Their governance effect has become a hot topic of common concern for the regulator, the industry and the academics.

Early literature validates the direct deterrence effects of securities regulatory punishments on the offending parties, including impairment of market value and reputation to illegal firms and executives and their correction of behaviour and restoration of reputation afterwards (G. Chen et al., 2005; Farber, 2005; Feroz et al., 1991; Karpoff et al., 2008a; Xin et al., 2013). However, regulatory punishments made by the regulator are not only aimed at the offending parties, but also intended to deter other innocent parties who are connected with the offending peers and reduce the occurrence of their future violations in advance, thus having an effect of 'punish one, teach a hundred'.<sup>2</sup> Recently, the literature has begun to focus on the possible indirect deterrence effects of securities regulatory punishments on other innocent parties (D'Acunto et al., 2018; Xue et al., 2017; Yiu et al., 2014). They find that firms in the same industry or region as the punished ones are more likely to be indirectly deterred by regulatory punishments and positively adjust their behavioural decisions related to violations. Based on this, we seem to be able to deduce that with the reinforcement of supervision of listed firms, the quality of listed firms in the market can be generally improved and the governance effect of 'punish one, teach a hundred' expected by the regulatory authorities can be achieved. However, the aforementioned cross-sectional indirect deterrence researches based on industry or regional characteristics cannot identify the specific impact paths. More importantly, the premise of regulatory punishments is violations of listed firms while the definition of their violations mainly depends on ex-post regulatory punishments. Thus, the increase in the number of

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<sup>2</sup>CSRC's extensive publicity on typical violation cases is intended to 'punish one, teach a hundred'.

regulatory punishment cases observed in reality does not directly measure the reinforcement of supervision but may also mean the increase in the number of violations of listed firms under certain enforcement. Especially in recent years, violations of listed firms have crowded together.<sup>3</sup> Existing literature finds that misconducts like option backdating, tax aggressiveness and financial fraud spread widely among companies, forming a serious contagion effect. This contagion effect has been widely disseminated mainly based on the interlock networks formed by executives in different firms (Bizjak et al., 2009; Brown, 2011; Chiu et al., 2013; Lu & Chang, 2018).<sup>4</sup> So with the contagion of listed firms' misconducts, the quality of listed firms in the market will deteriorate rapidly, which makes us doubt whether regulatory punishments can achieve the governance effect of 'punish one, teach a hundred', especially in the context of executives' interlock. Furthermore, existing researches show that executives' interlock can also alleviate information asymmetry and agency problem and play a positive role in corporate governance (S. Chen et al., 2013; Chen & Xie, 2011, 2012). Then, how regulatory punishments have the indirect deterrence effects through executives' interlock is an important research question. Therefore, we examine the effectiveness and realisation mechanisms of the indirect deterrence effects of regulatory punishments from the perspective of executives' interlock.

With the aforementioned doubt, we observe the time trend of firms' financial misstatement based on data of listed firms' securities regulatory punishments.<sup>5</sup> The result is reported in Figure 1. It can be found that the punished firms have obvious misstatement in their financial statements before regulatory punishments, with the maximum likelihood 47.01% 1 year before regulatory punishments. While after that, the likelihood of financial misstatement drops dramatically, with the likelihood falling to 16.47% in the third year after punishments. It indicates that the direct deterrence effects of regulatory punishments on illegal firms is established. Secondly, for the comparable control firms in the same industry and region as punished firms, their likelihood of financial misstatement is also high before punishments and decreases after punishments, that is, from 20.93% 1 year before to 11.88% in the third year after punishments. The result is consistent with existing literature on the contagion effects and the indirect deterrence effects, respectively. Lastly, for other innocent firms which interlock with punished ones through punished executives, their probability of financial misstatement before punishments is basically in the same trend as that of punished ones and control ones.<sup>6</sup> However, it has obviously increased after punishments. The probability increases from 5.20% in the year of punishments to 12.85% in the third year after that, which is close to 2.5 times that of before. It indicates that the indirect deterrence effects of regulatory punishments on these innocent firms which interlock with punished ones through punished executives may be invalid and even the quality of these firms may have deteriorated significantly.

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<sup>3</sup>Financial fraud cases, such as cases of Yunnan Greenland, Wanfu Biotechnology, Xintai Electric and Jinya Technology, caused a sensation in the capital market. Now Kangmei Pharmaceutical's financial fraud touches sensitive nerves of investors once again and it is also called the Chinese 'Enron' by the media. <http://stock.jrj.com.cn/2019/05/17221627587936.shtml#>.

<sup>4</sup>Executives mentioned in our paper include directors, supervisors and senior managers.

<sup>5</sup>According to our statistics, about 90% of listed firms' and executives' violations are involved in information disclosure. Because observed violations are significantly affected by other factors, such as regulatory enforcement, we turn to choose financial misstatement indicator which is relatively cleaner than violation indicator.

<sup>6</sup>Before punishments, interlocked firms' probability of financial misstatement is lower than that of control ones. The possible reason is that control firms are comparable to punished ones in the dimensions of matched company characteristics, resulting in their high probability of financial misstatement.

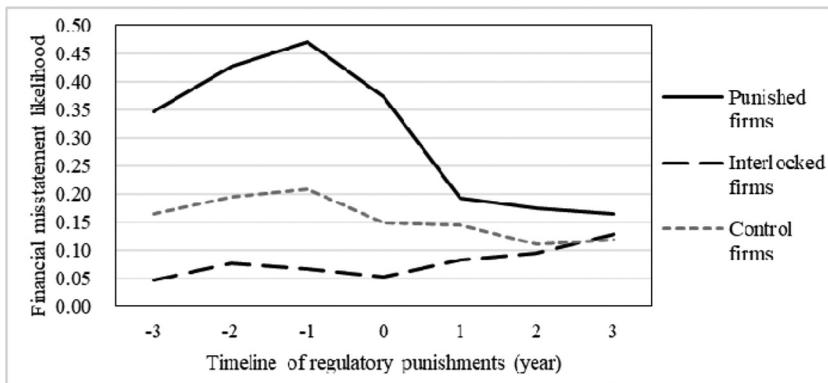


Figure 1. Financial misstatement trend of different firms during regulatory punishments.

Therefore, based on data of securities regulatory punishments from 1991 to 2017, we examine the indirect deterrence effects of regulatory punishments on innocent interlocked firms through punished executives. We find that the financial misstatement decreases for punished firms while increases for innocent firms which interlock with punished ones through punished executives after regulatory punishments. Further, we explore the possible reasons for the failure of the indirect deterrence effects of regulatory punishments. The results indicate that punished executives are more likely to leave these innocent firms after being punished. But at the same time, independent directors actively saying 'no' are more likely to resign from these innocent firms, thus leading to the declining independence of independent directors of these innocent firms. In addition, these innocent firms' auditors do not make adjustment to audit decisions for the rising engagement risk indicated by punished executives. Therefore, the aforementioned negative adjustments exceeding positive adjustments of these innocent firms' corporate governance results in the failure of the indirect deterrence effects of regulatory punishments, finally leading to these innocent firms' value being impaired. To sum up, our findings indicate that the governance effect of 'punish one, teach a hundred' of regulatory punishments depend on the coordination with internal and external corporate governance mechanisms.

The contributions of our paper are mainly reflected in the following aspects. Firstly, most of the researches on the indirect deterrence effects of regulatory punishments only discuss the existence of the effects but do not pay enough attention to the effectiveness and corresponding institutional environment. We show that the indirect deterrence effects may not be achieved by regulatory punishments alone and the effectiveness depends on the coordination with internal and external corporate governance mechanisms, including independent director mechanism and independent audit mechanism. Secondly, most of the researches on the indirect deterrence effects of regulatory punishments only focus on innocent firms in the same industry or region from a cross-sectional perspective, which is susceptible to endogenous problems. Besides, there is lack of studies on the specific impact paths. The time series perspective and the setting of inter-firm executives' interlock networks to identify innocent firms in our paper make the research object more direct and the channels of influence clearer. Thirdly, executives' interlock is an important phenomenon and problem in the field of social networks and

corporate governance. We take the perspective of regulatory punishments and finds that regulatory punishments can activate market reputation mechanism through executives' interlock and prompt innocent firms to dismiss the illegal executives, giving play to the external governance effect. But at the same time, it can prompt independent directors actively saying 'no' to resign from innocent firms due to the risk signal transmitted by punished executives, which impairs corporate governance. Fourthly, the effectiveness of the independent director mechanism has always been the focus of the regulator, the industry and the academics. A large amount of literature has found that independent directors tend to leave from high-risk firms. But given the information disadvantage of independent directors relative to insiders, little existing literature studies the sources of information that independent directors use to judge firms' risk characteristics. We show that colleagues being punished for violation of regulations in other firms is an important decision basis for independent directors to resign to avoid risks.

## 2. Literature review, theoretical analysis and research question

### 2.1. *The contagion effects of misconducts and the indirect deterrence effects of regulatory punishments*

The social learning theory pioneered by Bandura (1968, 1977) holds that each individual can learn not only by his own direct experience but also by observing others' behaviours and corresponding consequences, which is called vicarious learning. Vicarious learning can save individuals from frequent personal trials and enable them to obtain large and systematic behaviour patterns only by observation. Effective observation can teach them general rules and strategies for different situations. Eventually, these observing individuals can be affected by the expectation of behaviours' consequences and adjust their own behaviours accordingly. Vicarious learning can manifest as either the imitative effects or the deterrence effects.

In terms of the imitative effects, individuals can form rational judgements on relevant behaviour strategies from the perspective of benefits and costs by observing others' behaviours and can also more easily accept others' behaviour strategies from the aspect of social psychology. Eventually, they turn to imitate others' behaviour strategies. This is also known as the peer effects in the literature. Such effects are also called the contagion effects for negative behaviours. Bizjak et al. (2009) find that the firms' option backdating strategies can be transmitted to other firms through executives' interlock. Brown (2011) shows that the firms' tax aggressiveness behaviours can also be transmitted to other firms through executives' interlock. Chiu et al. (2013) and Kedia et al. (2015) find that the firms' financial fraud is widely spread through executives' interlock or in the same industry or region. The contagion effects of misconducts can be also reflected in intermediaries, such as auditors and financial consultants (Dimmock et al., 2018; Li et al., 2017). The study of Lu and Chang (2018) indicates that there is a significant contagion effect of information disclosure violations in China's capital market.

In terms of the deterrence effects, when an observing individual sees that others are being punished for certain behaviours, he expects either from the perspective of rational choice or social psychology that the probability of being punished for similar behaviours

will greatly increase, prompting him to restrain his own similar behaviours in the future (Bandura, 1977; Becker, 1968). Unlike the direct deterrence effects of punishments on illegal individuals, restricting observing individuals' future violations from similar punishments is called the indirect deterrence effects or vicarious punishments (Stafford & Warr, 1993). Based on data of China's securities regulatory punishments, Yiu et al. (2014) find that punishments of listed firms' financial fraud can reduce that of other firms in the same industry. D'Acunto et al. (2018) further distinguish the nature of property rights and find that when firms in the same region are punished by CSRC for loan guarantee fraud, local state-owned enterprises are more likely to improve corporate governance than private enterprises, including reducing tunnelling through loan guarantee by private-related parties, increasing the proportion of independent directors and cutting inefficient investments. Xue et al. (2017) focus on executives' corruption and find that exposure to the corruption of listed firms' executives has an indirect deterrence effect on the excessive perks of executives of other firms in the same region or industry. Besides, regulatory punishments imposed on auditors also have an indirect deterrence effect on other innocent auditors (Defond et al., 2018; Yang et al., 2018).

However, as pointed out above, listed firms' violations and securities regulatory punishments are two sides of the same coin. The premise of regulatory punishments is listed firms' violations while the definition of listed firms' violations mainly relies on ex-post regulatory punishments, which makes the aforementioned research conclusions on the contagion effects and the indirect deterrence effects inconsistent. For example, studies on the contagion effects suggest that the more financial fraud of punished firms is, the more financial fraud of other firms in the same industry or region is. But studies on the indirect deterrence effects argue that the more punishments on financial fraud of punished firms are, the less financial fraud of other firms in the same industry or region is. It also leads to that the increase in the number of regulatory punishment cases observed in reality does not directly measure the reinforcement of supervision but may also mean the increase in the number of violations by listed firms under certain enforcement. Executives' interlock between punished firms and other innocent firms through punished executives may be an important mechanism for the generation of both of the contagion effects and the indirect deterrence effects. Therefore, it is necessary to make an in-depth and detailed analysis of the effectiveness of the indirect deterrence effects of regulatory punishments from the perspective of executives' interlock.

## ***2.2. The effectiveness of the indirect deterrence effects of regulatory punishments and the research question***

The reason why regulatory punishments can have the deterrence effects on illegal firms and reduce their occurrence of ex-post violations is not just direct penalties but also related to reputation loss and litigation risk caused by regulatory punishments (Karpoff et al., 2008b). It prompts illegal firms to actively adjust corporate governance to repair their reputation. For example, Farber (2005) finds that the number and proportion of external directors and the number of audit committee meetings held after firms' financial fraud is exposed by the regulator have significantly increased and these firms' market value has recovered afterwards. G. Chen et al. (2005) and Karpoff et al. (2008a) find that

illegal firms are more likely to fire executives after regulatory punishments. In addition, existing literature also shows that regulatory punishments implicate other innocent firms where illegal executives work for and knock down their stock price. Hence, these illegal executives are punished by the labour market and they are more likely to lose their positions in other innocent firms after regulatory punishments (Cu, 2011; Fich & Shivdasani, 2007; Karpoff et al., 2008a). It means that regulatory punishments can prompt innocent firms to maintain reputation by dismissing illegal executives. Therefore, if regulatory punishments play a deterrence role in innocent firms which interlock with punished ones through punished executives and lead to positive adjustments to their corporate governance, the quality of these firms will be improved and the indirect deterrence effects of regulatory punishments will be established.

However, in fact, the indirect deterrence effects of regulatory punishments on innocent firms may have the following institutional resistance. The first one is the effectiveness of independent director mechanism. The independent director mechanism is considered to be one of the important mechanisms to alleviate the agency conflicts between shareholders and managers (Fama & Jensen, 1983). But in reality, the effectiveness of independent director mechanism in China is highly questioned. In the face of negative events, independent directors tend to adopt risk aversion strategies and leave firms with high risks (Dou, 2017; Fahlenbrach et al., 2017; Xin et al., 2013). One reason is that firms with negative events need independent directors to invest more time and energy to improve firms' situation but the nature and number of part-time jobs of independent directors strictly limit the time and energy they can allocate (Fich & Shivdasani, 2006; Masulis & Mobbs, 2014). Another reason is that the negative events increase the reputation risk and litigation risk faced by independent directors, resulting in the decreasing number of their part-time jobs in firms and the increasing probability of being sued by investors (Brochet & Srinivasan, 2014; Fich & Shivdasani, 2007). As a result, colleagues being punished by the regulator has sent negative signals about firms' situation to independent directors and being in the same organisation with illegal colleagues may affect their reputation. The independent directors are more sensitive to the risks of these innocent firms. The consequent voluntary departure of these independent directors may lead to the declining independence of independent directors and worsen the governance of these innocent firms. Furthermore, there is a serious 'reverse elimination' effect of independent directors in China's listed firms. Independent directors actively saying 'no' in independent opinions are more likely to leave and have a lower probability of reappointment (R. Chen et al., 2015; Tang et al., 2010; Zheng et al., 2016). Hence, independent directors who actively express negative opinions in innocent firms with illegal colleagues and poor quality are forced to leave, resulting in the declining independence of independent directors and deterioration of the governance of these innocent firms. Therefore, lack of the effectiveness of independent director mechanism is likely to invalidate the indirect deterrence effects of regulatory punishments.

The second one is the effectiveness of independent audit mechanism. Independent audit mechanism is an important part of information disclosure mechanism of the capital market. Independent audit helps to improve the credibility of accounting information disclosed by firms and alleviate agency problems arising from the separation of residual control rights and residual claim rights (Jensen & Meckling, 1976). On one hand, a large number of studies have shown that market reputation mechanism plays an important role

in the engagement of auditors in China (Fang, 2011). The reputation risk and litigation risk caused by regulatory punishments can lead to the loss of customers and the prosecution by investors. Therefore, illegal executives being punished in innocent firms can attract the attention of auditors. Auditors will adjust their audit decisions to be cautious and the audit quality will be correspondingly high, which in turn improves the quality of these innocent firms. On the other hand, the effectiveness of independent audit mechanism is affected by institutional environment. From the supply side, the litigation risk faced by auditors in China is relatively low (Ke et al., 2015) and auditors' independence is significantly influenced by market competition and social ties (Guan et al., 2016). From the demand side, soft budget constraint caused by government intervention has made investors lack the demand for high-quality audits (Wang et al., 2008). Therefore, auditors may not respond adequately to regulatory punishments of illegal executives and the corresponding audit decisions will not be effectively adjusted, thus allowing the governance of these innocent firms to deteriorate. As a result, lack of the effectiveness of independent audit mechanism may also exacerbate the failure of the indirect deterrence effects of regulatory punishments.

Therefore, the effectiveness of the indirect deterrence effects of regulatory punishments is an empirical issue. We conduct detailed empirical tests in the following parts.

### 3. Research design

#### 3.1. Sample selection

To investigate whether regulatory punishments have the indirect deterrence effects on innocent firms through executives' interlock, we select a sample of non-financial A-share listed firms' violation cases punished by CSRC, Shanghai Stock Exchange and Shenzhen Stock Exchange from 1991 to 2017. Considering that concurrent violations of listed firms and executives mainly involve information disclosure and to characterise the indirect deterrence effects of regulatory punishments more clearly, we further select a subsample of information disclosure violation cases from the aforementioned sample.<sup>7</sup> Table 1 reports the distribution of information disclosure violation cases of non-financial A-share listed firms and executives by year and industry. It can be found that the number of these information disclosure violation cases peaks in 2005, then falls back and has increased sharply since 2011. At the same time, the number of these cases mainly concentrates in industries of machines, information technology and Petroleum.

Then, we convert the regulatory punishment cases into the corresponding firm-year sample. We also delete the sample facing bankruptcy and having missing variables. After these steps, we obtain 2,378 observations for punished firms with 3 years before and after regulatory punishments, respectively, as the benchmark sample, namely the punished sample. Next, we get other innocent firms which interlock with punished ones through punished executives according to these executives' interlock networks, thereby obtaining 1,050 observations for interlocked innocent firms with 3 years before and after regulatory punishments, respectively, as the main test sample, namely the interlocked sample. Data

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<sup>7</sup>According to the aforementioned statistics, violations of information disclosure account for more than 90% of all violations. The newly established Sci-Tech Innovation Board and the pilot of the registration system in China also focus on information disclosure.

**Table 1.** Distribution of information disclosure violation cases of listed firms and executives.

Panel A: By year			Panel B: By industry		
Year	Number	Frequency (%)	Industry	Number	Frequency (%)
1998	6	0.42	Agriculture and Fishery	49	3.43
1999	7	0.49	Mining	54	3.78
2000	11	0.77	Food/Beverage	65	4.56
2001	26	1.82	Textiles	43	3.01
2002	27	1.89	Paper/Printing	20	1.40
2003	39	2.73	Petroleum	140	9.81
2004	67	4.70	Electronic	13	0.91
2005	75	5.26	Metal/Non-metal	111	7.78
2006	57	3.99	Machines	205	14.37
2007	56	3.92	Pharmaceutical	82	5.75
2008	47	3.29	Furniture/Others	25	1.75
2009	44	3.08	Utilities	45	3.15
2010	53	3.71	Construction	47	3.29
2011	40	2.80	Transportation and Logistics	21	1.47
2012	67	4.70	Information Technology	171	11.98
2013	82	5.75	Wholesales and Retail	107	7.50
2014	150	10.51	Real estate	126	8.83
2015	145	10.16	Service	55	3.85
2016	206	14.44	Communication	20	1.40
2017	222	15.56	Others	28	1.96
Total	1,427	100	Total	1,427	100

of regulatory punishments, data of executives' interlock and firms' financial and governance data are all collected from CSMAR database. To ensure the accuracy of data, we also conduct manual verification with listed firms' annual reports and online searches.

### 3.2. Research model

We use the following regression model to test the direct deterrence effects and the indirect deterrence effects of regulatory punishments on the punished sample and the interlocked sample, respectively. Accordingly, we analyse the total effect of regulatory punishments without considering the control sample:<sup>8</sup>

$$RESTATE = \beta_0 + \beta_1 * POST + \beta_2 * Controls + \sum Industry + \sum Year + \varepsilon \quad (1)$$

The dependent variable *RESTATE* is financial misstatement, defined as a dummy that equals 1 if the current-year annual report of the firm is subsequently restated and 0 otherwise. The reason for choosing financial misstatement to characterise the deterrence effects of regulatory punishments is that financial misstatement is a widely used indicator in the literature of corporate misconducts, closely related to firms' information disclosure and not directly affected by supervision enforcement as financial fraud.

The independent variable *POST* is an event variable. When testing the direct deterrence effects by using the punished sample, *POST* is defined as a dummy that equals 1 for the years when and after firms (and executives) are punished and 0 otherwise. When testing

<sup>8</sup>We focus on the indirect deterrence effects of regulatory punishments, with the direct deterrence effects of regulatory punishments mainly for comparative analysis. The total effect here refers to not considering the impact of changes in the control group due to regulatory punishments and only focusing on changes in the treatment group due to regulatory punishments. The net effect below refers to net changes that equal changes in the treatment group minus changes in the control group due to regulatory punishments.

the indirect deterrence effects by using the interlocked sample, *POST* is defined as a dummy that equals 1 for the years when and after executives are punished for their legal responsibilities in other firms they interlock and 0 otherwise. If the regression coefficient  $\beta_1$  is significantly negative, it means that regulatory punishments have a deterrence effect. If  $\beta_1$  is not significant or significantly positive, it indicates that the deterrence effect of regulatory punishments fails and even the quality of firms deteriorates.

Meanwhile, we control several control variables in Model (1), including firms' size (*SIZE*), leverage (*LEV*), cash flow (*OCF*), profitability (*ROA*), growth (*GROWTH*), nature of property rights (*SOE*), ownership structure (*LARGEST*), auditors' characteristic (*BIG*) and institutional environment (*MARKET*). Table 2 provides detailed definitions of all of the variables. We also control industry-fixed effect and year-fixed effect in Model (1). To control the influence of outliers, we winsorise all continuous variables with the threshold of 1%. To control the potential cross-sectional correlated problem, we cluster the standard error at the firm level in all regressions.

To make sure the results are robust, we also adopt difference-in-differences (DID) model by constructing the control sample to test the direct deterrence effects and the indirect deterrence effects of regulatory punishments. Specifically, we get the control sample from samples that firms (and executives) are not punished and do not have executives that are punished for their legal responsibilities in other firms they interlock (that is, non-punished and non-interlocked sample) by using the Propensity Score Matching method. The matching rule is the same industry, the same region and the closest aforementioned control variables. The matching time is 1 year before of regulatory punishments for the punished sample or interlocked sample. We use the following regression model to test the direct deterrence effects and the indirect deterrence effects of regulatory punishments on the punished and control sample and the interlocked and control sample, respectively. Accordingly, we analyse the net effect of regulatory punishments with considering the control sample:

$$RESTATE = \beta_0 + \beta_1 * TREATPOST + \beta_2 * Controls + \sum Firm + \sum Year + \varepsilon \quad (2)$$

Model (2) is a more rigorous difference-in-differences model. The firm-fixed effect and year-fixed effect absorb the dummy variable *TREAT* that distinguishes the treatment group and the control group and the dummy variable *POST* that distinguishes before and after the event. The independent variable *TREATPOST* is equivalent to *TREAT\*POST*. When testing the direct deterrence effects by using the punished and control sample, *TREATPOST* is defined as a dummy that equals 1 for the years when and after firms (and executives) are punished and 0 otherwise. When testing the indirect deterrence effects by using the interlocked and control sample, *TREATPOST* is defined as a dummy that equals 1 for the years when and after executives are punished for their legal responsibilities in other firms they interlock and 0 otherwise. The control variables are the same as those in Model (1).

**Table 2.** Variable definitions.

Variables	Definitions
Variables used in Model (1) and (2)	
<i>RESTATE</i>	1 if the current-year annual report of the firm is subsequently restated, and 0 otherwise.
<i>SIZE</i>	Natural logarithm of total assets at the end of the current year.
<i>LEV</i>	Total liabilities divided by total assets at the end of the current year.
<i>OCF</i>	Operating cash flow divided by total assets at the end of the current year.
<i>ROA</i>	Net income divided by total assets at the end of the current year.
<i>GROWTH</i>	Difference between current- and prior-year sales, divided by prior-year sales.
<i>SOE</i>	1 if the firm's ultimate shareholder is a government entity, and 0 otherwise.
<i>LARGEST</i>	Percentage of ownership held by the largest shareholder.
<i>BIG</i>	1 if the current-year annual report is audited by a top 10 CPA firm (as defined by total audit fees in the current year of audits), and 0 otherwise.
<i>MARKET</i>	Decile ranking (0–9, divided by 9) of the marketisation index for the province in which the firm is located (Guan et al., 2016).
Variables used in other tests later	
<i>CHANGE_CEO</i>	1 if the company changes its CEO in the current year, and 0 otherwise.
<i>REJECT</i>	1 if the independent director gives opinions other than approval when voting on the proposals in the current year, and 0 otherwise.
<i>CHANGE_ID</i>	1 if the independent director leaves the firm in the current year, and 0 otherwise.
<i>CHANGE2_ID</i>	1 if the independent director voluntarily leaves the firm (turnover within his first term) in the current year, and 0 otherwise.
<i>CHANGE_AUD</i>	1 if the company changes its audit firm in the current year, and 0 otherwise.
<i>LNFFEE</i>	Natural logarithm of audit fees paid to the auditor in the current year.
<i>MAO</i>	1 if the audit opinion in the current year is a modified opinion (including unqualified opinions with explanatory notes, qualified opinions, disclaimer opinions, and adverse opinions), and 0 otherwise.
<i>TOBINQ</i>	Sum of market value of equities and book value of total liabilities, divided by book value of total assets at the end of the current year.
<i>INVR</i>	Inventory divided by total assets at the end of the current year.
<i>RECR</i>	Accounts receivable divided by total assets at the end of the current year.
<i>QUICK</i>	Difference between current assets and inventories, divided by current liabilities at the end of the current year.
<i>LOSS</i>	1 if the firm reports losses in the current year, and 0 otherwise.
<i>MA</i>	1 if the firm has a merger or acquisition in the current year, and 0 otherwise.
<i>SEO</i>	1 if the firm issues new shares in the current year, and 0 otherwise.
<i>BOARD</i>	Natural logarithm of 1 plus the number of directors in the board in the current year.
<i>INDEP</i>	Number of independent directors divided by number of directors in the board in the current year.
<i>DUAL</i>	1 if the chairman of the board also holds position of CEO in the current year, and 0 otherwise.
<i>LAGMAO</i>	One-year lagged value of <i>MAO</i> .
<i>MALE_ID</i>	1 if the independent director is male, and 0 otherwise.
<i>FIN_ID</i>	1 if the independent director has working background on accounting or finance, and 0 otherwise.
<i>GOV_ID</i>	1 if the independent director has political background, and 0 otherwise.
<i>SCH_ID</i>	1 if the independent director has academic background, and 0 otherwise.
<i>AGE_ID</i>	Natural logarithm of 1 plus the age of the independent director.
<i>TENURE_ID</i>	Natural logarithm of 1 plus the tenure of the independent director.

### 3.3. Descriptive statistics

Table 3 reports the descriptive statistics of variables for the punished sample and the interlocked sample. It can be found that the average probability of financial misstatement of punished firms is 0.300 while that of interlocked firms is 0.089, indicating that misconducts of punished firms are indeed more serious than those of interlocked innocent firms. In the dimension of corporate finance and governance, the status of punished firms is also worse than that of interlocked ones. For example, these punished firms have higher leverage, worse cash flow and profitability, slower revenue growth, lower probability to hire big audit firms and poorer institutional environment of the regions where they headquarter.

**Table 3.** Descriptive statistics.

Panel A: Punished sample								
Variables	N	Mean	SD	Min	P25	P50	P75	Max
RESTATE	2,378	0.300	0.458	0	0	0	1	1
SIZE	2,378	21.500	1.219	18.979	20.621	21.373	22.183	24.881
LEV	2,378	0.531	0.208	0.061	0.379	0.553	0.683	0.958
OCF	2,378	0.034	0.099	-0.274	-0.013	0.032	0.081	0.372
ROA	2,378	0.005	0.080	-0.302	0.002	0.015	0.040	0.195
GROWTH	2,378	0.210	0.704	-0.718	-0.092	0.090	0.287	4.345
SOE	2,378	0.491	0.500	0	0	0	1	1
LARGEST	2,378	0.340	0.153	0.094	0.223	0.299	0.430	0.750
BIG	2,378	0.407	0.491	0	0	0	1	1
MARKET	2,378	0.683	0.305	0	0.444	0.778	1	1

Panel B: Interlocked sample								
Variables	N	Mean	SD	Min	P25	P50	P75	Max
RESTATE	1,050	0.089	0.284	0	0	0	0	1
SIZE	1,050	21.753	1.262	19.089	20.887	21.636	22.368	25.513
LEV	1,050	0.493	0.210	0.060	0.324	0.511	0.649	0.928
OCF	1,050	0.058	0.101	-0.274	0.009	0.057	0.109	0.372
ROA	1,050	0.036	0.055	-0.190	0.011	0.034	0.066	0.170
GROWTH	1,050	0.224	0.595	-0.636	-0.015	0.125	0.295	4.080
SOE	1,050	0.608	0.489	0	0	1	1	1
LARGEST	1,050	0.362	0.153	0.101	0.242	0.321	0.473	0.743
BIG	1,050	0.425	0.495	0	0	0	1	1
MARKET	1,050	0.732	0.280	0	0.556	0.778	1	1

## 4. Empirical results and analysis

### 4.1. Results of the deterrence effects of regulatory punishments

Table 4 reports the results of the deterrence effects of regulatory punishments. Columns (1)–(3) of Panel A show the results of the direct deterrence effects of regulatory punishments based on the punished sample. The result in Column (1) indicates that financial misstatement of punished firms is significantly reduced after regulatory punishments. Regulatory punishments reduce the probability of financial misstatement of punished firms by about 14.90%, which is economically significant. In Column (2), we distinguish between before and after regulatory punishments. For the punished sample,  $POST^{-1}$  is defined as a dummy that equals 1 for 1 year before firms (and executives) are punished and 0 otherwise;  $POST^0$  is defined as a dummy that equals 1 for the year firms (and executives) are punished and 0 otherwise;  $POST^1$  is defined as a dummy that equals 1 for 1 year after firms (and executives) are punished and 0 otherwise;  $POST^2$  is defined as a dummy that equals 1 for the second year and subsequent years after firms (and executives) are punished and 0 otherwise. The result indicates that the probability of financial misstatement of punished firms before regulatory punishments is significantly higher while it is significantly reduced after regulatory punishments. We further investigate the impact of the degree of regulatory punishments in Column (3). According to Xin et al. (2013), we define the variable of the degree of regulatory punishments *SEVERITY* based on the type of punishments. It is an ordered categorical variable that equals 1 for other type of punishments, 2 for criticism, 3 for condemnation, 4 for warning, 5 for fine or confiscation of illegal income and 6 for banning the entry into the securities market or ordering to close. The result indicates that when regulatory punishments are severer, its

**Table 4.** Regulatory punishments and financial misstatement.

Panel A: Total effect						
Variables	Punished sample			Interlocked sample		
	(1)	(2)	(3)	(4)	(5)	(6)
<i>RESTATE</i>	<i>RESTATE</i>	<i>RESTATE</i>	<i>RESTATE</i>	<i>RESTATE</i>	<i>RESTATE</i>	<i>RESTATE</i>
<i>POST</i>	-0.796*** (-6.327)		-0.222 (-1.088)	0.651** (2.161)		0.918 (0.987)
<i>POST</i> <sup>-1</sup>		0.334*** (2.630)			0.551 (1.588)	
<i>POST</i> <sup>0</sup>		-0.117 (-0.724)			0.372 (0.850)	
<i>POST</i> <sup>1</sup>		-0.907*** (-4.895)			0.924* (1.947)	
<i>POST</i> <sup>2</sup>		-0.994*** (-5.525)			1.280*** (2.948)	
<i>POST</i> * <i>SEVERITY</i>			-0.309*** (-3.674)			-0.114 (-0.334)
<i>SEVERITY</i>			0.156** (2.182)			0.221 (0.788)
<i>SIZE</i>	0.042 (0.562)	0.035 (0.465)	0.049 (0.649)	0.250 (1.514)	0.256 (1.515)	0.241 (1.473)
<i>LEV</i>	-0.313 (-0.851)	-0.330 (-0.880)	-0.369 (-0.997)	0.915 (1.019)	0.834 (0.922)	0.924 (1.040)
<i>OCF</i>	-0.382 (-0.607)	-0.415 (-0.664)	-0.341 (-0.544)	-1.538 (-1.014)	-1.363 (-0.882)	-1.489 (-0.976)
<i>ROA</i>	-2.462*** (-3.418)	-2.157*** (-2.926)	-2.478*** (-3.421)	-1.074 (-0.429)	-1.070 (-0.413)	-1.010 (-0.401)
<i>GROWTH</i>	-0.011 (-0.132)	-0.001 (-0.013)	-0.010 (-0.122)	0.206 (0.958)	0.239 (1.072)	0.223 (1.020)
<i>SOE</i>	-0.522*** (-3.425)	-0.504*** (-3.272)	-0.518*** (-3.354)	0.742** (2.184)	0.783** (2.277)	0.753** (2.185)
<i>LARGEST</i>	-0.819 (-1.635)	-0.883* (-1.735)	-0.824 (-1.632)	-0.211 (-0.218)	-0.222 (-0.227)	-0.205 (-0.210)
<i>BIG</i>	-0.122 (-0.921)	-0.120 (-0.900)	-0.124 (-0.929)	-0.294 (-0.958)	-0.346 (-1.086)	-0.275 (-0.886)
<i>MARKET</i>	-0.166 (-0.757)	-0.179 (-0.802)	-0.158 (-0.711)	-0.849* (-1.798)	-0.868* (-1.805)	-0.823* (-1.771)
Industry & Year	YES	YES	YES	YES	YES	YES
Pseudo R <sup>2</sup>	0.094	0.106	0.100	0.158	0.169	0.159
N	2,378	2,378	2,378	1,050	1,050	1,050

## Panel B: Net effect

Variables	Punished and control sample			Interlocked and control sample		
	(1)	(2)	(3)	(4)	(5)	(6)
<i>RESTATE</i>	<i>RESTATE</i>	<i>RESTATE</i>	<i>RESTATE</i>	<i>RESTATE</i>	<i>RESTATE</i>	<i>RESTATE</i>
<i>TREATPOST</i>	-0.642*** (-3.498)		-0.071 (-0.285)	0.727** (2.103)		1.370 (1.400)
<i>TREATPOST</i> <sup>-1</sup>		0.630*** (3.268)			0.245 (0.512)	
<i>TREATPOST</i> <sup>0</sup>		0.069 (0.301)			0.049 (0.092)	
<i>TREATPOST</i> <sup>1</sup>		-0.988*** (-3.419)			0.716 (1.334)	
<i>TREATPOST</i> <sup>2</sup>		-1.059*** (-3.132)			0.939* (1.733)	
<i>TREATPOST</i> * <i>SEVERITY</i>			-0.314*** (-3.334)			-0.254 (-0.701)
<i>SIZE</i>	0.263 (1.640)	0.221 (1.349)	0.267* (1.668)	0.189 (0.728)	0.193 (0.741)	0.183 (0.702)
<i>LEV</i>	-0.463 (-0.817)	-0.836 (-1.436)	-0.559 (-0.982)	-0.206 (-0.200)	-0.236 (-0.229)	-0.178 (-0.173)
<i>OCF</i>	0.527	0.526	0.595	0.094	0.084	0.123

(Continued)

Table 4. (Continued).

	(0.863)	(0.849)	(0.971)	(0.092)	(0.082)	(0.120)
ROA	-1.840**	-1.268	-1.931**	-4.249**	-4.301**	-4.245**
	(-2.106)	(-1.394)	(-2.185)	(-2.155)	(-2.175)	(-2.153)
GROWTH	-0.045	-0.030	-0.034	0.160	0.164	0.160
	(-0.524)	(-0.346)	(-0.389)	(1.306)	(1.328)	(1.306)
SOE	-0.382	-0.237	-0.353	-0.024	-0.037	-0.037
	(-1.422)	(-0.862)	(-1.309)	(-0.047)	(-0.069)	(-0.070)
LARGEST	-0.225	-0.263	-0.047	-0.508	-0.519	-0.527
	(-0.264)	(-0.301)	(-0.054)	(-0.309)	(-0.315)	(-0.320)
BIG	-0.228	-0.193	-0.208	-0.132	-0.132	-0.124
	(-1.269)	(-1.056)	(-1.162)	(-0.441)	(-0.440)	(-0.414)
MARKET	0.107	0.289	0.096	-0.774	-0.764	-0.857
	(0.099)	(0.263)	(0.089)	(-0.476)	(-0.470)	(-0.527)
Firm & Year	YES	YES	YES	YES	YES	YES
Pseudo R <sup>2</sup>	0.116	0.146	0.123	0.072	0.073	0.072
N	3,186	3,186	3,186	1,995	1,995	1,995

Z-statistics based on robust standard errors that are clustered by firm are displayed in parentheses. \*\*\*, \*\* and \* represent 1%, 5% and 10% significance levels, respectively, based on a two-tailed test. *SEVERITY* in Column (3) and (6) of Panel B are automatically deleted due to collinearity problem.

effect of reducing financial misstatement is stronger.<sup>9</sup> Therefore, the aforementioned results indicate that regulatory punishments can have the direct deterrence effects on firms that violate regulations.

Next, we examine the indirect deterrence effects of regulatory punishments. Columns (4)–(6) of Panel A show the results of the indirect deterrence effects of regulatory punishments based on the interlocked sample. The result in Column (4) indicates that financial misstatement of innocent firms which interlock with punished ones through punished executives increases significantly after regulatory punishments. Regulatory punishments increase the probability of financial misstatement of interlocked innocent firms by about 6.01%, which is economically significant. In Column (5), we distinguish between before and after regulatory punishments. For the interlocked sample, the definitions of  $POST^{-1}$ ,  $POST^0$ ,  $POST^1$  and  $POST^2$  are similar to those in Column (2). The only difference is that the event is executives being punished for their legal responsibilities in other firms they interlock. The result indicates that the probability of financial misstatement of interlocked innocent firms increases significantly after the illegal executives are punished. In Column (6), we further investigate the impact of the degree of regulatory punishments. The definition of the degree of regulatory punishments is the same as that in Column (3). The result indicates that the degree of regulatory punishments is not significantly correlated with the indirect deterrence effects of regulatory punishments on interlocked innocent firms. Therefore, the aforementioned results indicate that the indirect deterrence effects of regulatory punishments on innocent firms which interlock with punished ones through punished executives fail.

<sup>9</sup>The coefficient of *SEVERITY* in Column (3) of Panel A is significantly positive, indicating that before regulatory punishments ( $POST = 0$ ), the severer the punishments are, the more serious the violations are, and the higher the probability of financial misstatement of punished firms is. This result is as expected. The coefficient of *SEVERITY* in Column (6) of Panel A is not significant, indicating that before regulatory punishments ( $POST = 0$ ), the degree of violation of punished firms is not significantly correlated with the probability of financial misstatement of innocent firms. This result is also as expected.

Correspondingly, we also do the aforementioned tests by adding the control sample and using the DID model. Columns (1)-(3) of Panel B report the results of the direct deterrence effects of regulatory punishments based on the punished and control sample. Columns (4)-(6) of Panel B report the results of the indirect deterrence effects of regulatory punishments based on the interlocked and control sample. The findings are consistent with those in Panel A.

In summary, there are the direct deterrence effects of regulatory punishments on punished firms while its indirect deterrence effects on interlocked firms fail. Therefore, in the following parts, we try to analyse the reasons for the failure of the indirect deterrence effects of regulatory punishments.

#### **4.2. Analysis of the failure of the indirect deterrence effects of regulatory punishments**

Based on the aforementioned theoretical analysis, we analyse the impact of regulatory punishments on firms' CEOs, independent directors and auditors step by step. Firstly, we examine the impact of regulatory punishments on CEO turnover. Existing literature shows that regulatory punishments take effect through market reputation mechanisms. They can not only prompt punished firms to dismiss punished executives (G. Chen et al., 2005; Karpoff et al., 2008a) but also prompt innocent firms to dismiss executives who are punished for their legal responsibilities in other firms (Cu, 2011; Fich & Shivdasani, 2007; Karpoff et al., 2008a). Hence, we define the CEO turnover variable *CHANGE\_CEO*. *CHANGE\_CEO* is a dummy that equals 1 if the firm changes its CEO and 0 otherwise. Table 5 reports the results on CEO turnover. Columns (1)-(2) of Panel B show the results of the direct deterrence effects of regulatory punishments based on the punished and control sample. The result in Column (1) indicates that the probability of CEO turnover in punished firms increases significantly after regulatory punishments. In Column (2), we distinguish whether the CEO is punished for violation of regulations and define the corresponding variable *GUILT\_CEO*. *GUILT\_CEO* is a dummy that equals 1 if the CEO is punished for violation of regulations and 0 otherwise. The result indicates that the probability of punished CEO turnover in punished firms increases significantly after regulatory punishments.<sup>10</sup> Columns (3)-(4) of Panel B show the results of the indirect deterrence effects of regulatory punishments based on the interlocked and control sample. The result in Column (3) indicates that the probability of CEO turnover in interlocked innocent firms increases significantly after regulatory punishments. In Column (4), we distinguish whether the CEO is punished for violation of regulations and define the corresponding variable *GUILT\_CEO*. The definition of *GUILT\_CEO* is similar to that in Column (2). The only difference is that CEO in innocent firms is punished for their legal responsibilities in other firms they interlock. The result indicates that the probability of punished CEO turnover in interlocked innocent firms increases significantly after regulatory punishments.

In summary, regulatory punishments prompt interlocked innocent firms to actively adjust corporate governance to maintain reputation by dismissing punished executives. So, this is not the reason for the failure of the indirect deterrence effects of regulatory punishments.



Table 5. Regulatory punishments and CEO turnover.

Variables	Panel A: Total effect				Panel B: Net effect			
	Punished sample		Interlocked sample		Punished and control sample		Interlocked and control sample	
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
POST	CHANGE_CEO 0.359** (2.195)	CHANGE_CEO 0.067 (0.338)	CHANGE_CEO 0.326 (1.232)	CHANGE_CEO 0.304 (1.145)	CHANGE_CEO 0.349** (2.234)	CHANGE_CEO 0.133 (0.719)	CHANGE_CEO 0.405* (1.931)	CHANGE_CEO 0.195 (1.279)
POST*GUILT_CEO		0.700** (2.240)		13.028*** (11.272)		0.646** (2.159)		2.412*** (4.713)
GUILT_CEO		-0.490* (-1.781)		-10.425*** (-7.682)				
SIZE	-0.017 (-0.179)	-0.017 (-0.174)	-0.072 (-0.468)	-0.072 (-0.460)	0.205 (1.270)	0.198 (1.231)	0.791*** (3.238)	0.057 (0.694)
LEV	0.479 (1.206)	0.476 (1.185)	0.879 (1.111)	1.044 (1.309)	0.857 (1.335)	0.888 (1.378)	-0.434 (-0.478)	0.264 (0.557)
ROA	-3.393*** (-3.583)	-3.412*** (-3.558)	-0.370 (-0.148)	-0.373 (-0.148)	-1.511 (-1.493)	-1.508 (-1.476)	-2.670 (-1.419)	-3.179*** (-2.152)
GROWTH	0.104 (1.027)	0.097 (0.954)	0.329* (1.824)	0.336* (1.863)	0.156* (1.749)	0.152* (1.699)	0.052 (0.417)	0.265** (2.484)
SOE	-0.152 (-0.952)	-0.165 (-1.035)	0.716* (1.851)	0.693* (1.787)	0.022 (0.057)	-0.041 (-0.105)	2.505*** (2.640)	0.425** (1.962)
LARGEST	-0.855 (-1.494)	-0.838 (-1.457)	0.475 (0.336)	0.463 (0.320)	-0.906 (-0.884)	-0.985 (-0.952)	1.977 (1.101)	-0.329 (-0.428)
BOARD	-0.960** (-2.539)	-0.951** (-2.499)	-2.282** (-2.515)	-2.440*** (-2.698)	-2.729*** (-4.106)	-2.674*** (-4.013)	-2.796*** (-2.815)	-1.876*** (-3.166)
DUAL	0.004 (0.025)	-0.002 (-0.013)	-0.048 (-0.132)	-0.032 (-0.088)	0.214 (1.012)	0.191 (0.905)	0.679** (2.184)	-0.006 (-0.027)
MARKET	-0.243 (-0.767)	-0.258 (-0.810)	-0.711 (-1.559)	-0.756 (-1.644)	-0.659 (-0.485)	-0.675 (-0.498)	2.434 (1.271)	-0.482 (-1.530)
Industry & Year	YES	YES	YES	YES	YES	YES	YES	YES
Pseudo R <sup>2</sup>	0.099	0.102	0.144	0.148	0.078	0.082	0.106	0.110
N	2,378	2,378	1,050	1,050	3,186	3,186	1,995	1,995

Z-statistics based on robust standard errors that are clustered by firm are displayed in parentheses. \*\*\*, \*\* and \* represent 1%, 5% and 10% significance levels, respectively, based on a two-tailed test. TREAT\*GUILT\_CEO and POST\*GUILT\_CEO in Column (2) and (4) of Panel B are automatically deleted due to collinearity problem. GUILT\_CEO in Column (2) and (4) of Panel B are automatically deleted due to non-within-group variation.

**Table 6.** Regulatory punishments and voting opinions of independent directors.

Panel A: Total effect			Panel B: Net effect		
	Punished sample	Interlocked sample		Punished and control sample	Interlocked and control sample
	(1)	(2)		(1)	(2)
Variables	<i>REJECT</i>	<i>REJECT</i>	Variables	<i>REJECT</i>	<i>REJECT</i>
<i>RESTATE</i>	0.529 (1.325)	1.649* (1.749)	<i>RESTATE</i>	2.673 (1.310)	1.053 (0.872)
<i>RESTATE*POST</i>	0.027 (0.046)	-2.913*** (-2.845)	<i>RESTATE*TREATPOST</i>	1.145 (0.654)	-5.494** (-2.098)
<i>POST</i>	0.113 (0.286)	0.105 (0.196)	<i>TREATPOST</i>	-0.294 (-0.692)	1.447 (1.628)
			<i>RESTATE*TREAT</i>	-2.279 (-1.086)	0.384 (0.246)
			<i>RESTATE*POST</i>	-0.995 (-0.609)	0.843 (0.473)
<i>SIZE</i>	-0.258* (-1.677)	-0.023 (-0.093)	<i>SIZE</i>	-0.942** (-2.244)	-1.881** (-2.154)
<i>LEV</i>	-0.087 (-0.104)	-0.336 (-0.277)	<i>LEV</i>	1.768 (1.467)	8.580*** (2.767)
<i>ROA</i>	-1.221 (-0.896)	-10.974** (-2.418)	<i>ROA</i>	1.362 (0.787)	12.554* (1.955)
<i>GROWTH</i>	0.054 (0.298)	-0.298 (-0.544)	<i>GROWTH</i>	-0.122 (-0.568)	-0.704 (-1.049)
<i>MA</i>	-0.080 (-0.303)	0.500 (0.886)	<i>MA</i>	0.165 (0.591)	0.584 (1.172)
<i>SEO</i>	-1.180* (-1.715)	0.145 (0.170)	<i>SEO</i>	-0.634 (-1.129)	-0.105 (-0.176)
<i>SOE</i>	-0.261 (-0.965)	-0.875 (-1.621)	<i>SOE</i>	0.087 (0.157)	0.136 (0.098)
<i>LARGEST</i>	-1.050 (-1.073)	0.381 (0.228)	<i>LARGEST</i>	-1.998 (-0.855)	-2.414 (-0.580)
<i>BOARD</i>	1.721** (2.275)	1.418 (1.154)	<i>BOARD</i>	0.302 (0.282)	-6.604** (-2.200)
<i>INDEP</i>	4.471 (1.608)	7.296 (1.593)	<i>INDEP</i>	1.658 (0.621)	9.757* (1.880)
<i>MARKET</i>	0.922** (1.997)	0.669 (0.687)	<i>MARKET</i>	3.345 (1.380)	-0.535 (-0.127)
Industry & Year	YES	YES	Firm & Year	YES	YES
Pseudo R <sup>2</sup>	0.203	0.194	Pseudo R <sup>2</sup>	0.069	0.213
N	2,106	868	N	2,885	1,908

Z-statistics based on robust standard errors that are clustered by firm are displayed in parentheses. \*\*\*, \*\* and \* represent 1%, 5% and 10% significance levels, respectively, based on a two-tailed test.

Secondly, we examine the impact of regulatory punishments on the independence of independent directors. Independent directors actively saying 'no' in their voting is an important manifestation of their independence (Tang et al., 2010). Accordingly, we analyse the independence of independent directors from their voting on firms' financial misstatement. Table 6 reports the impact of regulatory punishments on the voting opinions of independent directors. According to existing literature (Tang et al., 2010; Zheng et al., 2016), we define the voting opinion variable *REJECT*. *REJECT* is a dummy that equals 1 if firms' independent directors give opinions other than approval when voting on the proposals and 0 otherwise. It can be found from Column (1) of Panel B that there is no significant change of the independent directors' voting opinions on financial misstatement in punished firms after regulatory punishments.<sup>11</sup> In Column (2) of Panel B, we find that the previous behaviour of independent directors in innocent firms which interlock

**Table 7.** Regulatory punishments and individual independent director turnover.

Panel A: Total effect			Panel B: Net effect		
Variables	Interlocked sample		Variables	Interlocked and control sample	
	(1)	(2)		(1)	(2)
<i>CHANGE2_ID</i>	1.425*** (5.962)	0.960*** (3.013)	<i>CHANGE2_ID</i>	0.927*** (4.642)	0.638*** (2.578)
<i>POST</i>	1.382* (1.953)	1.482** (1.960)	<i>TREATPOST</i>	3.180** (2.562)	2.947** (2.415)
<i>POST*REJ</i>	-1.364* (-1.908)	-1.588** (-2.057)	<i>TREATPOST*REJ</i>	-2.024 (-1.470)	-2.160 (-1.576)
<i>REJ</i>			<i>REJ</i>	0.625 (0.406)	0.682 (0.437)
			<i>TREAT*REJ</i>	-1.901 (-1.349)	-1.638 (-1.162)
<i>MALE_ID</i>	0.413** (2.058)	-0.206 (-0.749)	<i>MALE_ID</i>	0.157 (1.118)	-0.089 (-0.420)
<i>FIN_ID</i>	-0.139 (-0.987)	-0.278 (-1.286)	<i>FIN_ID</i>	-0.149 (-1.465)	-0.096 (-0.625)
<i>GOV_ID</i>	16.249 (0.021)	13.205 (0.023)	<i>GOV_ID</i>	18.569 (0.025)	14.826 (0.023)
<i>SCH_ID</i>	-0.207 (-1.338)	-0.373* (-1.669)	<i>SCH_ID</i>	-0.250** (-2.251)	-0.367** (-2.191)
<i>AGE_ID</i>	0.257 (0.613)	-0.770 (-1.345)	<i>AGE_ID</i>	0.399 (1.271)	-0.466 (-1.093)
<i>TENURE_ID</i>	-0.005 (-0.069)		<i>TENURE_ID</i>	0.107** (1.994)	
<i>SIZE</i>	0.037 (0.157)	0.189 (0.565)	<i>SIZE</i>	-0.039 (-0.250)	0.086 (0.405)
<i>LEV</i>	0.542 (0.626)	-2.096* (-1.677)	<i>LEV</i>	-0.955 (-1.634)	-1.782** (-2.068)
<i>ROA</i>	3.628* (1.798)	3.289 (1.208)	<i>ROA</i>	0.490 (0.393)	-0.180 (-0.101)
<i>GROWTH</i>	0.151 (1.084)	-0.050 (-0.223)	<i>GROWTH</i>	0.042 (0.494)	0.088 (0.755)
<i>SOE</i>	1.572 (1.607)	0.972 (0.991)	<i>SOE</i>	0.119 (0.236)	1.016 (1.532)
<i>LARGEST</i>	2.196 (1.118)	-1.814 (-0.730)	<i>LARGEST</i>	3.359*** (2.772)	2.853 (1.601)
<i>BOARD</i>	-5.380*** (-6.286)	-5.759*** (-5.271)	<i>BOARD</i>	-5.159*** (-8.837)	-4.943*** (-6.254)
<i>DUAL</i>	-0.955*** (-2.656)	-2.009*** (-3.112)	<i>DUAL</i>	-0.488** (-2.228)	-0.804** (-2.233)
<i>MARKET</i>	-1.579 (-0.856)	1.001 (0.395)	<i>MARKET</i>	-2.601** (-2.051)	-1.991 (-1.148)
Industry & Year	YES	YES	Firm & Year	YES	YES
Pseudo R <sup>2</sup>	0.209	0.140	Pseudo R <sup>2</sup>	0.205	0.102
N	3,669	3,669	N	7,080	7,080

Z-statistics based on robust standard errors that are clustered by firm are displayed in parentheses. \*\*\*, \*\* and \* represent 1%, 5% and 10% significance levels, respectively, based on a two-tailed test.

with punished ones through punished executives actively saying 'no' on financial misstatement significantly weakens after regulatory punishments. Combined with the aforementioned finding that financial misstatement of these innocent firms increases significantly, it indicates that the independent directors in interlocked innocent firms do not actively perform their monitoring duties after regulatory punishments.

In summary, the independent directors of innocent firms which interlock with punished ones through punished executives no longer actively say 'no' on financial misstatement after regulatory punishments.

An important reason for the aforementioned results is likely to be that the independent directors who actively say 'no' resign from these innocent firms to avoid risks after receiving the negative signal from their executive colleagues being punished. Existing literature finds that in the face of negative events, independent directors tend to adopt risk aversion strategies and leave these high-risk firms (Dou, 2017; Fahlenbrach et al., 2017; Xin et al., 2013). Moreover, the serious 'reverse elimination' effect of independent directors in China's listed firms exacerbates the turnover probability of independent directors who actively say 'no' in their independent opinions (R. Chen et al., 2015; Zheng et al., 2016). Therefore, we further analyse the impact of regulatory punishments on independent director turnover in interlocked innocent firms from the perspective of individual independent directors. Specifically, we focus on the impact of the past voting opinions of independent directors on the relationship between regulatory punishments and independent director turnover. We define the independent director turnover variable *CHANGE\_ID* and *CHANGE2\_ID*. *CHANGE\_ID* is a dummy that equals 1 if the independent director leaves the firm and 0 otherwise. *CHANGE2\_ID* is a dummy that equals 1 if the independent director voluntarily leaves the firm (turnover within his first term) and 0 otherwise. We also define the independent director's past voting opinions variable *REJ*. *REJ* is a dummy that equals 1 if the independent director has issued opinions other than approval when voting on the proposals before regulatory punishments and 0 otherwise. The results are reported in Table 7.<sup>12</sup> It can be found from Panel B that the probability of the independent director turnover (especially voluntarily turnover) in innocent firms increases significantly after regulatory punishments. And if the independent director has issued opinions other than approval when voting on the proposals before regulatory punishments, the probability of his turnover (especially voluntary turnover) in interlocked innocent firms is significantly higher after regulatory punishments.<sup>13</sup>

In summary, regulatory punishments prompt the independent directors who actively say 'no' in their voting opinions to resign from innocent firms which interlock with punished ones through punished executives. Thus, the probability of independent directors saying 'no' on financial misstatement in these innocent firms drops significantly. These findings indicate the declining independence of independent directors of these innocent firms eventually leads to the failure of the indirect deterrence effects of regulatory punishments.

Thirdly, we examine the impact of regulatory punishments on auditors' audit decisions. If regulatory punishments of executives that violate regulations draw auditors' attention to the engagement risk of innocent firms that illegal executives interlock, they will be more cautious when doing audit decisions and the audit quality will be correspondingly higher. So, the governance of these innocent firms may be improved. On the contrary, if

<sup>12</sup>In Column (2) of Panel A and Panel B, we do not control the tenure of the independent director because here we have limited the independent director turnover within his first term, which has little to do with the length of his entire tenure. Of course, the result does not change if additionally controlling the tenure.

<sup>13</sup>The coefficient of *REJ* in Panel A means the difference of turnover between independent directors who actively say 'no' and other independent directors before regulatory punishments (*POST* = 0). This is not entirely the same as the research contexts in existing literature. So, we do not over-interpret this coefficient.



Table 8. Regulatory punishments and auditors' audit decision.

		Panel B: Net effect												
		Punished sample			Interlocked sample			Punished and control sample				Interlocked and control sample		
Variables		(1)	(2)	(3)	(4)	(5)	(6)	Variables	(1)	(2)	(3)	(4)	(5)	(6)
		CHANGE_AUD	LNFFEE	MAO	CHANGE_AUD	LNFFEE	MAO	TREATPOST	CHANGE_AUD	LNFFEE	MAO	CHANGE_AUD	LNFFEE	MAO
POST		0.144 (0.958)	0.065*** (2.600)	-0.593*** (-3.217)	-0.168 (-0.572)	-0.018 (-0.572)	0.596 (0.999)		0.236 (1.079)	0.042** (2.254)	-0.217 (-0.713)	-0.223 (-0.639)	-0.008 (-0.359)	0.199 (0.243)
SIZE		-0.013 (-0.180)	0.309*** (14.732)	-0.199** (-2.232)	0.078 (0.660)	0.306*** (9.453)	-0.916** (-2.425)	SIZE	-0.098 (-0.566)	0.239*** (9.497)	-0.708*** (-2.646)	0.394 (8.906)	0.261*** (8.906)	-1.496** (-2.040)
LEV		0.643 (4.447)	0.026 (0.242)	2.514*** (4.359)	-0.126 (-0.153)	-0.028 (-0.180)	2.030 (0.978)	LEV	1.855*** (15.162)	-0.043 (-0.512)	5.561*** (5.263)	0.924 (0.766)	0.000 (0.004)	7.205** (2.198)
INVR		-0.134 (-0.248)	-0.172 (-1.260)	-2.288*** (-3.551)	1.772* (1.786)	-0.588*** (-2.931)	-1.419 (-0.904)	INVR	-1.612* (-1.718)	-0.225** (-2.295)	-6.719*** (-4.194)	0.531 (0.362)	-0.090 (-0.915)	-1.354 (-0.373)
RECR		-0.278 (-0.435)	0.064 (0.395)	0.878 (1.243)	2.367 (1.469)	0.112 (0.411)	-4.550 (-1.115)	RECR	-1.078 (-0.936)	0.011 (0.092)	1.885 (1.283)	3.301 (1.560)	0.120 (0.906)	2.065 (0.340)
QUICK		0.144*** (2.666)	-0.013 (-1.303)	0.144** (2.065)	0.054 (0.682)	-0.042*** (-3.237)	-0.150 (-0.655)	QUICK	0.184** (2.246)	-0.019** (-1.978)	0.013 (0.096)	0.341** (2.359)	-0.013 (-1.528)	-0.081 (-0.152)
OCF		0.139 (0.193)	0.166 (1.452)	-3.430*** (-3.832)	0.910 (0.593)	0.148 (0.799)	0.434 (0.202)	OCF	0.711 (0.966)	0.060 (0.951)	-3.363*** (-3.145)	-0.107 (-0.090)	0.077 (1.127)	-0.418 (-0.138)
ROA		-2.018* (-1.737)	-0.010 (-0.047)	-2.891** (-2.399)	-0.380 (-0.105)	1.199** (2.042)	-20.030*** (-2.868)	ROA	-1.676 (-1.297)	0.021 (0.189)	-0.707 (-0.451)	1.090 (0.361)	0.022 (-0.031)	-0.589 (-0.811)
LOSS		-0.094 (-0.426)	0.040 (1.067)	1.166*** (4.910)	0.153 (0.265)	0.162** (2.332)	-0.022 (-0.020)	LOSS	-0.368 (-1.611)	0.016 (1.006)	1.078*** (3.805)	-0.250 (-0.571)	0.022 (1.017)	-0.589 (-0.811)
GROWTH		-0.160 (-1.401)	0.015 (1.098)	-0.180 (-1.399)	0.409** (2.422)	-0.028 (-1.259)	-0.254 (-0.844)	GROWTH	-0.012 (-0.140)	0.020** (2.311)	-0.198 (-1.606)	0.373*** (3.017)	0.001 (0.104)	-0.789** (-2.032)
SOE		-0.023 (-0.161)	-0.063 (-1.623)	-0.259 (-1.596)	0.629* (1.709)	-0.186*** (-3.650)	2.592*** (2.760)	SOE	-0.211 (-0.638)	-0.062 (-1.357)	0.411 (1.057)	1.306* (0.783)	-0.033 (-0.629)	-0.354 (-0.360)
LARGEST		0.580 (1.363)	-0.088 (-0.711)	0.482 (0.910)	0.192 (0.210)	-0.149 (-0.683)	1.495 (0.828)	LARGEST	1.251 (1.912)	0.047 (0.306)	2.776* (1.802)	0.690 (0.307)	-0.179 (-1.081)	-0.592 (-0.108)
BIG		0.128 (0.894)	0.148*** (4.551)	0.054 (0.324)	0.866*** (3.152)	0.224*** (4.283)	-0.606 (-0.860)	BIG	0.316* (1.826)	0.025 (1.288)	0.136 (0.484)	0.551** (1.972)	0.046** (2.128)	1.353* (1.836)
MARKET		-0.406* (-1.761)	0.280*** (4.072)	0.398 (1.410)	-0.939** (-2.225)	0.232** (2.151)	-0.742 (-0.871)	MARKET	-1.697 (-1.317)	0.088 (0.964)	-2.862 (-1.505)	-0.435 (-0.222)	0.133 (1.119)	-1.627 (-0.415)
LAGMAO		0.771*** (4.808)		2.771*** (14.048)	1.813*** (3.771)		3.183*** (3.937)	LAGMAO	0.533** (2.568)		0.672*** (3.428)	0.665 (1.540)		0.194 (0.398)
MAO			0.068* (1.885)		-0.045 (-0.428)			MAO		0.017 (0.722)			-0.020 (-0.620)	

(Continued)

Table 8. (Continued).

		Panel A: Total effect						Panel B: Net effect					
		Punished sample			Interlocked sample			Punished and control sample			Interlocked and control sample		
Industry & Year		(1)	(2)	(3)	(4)	(5)	(6)	(1)	(2)	(3)	(4)	(5)	(6)
Pseudo R <sup>2</sup> / Adj. R <sup>2</sup>		0.056	0.592	0.380	0.153	0.630	0.575	0.058	0.411	0.310	0.145	0.433	0.454
N		2,162	2,162	2,162	951	951	951	2,892	2,892	2,892	1,819	1,819	1,819
POST <sup>-1</sup>		0.381*	0.014	0.986***	-0.002	-0.013	1.822	0.325	0.029*	1.384***	-0.002	-0.003	2.839**
		(1.799)	(0.745)	(4.032)	(-0.004)	(-0.522)	(1.429)	(1.355)	(1.848)	(4.087)	(-0.004)	(-0.132)	(2.237)
POST <sup>0</sup>		0.652***	0.044*	0.096	-0.137	-0.020	1.410	0.550**	0.051**	0.952**	-0.028	-0.004	0.965
		(2.931)	(1.800)	(0.343)	(-0.299)	(-0.621)	(1.157)	(2.018)	(2.338)	(2.207)	(-0.053)	(-0.117)	(0.703)
POST <sup>1</sup>		0.260	0.064**	0.000	-0.114	-0.029	1.258	0.080	0.070**	0.778	-0.233	-0.011	1.089
		(1.139)	(2.146)	(0.000)	(-0.267)	(-0.745)	(1.014)	(0.242)	(2.516)	(1.437)	(-0.422)	(-0.301)	(0.769)
POST <sup>2</sup>		0.006	0.096**	-0.357	-0.231	-0.023	1.526	-0.122	0.094***	0.484	-0.243	-0.011	2.288
		(0.031)	(2.579)	(-1.408)	(-0.538)	(-0.464)	(1.431)	(-0.307)	(2.700)	(0.720)	(-0.422)	(-0.260)	(1.555)

Z-statistics/t-statistics based on robust standard errors that are clustered by firm are displayed in parentheses. \*\*\*, \*\*, \* and \* represent 1%, 5% and 10% significance levels, respectively, based on a two-tailed test.

auditors do not respond adequately to the engagement risk of these innocent firms signalled by executives being punished, the ineffective adjustment of audit decisions may worsen the governance of these innocent firms. Table 8 reports the result of the impact of regulatory punishments on auditors' audit decisions. Specifically, we define the audit decision variable *CHANGE\_AUD*, *LNFEES* and *MAO*. *CHANGE\_AUD* is a dummy that equals 1 if the auditor leaves the firm and 0 otherwise. *LNFEES* is the natural logarithm of audit fees paid to the auditor. *MAO* is a dummy that equals 1 if the auditor issues a modified opinion on the firm's financial report and 0 otherwise. In Panel B, we find that auditors of punished firms are more likely to issue modified opinions before regulatory punishments, which means that auditors are aware of the financial fraud risk of punished firms. Auditors are more likely to leave punished firms in the year of regulatory punishments, which means that the current auditors resign for undetected financial fraud and the punished firms also repair their reputation by dismissing current auditors. Besides, the successor auditors are more likely to issue modified opinions in the year of succession and request higher audit fees subsequently, which means that auditors are more cautious about the engagement risk after firms are punished for violation of regulations and they also improve the audit efforts and require risk premiums. However, auditors of innocent firms which interlock with punished ones through punished executives do not adjust their audit decisions significantly after regulatory punishments. Combined with the aforementioned finding that financial misstatement of these innocent firms increases significantly, it indicates that regulatory punishments do not sufficiently arouse the attention of auditors of these innocent firms to the engagement risk. The insufficient response of auditors further exacerbates the failure of the indirect deterrence effects of regulatory punishments.

In summary, regulatory punishments prompt interlocked innocent firms to dismiss punished executives but it also leads independent directors who actively say 'no' in their voting opinions to resign from these innocent firms, resulting in the declining independence of independent directors of these innocent firms. Besides, auditors do not respond adequately to the engagement risk indicated by punished executives. Therefore, the negative adjustments exceeding positive adjustments of these innocent firms' corporate governance results in the failure of the indirect deterrence effects of regulatory punishments.

#### **4.3. The economic impact of the deterrence effects of regulatory punishments**

According to the aforementioned analysis, regulatory punishments can have the direct deterrence effects on punished firms. The reputation restoration measures taken by punished firms improve corporate governance, which will ultimately have a positive effect on their firm value. On the contrary, regulatory punishments generally do not have the indirect deterrence effects on innocent firms which interlock with punished ones through punished executives. The voluntary resignation of active independent directors leads to the declining independence of independent directors. Auditors do not make adjustment to audit decisions for the rising engagement risk indicated by punished executives. All these factors deteriorate the quality of these innocent firms and then reduce their firm value. Therefore, we examine the impact of regulatory punishments on firm value. Specifically, we use Tobin's Q indicator *TOBINQ* to measure firm

**Table 9.** Regulatory punishments and firm value.

Panel A: Total effect			Panel B: Net effect		
	Punished sample	Interlocked sample		Punished and control sample	Interlocked and control sample
	(1)	(2)		(1)	(2)
Variables	<i>TOBINQ</i>	<i>TOBINQ</i>	Variables	<i>TOBINQ</i>	<i>TOBINQ</i>
<i>POST</i>	0.169** (2.512)	-0.140* (-1.859)	<i>TREATPOST</i>	0.197*** (2.775)	-0.285*** (-2.925)
<i>SIZE</i>	-0.924*** (-10.483)	-0.712*** (-7.113)	<i>SIZE</i>	-1.142*** (-7.906)	-1.333*** (-7.658)
<i>LEV</i>	0.072 (0.202)	-0.474 (-0.873)	<i>LEV</i>	0.134 (0.324)	0.224 (0.400)
<i>OCF</i>	1.099** (2.404)	1.083** (2.403)	<i>OCF</i>	0.322 (1.129)	0.193 (0.604)
<i>ROA</i>	2.187*** (3.197)	2.416 (1.575)	<i>ROA</i>	1.355** (2.547)	4.097*** (4.510)
<i>GROWTH</i>	0.130** (2.146)	0.237 (1.420)	<i>GROWTH</i>	0.129*** (3.537)	0.040 (0.820)
<i>SOE</i>	0.059 (0.499)	-0.230 (-1.393)	<i>SOE</i>	-0.010 (-0.058)	0.028 (0.154)
<i>LARGEST</i>	-0.088 (-0.299)	0.303 (0.825)	<i>LARGEST</i>	0.117 (0.189)	1.637* (1.922)
<i>MARKET</i>	-0.052 (-0.271)	-0.141 (-0.719)	<i>MARKET</i>	1.509*** (3.031)	0.657 (1.139)
Industry & Year	YES	YES	Firm & Year	YES	YES
Adj. R <sup>2</sup>	0.459	0.547	Adj. R <sup>2</sup>	0.430	0.449
N	2,378	1,050	N	3,186	1,995

T-statistics based on robust standard errors that are clustered by firm are displayed in parentheses. \*\*\*, \*\* and \* represent 1%, 5% and 10% significance levels, respectively, based on a two-tailed test.

value. The results are reported in Table 9. We find that, in the long run, regulatory punishments have a positive impact on the firm value of punished firms and have a negative impact on the firm value of innocent firms which interlock with punished ones through punished executives. The results further confirm the aforementioned research conclusions.

#### 4.4. Robustness tests

Besides, we conduct several robustness tests. The results are reported in Table 10. In Panel A, we extend the window periods and use 5 years before and after regulatory punishments, respectively, to do tests. In Panel B, we delete samples with other types of violation, such as fund usage violation and market trading violation, to do tests. The results are consistent with the aforementioned research conclusions.

## 5. Research conclusions and policy implications

The supervision of listed firms plays an important role in improving the quality of listed firms and the efficiency of resource allocation in the capital market. As a result, whether regulatory punishments achieve the governance effect of 'punish one, teach a hundred' is attracting more and more attention from the regulator, the industry and the academics. We study the effectiveness and realisation mechanisms of the indirect deterrence effects of regulatory punishments from the perspective of executives' interlock. We find that the



Table 10. Robustness tests.

Panel A: Extend the window periods		Punished sample		Interlocked sample		Punished and control sample		Interlocked and control sample	
		(1)	(2)	(3)	(4)				
Variables		RESTATE	RESTATE	RESTATE	RESTATE	RESTATE	RESTATE	RESTATE	RESTATE
POST		-0.720*** (-6.077)	0.758*** (2.688)	-0.582*** (-3.655)	0.703*** (2.581)				
Controls		YES	YES	YES	YES			YES	YES
Industry & Year		YES	YES		YES			YES	YES
Pseudo R <sup>2</sup>		0.098	0.162	0.113	0.055			0.055	0.055
N		3,257	1,430	4,454	2,999				
Panel B: Delete other types of violation samples		Punished sample		Interlocked sample		Punished and control sample		Interlocked and control sample	
		(1)	(2)	(3)	(4)				
Variables		RESTATE	RESTATE	RESTATE	RESTATE	RESTATE	RESTATE	RESTATE	RESTATE
POST		-0.843*** (-6.578)	0.914** (2.433)	-0.683*** (-3.498)	1.103*** (2.674)				
Controls		YES	YES	YES	YES			YES	YES
Industry & Year		YES	YES		YES			YES	YES
Pseudo R <sup>2</sup>		0.095	0.168	0.118	0.089			0.089	0.089
N		2,265	798	3,072	1,773				

Z-statistics based on robust standard errors that are clustered by firm are displayed in parentheses. \*\*\*, \*\* and \* represent 1%, 5% and 10% significance levels, respectively, based on a two-tailed test.

financial misstatement decreases for punished firms while increases for innocent firms which interlock with punished ones through punished executives after regulatory punishments. Further analyses indicate that punished executives are more likely to leave these innocent firms after being punished. But at the same time, independent directors actively saying 'no' are more likely to resign from these innocent firms, thus leading to the declining independence of independent directors of these innocent firms. In addition, these innocent firms' auditors do not make adjustment to audit decisions for the rising engagement risk indicated by punished executives. Therefore, the aforementioned negative adjustments exceeding positive adjustments of these innocent firms' corporate governance results in the failure of the indirect deterrence effects of regulatory punishments, finally leading to these innocent firms' value being impaired. Our findings indicate that the indirect deterrence effects of regulatory punishments depend on the coordination with internal and external corporate governance mechanisms.

Our findings have important policy implications. Under the current background of deepening financial supply-side structural reforms and enhancing the capabilities of finance serving the real economy, it is of great significance to establish a standardised, transparent, open, dynamic and resilient capital market through deepening reforms to realise the effective allocation of social resources by taking advantage of direct financing. Listed firms are the micro foundation of the capital market. Their quality depends on the supervision of listed firms. In particular, with the establishment of the Sci-Tech Innovation Board and the pilot of the registration system in China's capital market, the supervision of listed firms has shifted from ex-ante supervision to ex-post supervision and the supervision of information disclosure by listed firms has become particularly critical. Moreover, the effectiveness of supervision is becoming more and more important. Although the regulator places great expectation on the deterrence effects of regulatory punishments, the violations of listed firms and executives that impair the interests of investors happen repeatedly in reality. Our research indicates that the governance effect of 'punish one, teach a hundred' in the supervision of listed firms cannot be achieved naturally but depends on the coordination with internal and external governance mechanisms, including the independent director mechanism and the independent audit mechanism. Specifically, it is necessary to strengthen the performance of duties of independent directors. For example, encourage them to overcome difficulties with listed firms and effectively alleviate the 'reverse elimination' effect through market guidance, system regulation and publicity and education. It is also necessary to strengthen the risk awareness and legal liability of auditors as intermediaries to actually improve the audit quality. Only by doing these, can firms ultimately achieve the improvement of corporate governance and quality.

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