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Does the form of state ownership and political connections influence the incidence of financial statement fraud?

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ABSTRACT

Do forms of state ownership and politically connected senior management affect the incidence of financial statement fraud? In this study, we consider these questions and provide new evidence as to the factors influencing fraud commission and detection for Chinese listed firms between 2007 and 2018. Six major types of financial statement fraud activities are identified. Using a bivariate probit model, developed to address partial observability concerns, we report state ownership lowers the likelihood of fraud detection, while increasing a firms' propensity to commit fraud. In addition, state-owned enterprises (SOEs) controlled by local government are more likely to engage in fraud and escape regulatory punishments, relative to SOEs controlled by central government. The effect of politically connected senior management over fraud commission or regulatory detection is also diluted by the presence of state ownership. Moreover, the role of state ownership in encouraging fraud commissions and escaping from regulatory punishments is more pronounced for the local non-politically connected SOEs.

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1. Introduction

Financial statement fraud is a significant threat to the existence and efficiency of capital markets, impairing trust, and misleading market participants. This study examines the incidence of this financial statement fraud in China, and how this is affected by political connections of senior management and different forms of state ownership. While the incidence of this fraud within state-owned enterprises (SOEs) has been widely examined (e.g. Chen et al. 2013; Engels, Kumar, and Philip 2020; Haß, Vergauwe, and Zhang 2019; Hou and Moore 2010; Hou, Lee, and Stathopoulos 2013; Luo, Peng, and Zhang 2020; Peng and Luo 2000; Shen and Lin 2016; Wang et al. 2017; Wang and Yung 2011), uncertainty persists as to the assumptions underlying many of these studies (Amiram et al. 2018). We address these concerns, including partial observability, the definition of fraud, and the complex environment in which fraud develops.

Specifically, we examine the role of state ownership, control by central and local government, and the influence of politically connected senior management over financial statement fraud commission and detection for Chinese listed firms between 2007 and 2018. We use a bivariate probit model to address partial observability, and a hand-collected dataset to specify the forms of fraud observed.[1] These are used to explore different forms of state ownership and its combined influence with politically connected senior management, whilst employing multiple controlling variables to ameliorate concerns with complex fraud environments.

We report six major types of financial statement fraud are committed by Chinese-listed firms. State ownership is associated with a lower likelihood of fraud detection and increases a firm's propensity to engage in fraud. SOEs controlled by the local government (local SOEs) are more likely to engage in fraud and escape regulatory

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punishments, relative to their counterparts controlled by central government (central SOEs). For firms with both political connections and a state-owned background, the role of state ownership in encouraging fraud commissions and escaping from regulatory punishments is diluted. Moreover, the impact of local state ownership on fraud is only significant when CEOs or chairmen do not have political connections.

Addressing methodological concerns is critical to ensure the reliability and veracity of our estimates and recommendations. Anxiety as to the impact of partial observability biases on the analysis of corporate fraud is long-standing (Wang 2013; Wang, Winton, and Yu 2010), with most academic studies only analyzing firms which have been caught for undertaking fraud. Partial observability in this context involves the assessment of a biased sub-set of observations, ignoring those fraudulent firms which are not caught by the legal and regulatory authorities (Amiram et al. 2018). While this sample selection bias is thought to be substantial, a great number of firms in some Chinese commercial areas have been observed engaging in fraudulent behaviors (Stuart and Wang 2016), this problem is often ignored and rarely addressed (Amiram et al. 2018). We amend for partial observability through examining the probability of detected fraud as the product of two latent probabilities: the probability of fraud commission and fraud detection.

While determining the causes of financial statement fraud is a policy priority in China and internationally, persistent concerns surround the definition of fraud. Fraud is a nebulous concept, containing many elements, and existing within a spectrum of misconduct activities (Amiram et al. 2018). This is compounded by recorded database deficiencies including the omission of fraud events, the inclusion of unrelated cases and the ambiguous and over-simplistic classification of fraud (Karpoff et al. 2017). Widely used Chinese fraud databases occasionally record multiple events linked to a single underlying fraud case and include extraneous fraud events, such as violations relating to environment pollution, price control and work safety. We address these concerns, by using a hand-collected dataset of regulatory sanction reports, rather than commonly used electronic databases of Chinese corporate fraud. Through the manual coding and cross-checking of each fraud case to ensure the data's reliability, we provide further details as to the ultimate forms of financial statement fraud undertaken in this market.

Lastly, we examine financial statement fraud whilst acknowledging the complex environment in which this behavior arises. Many firm characteristics appear to influence these fraudulent behaviors, including firm size and institutional ownership (Shi, Aguilera, and Wang 2020), corporate R&D spending (Wang 2013) and leverage (Khanna, Kim, and Lu 2015); or corporate governance attributes including executive pay (Shi, Aguilera, and Wang 2020), CEO duality (Aggarwal, Hu, and Yang 2015), whether one of the big 4 auditors is used (Lennox and Pittman 2010), the size of the supervisory board (Firth, Fung, and Rui 2007), the frequency of board meetings (Shi, Aguilera, and Wang 2020), CEO and board ownership (Ronen, Tzur, and Yaari 2006), and directors age (Sun et al. 2019). We acknowledge the importance of these past contributions and incorporate these concerns into our assessment. We further examine different types of state ownership and the joint effects of state ownership with politically connected senior managers, which have been overlooked in previous research.

This study is timely for many reasons. Financial statement fraud has received considerable attention from the public, press, financial professions, regulators, and academics. High-profile financial scandals internationally have significantly reduced trust in capital markets, led to inefficient capital allocation decisions, and brought the issue of financial statement fraud to the forefront of policy making (Wang et al. 2022). China provides a unique laboratory for examining these fraudulent behaviors, due to the rapid growth of the Chinese economy and capital markets, and an economic and legal system widely viewed as conducive to bribery (Jiang et al. 2024). Unsurprisingly, the incidence of fraud is persistent, with the China Securities Exchange Commission (CSRC) receiving 380 leads on potential violations and investigating 273 cases in 2021 (CSRC 2022). The paper strives to disentangle the combined effects of these different influences, methodological challenges, and institutional characteristics affecting the commission and detection of this pervasive financial fraud.

The paper makes multiple contributions to the literature. Using a bivariate probit model, we quantify the determinants of fraud commission and detection and the interaction between these two latent processes (Wang 2013). This contributes to an emergent literature examining the partial observability of fraud within financial markets (e.g. Ashton et al. 2021; Dyck, Morse, and Zingales 2024; Shi, Aguilera, and Wang 2020; Wang 2013; Wang, Winton, and Yu 2010). In other words, we contribute to the literature examining fraud within China, (e.g. Chen et al. 2013; Engels, Kumar, and Philip 2020; Hou and Moore 2010; Hou, Lee, and Stathopoulos 2013;

Jia et al. 2009; Peng and Luo 2000; Shen and Lin 2016; Wang et al. 2017), through addressing long-standing methodological concerns (Amiram et al. 2018). Moreover, this work extends the contribution by Shi, Aguilera, and Wang (2020), using a distinctly constructed dataset and examining different elements influencing the wider fraud environment.

We also contribute to the literature by providing a detailed classification of financial statement fraud using a hand-collected fraud database, which has been overlooked in previous research. Specifically, we document six major types of fraud, including false income statements, false balance sheets, false cash flow statements, improper financial statement consolidation, delayed disclosure of annual reports, and insufficient and false disclosure of information. Additionally, we identify 40 subcategories of specific fraud techniques. In this regard, we call for fraud-related studies not only to focus on the determinants and consequences of fraud (Shi, Aguilera, and Wang 2020), but also to comprehensively examine the nature of fraud cases, in order to design relevant mechanisms for early detection of different types of fraud.

Lastly, this is one of the first studies that examines the role of state ownership and political connections simultaneously, differentiating from existing studies (e.g. Babenko, Fedaseyeu, and Zhang 2020; Berkman, Cole, and Fu 2010; Hu et al. 2020) that largely examine their roles separately. Our research provides new evidence that for firms with both politically connected CEOs or chairmen and a state-owned background, the role of state ownership in encouraging fraud commission and escaping from regulatory punishments is diluted. Additionally, compared to central SOEs, the role of state ownership in encouraging fraud commission and escaping from regulatory punishments is more pronounced for non-politically connected local SOEs.

The paper is organized as follows. The next section outlines the context of the study and explores apposite theoretical frameworks. We state the hypotheses in the third section and outline the model, data, and variables employed in the fourth section. The empirical results are discussed in section five and the final section concludes the paper, where we draw out implications and suggest avenues for further research.

2. Literature review

State ownership, and associated political connections held by senior managers, are globally important forms of corporate control providing governments with a degree of macro-economic and policy leverage. Chinese SOEs are administered and controlled by central and local governments, which enables the state to influence the Chinese capital market affecting both state-owned and non-state-owned assets (Zhou et al. 2015). These forms of influence and control allow SOEs to benefit from government allocations of resources and access legislative and legal processes (Zhang et al. 2023), and potentially alter the propensity of these firms to commit financial statement fraud and be detected for these activities. Ascertaining the influence of political connections and state ownership over financial statement fraud is a complex process, relying on both the context of fraud and the theoretical frameworks used to explain these actions.

2.1. Institutional context: stock market, investors, and regulators

The last 30 years have witnessed the transformation of the Chinese economy. This process, driven by economic restructuring and regulatory reform and was bolstered by a substantial program of partial privatization. This enabled many SOEs to modernize, reorganize as joint stock companies, and raise capital funds through initial public offerings (IPO) on the Shanghai and Shenzhen stock exchanges established in 1990 and 1991. By publicly issuing shares, these partially privatized SOEs were expected to enhance their profitability and pursue social and political objectives (Yang, Jiao, and Buckland 2017), while remaining under majority government control.

The partial privatization process also led to a unique classification of shares and trading restrictions. Tradable A-shares, representing about 40% of a firm's total equity, are held by the public and freely traded on stock exchanges (Jiang, Jiang, and Kim 2020; Yang, Jiao, and Buckland 2017). State and legal person shares account for about 45% of listed firms, whereby shares are not publicly traded. State shares are mainly held by the State-Owned Assets Supervision and Administration Commission and legal person shares are retained by domestic institutions including stock companies, state-private mixed enterprises, non-bank financial institutions, and SOEs that

have at least one non-state owner (Qu, Leung, and Cooper 2013). Employee shares are retained by the workers and managers of these listed firms.

The principal regulator for corporate fraud in China, the China Securities Regulatory Commission (CSRC), is modeled on the US Securities and Exchange Commission (SEC). The CSRC is granted authority to investigate major fraudulent activities and issue administrative sanctions, rather than civil sanctions. Less severe offences are examined by CSRC regional offices who may impose non-administrative sanctions (i.e. supervisory measures) and administrative sanctions. Other regulators include the Ministry of Finance, which has jurisdiction over financial reporting of listed and unlisted firms in China, and the Shanghai and Shenzhen stock exchanges, monitor relatively minor violations and issue self-disciplinary measures against fraudulent firms (Xu, Chen, and Xu 2017).

Collectively these developments have raised anxieties as the Chinese government has a history of intervention (Fan, Wong, and Zhang 2007), property rights are relatively weak, and the legal system is relatively inefficient and bureaucratic. Concerns persist that politically connected senior management and state control both provide favorable access to the state and legal bureaucracy, reducing legal risks (Jia, Mao, and Yuan 2019). The significantly lower demand for directors' and officers' liability insurance displayed by SOE managers (Jia, Mao, and Yuan 2019) may be an illustration of this process. Indeed, while the Chinese judiciary has become increasingly independent since it was reformed in 2014, local biases are thought to persist in the administration of the law (Liu et al. 2022). For instance, state-owned firms or firms with political connections use the legal system more readily than other firms (Ang and Nan 2014), and have a much lower likelihood of being sued in the courts (Jia, Mao, and Yuan 2019). Subsequently, investors are only partially protected through private enforcement measures (Xu, Chen, and Xu 2017).

2.2. State ownership and fraud: a theoretical review

The influence of political connections and state ownership over financial statement fraud has been explained using multiple theories. Initially, fraud may be shaped by regulative, normative, and cognitive institutions (Jiang et al. 2024). These include the ability of the regulatory system to identify and capture fraudulent firms, the normative and shared beliefs facilitating fraudulent behavior, and the cognitive ability of managers to identify and undertake fraud. These institutions take multiple forms, including the legal system, expected levels of compliance and the characteristics of firms and their senior managers.

Resource-based theory argues a firm's competitive advantage is based on the possession of hard-to-replicate tangible and intangible resources (Wu, Wu, and Rui 2012a). In the Chinese context, state-ownership and politically connected senior management are competitive advantages (Adhikari, Derashid, and Zhang 2006; Claessens, Feijen, and Laeven 2008), providing firms with preferential access to government funding and contracts, lower tax rates and financing and business opportunities (Yu and Zheng 2019). Indeed, SOEs have been reported to receive a great deal of favorable treatment from local and central government. This includes explicit (Hu et al. 2020) and implicit state subsidies (Su and He 2012), tax benefits (Wu et al. 2012b), preferential loan borrowing terms from state-owned banks, government-sponsored bailouts at a time of distress (Cheung, Rau, and Stouraitis 2010; Wang et al. 2022), grants (Stuart and Wang 2016), guaranteed sales (Wang and Yung 2011), and less pressure from debt covenant constraints (Shen and Lin 2016). These outcomes can assist SOEs in obtaining higher levels of investment (Shen and Lin 2016), incurring lower cost of debts (Haß, Vergauwe, and Zhang 2019; Hu et al. 2020), and having a heightened ability to transact business in uncertain environments (Hou, Lee, and Stathopoulos 2013). This competitive advantage is also seen in other financial contexts such as banking, where state-owned banks incur benefits in raising money relative to foreign-owned banks (Jiang, Liu, and Molyneux 2019). Within this benevolent financial environment, managers may face less pressure to manipulate financial performance or commit fraud (Zhang et al. 2023).

State-ownership in China has also been linked to corporate underperformance (Fan, Wong, and Zhang 2007; Wu et al. 2012b), and situations where firms incur more loan defaults (Chen et al. 2018), and over-invest free cash flows (Wu, Wu, and Rui 2012a). Many such negative outcomes have been explained using contract theory which assumes firms are a 'nexus of contracts' with typically incomplete contractual relationships. These partial contracts allow discretion in the financial reporting process (Hart and Moore 1988), providing opportunities for

managerial opportunism. These effects are amplified when state owners hold a large proportion of outstanding shares, requiring managers to serve the interests of the state rather than minority shareholders. Through reducing dependence on external stock markets, state ownership may limit the requirements for firms to provide transparent information and lead to more financial misconduct.

From this theoretical perspective state ownership and political connections held by senior management may adversely influence corporate monitoring, shareholder protection, reduce financial transparency and diminish external dependencies (Wang, Sewon, and Claiborne 2008). These outcomes may encourage actions such as tunnelling (Hu et al. 2020), and increase fraud (Stuart and Wang 2016). These effects are amplified by the characteristics of state and retail investors. Concerns exist that unimpeded state owners can expropriate minority shareholders' wealth through asset misappropriation, facilitated by related party transactions and the provision of guaranteed events between listed firms and their parent or subsidiary entities (Qu, Leung, and Cooper 2013). These activities are unrestrained by retail investors who are widely characterized as uninformed, possessing short-term investment horizons, and prone to herd behaviors. This ownership structure can therefore generate agency conflict, constraining the monitoring of minority shareholders.

These influences may have negative ramifications for the wider economy through undermining judicial and regulatory independence (Hou and Moore 2010), or insulating firms from the effect of new and augmented regulations (Berkman, Cole, and Fu 2010). Cognizant of this situation, the Chinese securities regulator has actively promoted institutional investment to deter firms from committing fraud (Aggarwal, Hu, and Yang 2015). These Chinese institutional investors include mutual funds, Qualified Foreign Institutional Investors (QFII), securities firms, insurance firms, pension funds, trust firms and other financial firms.

3. Development of hypotheses

3.1. State ownership and fraud

As previously discussed, compared to non-SOEs, SOEs are more likely to receive financial support from government authorities and less likely to rely on stock markets for funding. Through reducing dependence on external stock markets, state ownership limits firms' need to provide transparent information. In addition, government intervention in managerial appointments to SOEs also increases the likelihood of managers' entrenchment. Subsequently, the board of directors and supervisors are not willing to hold managers accountable when they learn about potentially fraudulent activities (Chen et al. 2016a). In terms of fraud detection, SOEs are treated more favorably by regulators due to their political affiliations (Hou and Moore 2010). As regulators may be reluctant to investigate and punish firms with state-owned background (Wu, Johan, and Rui 2016). Therefore, the following hypothesis is posed:

H_1: State ownership is positively associated with a firm's propensity to commit fraud and is negatively related to the likelihood of fraud being detected.

3.2. Central and local government ownership and fraud

We propose central government is likely to act as a 'helping hand' for the central SOEs. First and as we have discussed, SOEs can access a great deal of financial support from central and local government. Central SOEs are also subject to stricter supervision and monitoring from multiple departments, including the National Audit Office, the Ministry of Finance and the CSRC (Chen, Firth, and Xu 2009).

Distinctly, we propose local government acts as a 'grabbing hand' expropriating minority shareholder wealth from local SOEs. As local government retains considerable authority in China, political connections which can access these networks, have significant influence over discretionary state assistance (Wang 2021). As laws and regulations are challenging to enforce when parties are distant from the center of power, local SOEs are subject to weaker external supervision. This exacerbates the problem of fraudulent managers 'escaping punishment' (Zhou et al. 2018) and manipulating financial information while receiving greater equity-based compensation (Bruner, McKee, and Santore 2008).

These concerns are apposite for the violation cases handled by the CSRC regional offices, where the staff who implement front-line supervision have a relatively low political status and may be prone to political interference from local government officials (Xu et al. 2013). Corrupt local government officials may also enrich themselves by misappropriating funds (Frye and Shleifer 1997) with substantial levels of wealth transferred from the minority to the controlling shareholders of local SOEs. In some cases, minority shareholders have lost half the value of related party transactions (Cheung, Rau, and Stouraitis 2010). Compounding these anxieties, more management shareholdings are held within local SOEs than within central SOEs (Deloitte 2018).

The goals of central government, in maintaining control of key industries and guaranteeing the safety of the national economy (Wu, Wu, and Rui 2012a), also differ from the regional social objectives pursued by the local government. This has a negative impact on local SOE value (Wu, Wu, and Rui 2012a), creating incentives for managers to engage in financial statement fraud. These effects have also been observed in other financial contexts such as Chinese banking (Hung et al. 2017). We therefore pose the following hypothesis:

H_2: Central SOEs are less likely to commit fraud, whereas local SOES are more likely to commit fraud and escape regulatory detection.

3.3. State ownership, political connections, and fraud

Political connections are globally important, with the political affiliations of senior managers associated with multiple financial outcomes internationally. These effects have been seen to influence equity returns (Babenko, Fedaseyeu, and Zhang 2020), credit ratings (Bhandari and Golden 2021), corporate monitoring by the media (Wang et al. 2022), and bank performance (Gropper, Jahera, and Park 2015), amongst many other outcomes.

Political connections have developed distinctly in China following the partial privatization process. Former or current government bureaucrats, often without a relevant professional background, became embedded within the senior management of the partially privatized SOEs (Fan, Wong, and Zhang 2007). This process increased the likelihood of managerial entrenchment, limiting the willingness of boards and supervisors to hold politically connected managers accountable for fraudulent activities (Chen et al. 2016a).

While this process has been the target of public criticism and has been constrained by multiple directives by the China's central government (Wang 2015), concerns persist. Building a relationship with the government maybe essential for Chinese firms (Bao, Johan, and Kutsuna 2016) and maintaining political connections with government officials remains an important element of Chinese business culture (Kusnadi, Yang, and Zhou 2015). Indeed, China still has a higher proportion of CEOs who are former or current government officials (27%) than other nations (e.g. France – 3.66%, Germany – 1.97%, the UK – 8.4%, Li, Song, and Wu 2015). These influences also affect other areas of financial activities including Chinese banking, where state-owned banks with political connections have a superior performance (Hung et al. 2017).

Although the personal connections of senior managers are a less explicit and stable link to political resources than government ownership, the roles are similar. These include achieving policy burdens, which can constrain a firms' performance, increase the likelihood of undertaking fraud, and reduce the chances of detection. Political connections also influence firm performance (Liu et al. 2018) for non-SOEs, with politically connected senior managers less likely to be punished for poor performance than senior managers without political connections (Chen et al. 2018).

We also propose that possessing both state-ownership and politically connected senior managers can be counterproductive for firms. State ownership may dilute the benefits arising from politically connected senior management (Liu et al. 2018; Wu, Wu, and Rui 2012a). This may arise for multiple reasons, yet being caught for financial fraud can be a career ending event for politically connected senior managers (Shi, Aguilera, and Wang 2020). In particular, the government expects its officials to uphold the legitimacy of their institution and act accordingly. Thus, we pose the following hypothesis:

$H_{3(a)}$: the role of state ownership in increasing fraud commission and reducing fraud detection is more pronounced in firms without political connections.

As the impact of state ownership on fraud is expected to be more pronounced in the non-politically connected firms, the form of state ownership and its association with fraud is then examined in those firms. As previously

discussed, local SOEs have fewer resources available and carry more policy burdens. These policy burdens have a negative impact on financial performance, leading to a higher propensity of fraud (Wu, Wu, and Rui 2012a). Subsequently, within non-politically connected firms, state ownership in those with a local government-owned background is associated with a higher likelihood of fraud commission and a lower likelihood of fraud detection. Thus, the following hypothesis is posed:

$H_{3(b)}$: Compared to central SOEs, the role of state ownership in local SOEs in encouraging fraud commission and escaping from regulatory punishments is more pronounced for the non-politically connected firms.

4. Research methodology

4.1. Data and variables

The hand-collected data used to assess financial statement fraud is developed from the regulators sanction reports and downloaded from the CSRC, 'CNINFO' and the Shanghai and Shenzhen Stock Exchange websites.[2] This data includes 21,848 observations of all listed firms on these stock exchanges between 2007 and 2018. Corporate governance and firm financial performance data is obtained from the China Stock Market and Accounting Research (CSMAR) database. A 12-year period is used to accommodate China's new accounting standards adopted in 2007. We exclude observations from the financial industry due to different data structures and omissions.[3]

The dependent variable is financial statement fraud commission with a value of 1 if a firm commits fraud and zero otherwise. As this variable is not directly observable, a bivariate probit model is used to estimate if a firm committing fraud yet has not been detected for this activity. To apply this model, fraud detection which equals to one if a firm is subject to a sanction decision imposed by regulators and zero otherwise, is introduced.

Test variables include 'State', 'Central', 'Local' and 'political connections'. To examine hypothesis 1, state ownership (State) is used and is measured as the percentage of shares held by the state or state agencies. Two variables 'Central' and 'Local' are then introduced to examine hypothesis 2. These two variables measure the proportion of state ownership in central SOEs and local SOEs separately. To examine hypothesis 3(a), samples are divided into political connected firms and non-political connected firms. Political connections are a dummy variable that equals to one if the CEO or chairman is a current or former officer of the government, military, a member of the People's Congress and the Chinese People's Political Consultative Conference, and zero otherwise. To examine hypothesis 3(b), our sample is divided into four sub-groups, including central SOEs with political connections, central SOEs without political connections, local SOEs with political connections and local SOEs without political connections.

We include a battery of control variables associated with the likelihood of fraud commission. We control firm size using the natural logarithm of firm total assets as small firms are subject to less regulatory scrutiny and are prone to commit fraud to satisfy analysts and investors' expectations (Shi, Aguilera, and Wang 2020). CEO duality is controlled as CEOs who are also chairmen have more discretion to falsify financial statements (Aggarwal, Hu, and Yang 2015). Big 4 is included as large accounting firms are associated with higher financial reporting quality (Lennox and Pittman 2010). Supervisory board size is quantified as a larger supervisory board may have greater expertise of financial accounting and are likely to resist CEOs' pressures (Firth, Fung, and Rui 2007). Supervisory board meeting frequency is added to reflect the external pressures imposed from supervisors on managers (Shi, Connelly, and Hoskisson 2017). CEO and board ownership is controlled as CEOs and board members holding a large proportion of the firms' shares have more incentives to manipulate earnings, collude with management and obtain private benefits (Ronen, Tzur, and Yaari 2006). Lastly, the average age of the board of directors, supervisors and senior managers is included as older corporate leaders tend to be more conservative, ethical and risk-averse (Sun et al. 2019).

Following Wang (2013) we include variables related to fraud detection. First, the ratio of research and development expenditures (R&D) to total assets is included as firms with high R&D are less likely to be caught for fraud. Firm leverage and sales growth rate are considered, as firms with higher financial leverage and sales growth are closely monitored by regulators (Khanna, Kim, and Lu 2015). Return on assets (ROA) is used as firms with a strong financial performance maybe overlooked by the CSRC (Shi, Aguilera, and Wang 2020). Stock returns

Table 1. Variable definitions.

Variable Type	Variable name	Description
Dependent variable	Fraud	A dummy variable coded 1 if a firm commits financial statement fraud and zero otherwise
Test variables	State	The proportion of total outstanding shares held by state owners
	Central	The proportion of state ownership in the central state-owned enterprises (SOEs). *Central SOE is a dummy variable that equal to one if a firm is controlled by the central government, and zero otherwise*
	Local	The proportion of state ownership in the local SOEs. *Local SOE is a dummy variable that equal to one if a firm is controlled by the local government, and zero otherwise*
	Political connections	A dummy variable equals to one if a firm's CEO or chairman is a current or former officer of the government, military, a member of the People's Congress or the Chinese People's Political Consultative Conference, and zero otherwise.
Control variables	Institution	The proportion of total outstanding shares held by institutional investors
	Firm size	Natural logarithm of a firm's total assets
	Duality	Equals to one if a CEO also serves as a chairman and zero otherwise
	BIG4	A dummy variable coded one if a firm's auditor is from one of the four biggest accounting firms and zero otherwise
	SBSIZE	The number of members of the supervisory board
	SB Meeting	The number of supervisory board meetings held in a year
	Board	The proportion of total outstanding shares held by the board of directors
	CEO	The proportion of total outstanding shares held by CEOs
	Age	Natural logarithm of the average age of the board of directors, board of supervisors and senior managers
	R&D	Ratio of research and development expenditures to total assets
	Leverage	Total liabilities divided by a firm's total assets
	Growth	Growth rate of total sales
	ROA	Net profits divided by total assets
	Stock returns	Annual firm stock returns (with cash dividend reinvested)
	Abnormal volatility	The demeaned standard deviation monthly stock returns in a year
	Abnormal turnover	The demeaned monthly stock turnover in a year

are also included to predict the likelihood of fraud detection. If a manager manipulates financial statements to generate unrealistic expectations about a firm's prospects, investors may feel cheated, which can trigger a regulatory investigation. A firm's abnormal return volatility is controlled using a firm's demeaned standard deviation of monthly stock returns. Firms with higher stock return volatility have an enhanced likelihood of significant investment losses, and face a greater probability of being the focus of investor complaints. Similarly, abnormal stock turnover measured as the demeaned monthly stock turnover in a year is considered, to quantify the extent that investors are affected by firms' stock prices (Wang 2013).

Institutional ownership is controlled in both commission and detection equations. Institutional investors are sophisticated investors with managerial skills and professional knowledge facilitating the detection of fraudulent activities. Subsequently, fraudulent firms with higher institutional ownership are more likely to be caught by regulators. These higher costs of fraud detection provide lower incentives for firms to commit fraud (Aggarwal, Hu, and Yang 2015). Corporate governance variables are only included in the commission model as a firm's internal governance mechanisms are more likely to affect managers' propensity to commit fraud rather than trigger regulatory investigations. This is plausible for China, where the board of directors, supervisors and auditors may all discourage firm managers from committing fraud through *Guanxi*-orientated private meetings (Chen et al. 2006; Wang, Chen, and Zhang 2024). As poor or abnormal corporate financial performance can trigger a regulatory investigation, financial variables are included in the detection equation. Table 1 summarizes the definition of the variables.

4.2. Bivariate probit model

Empirical studies of fraud typically adopt a single probit or logit model with matched pairs to capture the joint probability of fraud being committed and detected. This approach overlooks the two latent processes underlying fraud: listed firms that commit fraud and those firms which are caught by regulators (Shi, Connelly, and Hoskisson 2017). Moreover, a strategic interdependence between a firm's motivations to commit fraud and

detection by regulators exists. A firm's management might estimate the likelihood of being caught prior to committing fraud. Conversely, a regulator's decision to investigate misconduct relies on its estimation of the firms' propensity to commit fraud. As a single probit equation cannot model this strategic interdependence, a bivariate probit model is used (Yu 2013).

Pre-testing is undertaken to examine the appropriateness of a bivariate probit model. First, variance inflation factor (VIF) diagnostic statistics indicate that there is no excessive multicollinearity with a mean VIF of less than 2 for the different models. Akaike information criterion (AIC) and Bayesian information criterion (BIC) values are compared for simple probit and bivariate probit models. Lower AIC and BIC values imply a better model fit (Bromiley and Harris 2014) and support the use of bivariate probit models. All test and control variables are lagged by one year to address potential reverse causality. Following Wang, Ashton, and Jaafar (2023) standard errors are clustered by firms to accommodate repeated firm observations over time.

Following Wang (2013) the detected fraud is modeled as a function of the joint realizations of two latent variables: fraud commission and fraud detection. F_i^* represents firm i's potential to commit financial statement fraud, D_i^* denotes the firm i's potential for being detected conditional on the firm i committing financial statement fraud. The reduced form model is then:

$$F_i^* = x_{F,i}\beta_F + u_i \tag{1}$$

$$D_i^* = x_{D,i}\beta_D + v_i \tag{2}$$

$x_{F,i}$ is the row vector that explains firm i's propensity to commit fraud, and $x_{D,i}$ contains variables that explain firm i's potential for being detected. u_i,v_i are zero-mean disturbances with a bivariate normal distribution. The variances are normalized to unity as these cannot be estimated and the correlation between u_i andv_i is assessed to be ρ (Wang 2013).

To model fraud commission, F_i^* is transformed into a binary variable F_i, where $F_i = 1$ if $F_i^* > 0$, and $F_i = 0$ otherwise. For the fraud detection model (conditional on fraud commission), D_i^* is converted into a binary variable D_i, where $D_i = 1$ if $D_i^* > 0$, and $D_i = 0$ otherwise. As D_i and F_i cannot be directly observed, Z_i an interaction term between D_i and F_i is considered, where:

$$Z_i = F_i * D_i \tag{3}$$

$Z_i = 1$ if the firm i has committed fraud and has been detected. $Z_i = 0$ if the firm i has not committed fraud or firm i has committed fraud but has not been detected by regulators. The empirical specification for Z_i is:

$$P(Z_i = 1) = P(F_i D_i = 1) = P(F_i = 1, D_i = 1) = \Phi(x_{F,i}\beta_F, x_{D,i}\beta_D, \rho) \tag{4}$$

$$P(Z_i = 0) = P(F_i D_i = 0) = P(F_i = 0, D_i = 0) + P(F_i = 1, D_i = 0) = 1 - \Phi(x_{F,i}\beta_F, x_{D,i}\beta_D, \rho) \tag{5}$$

where Φ is the bivariate standard normal cumulative distribution function. Full identification of the model parameters requires that $x_{F,i}$ and $x_{D,i}$ cannot include exactly the same variables. The model is estimated by using the maximum-likelihood method with the following log-likelihood function:

$$\begin{aligned} L(\beta_F, \beta_D, \rho) &= \sum_{z_i=1} \log(P(Z_i = 1)) + \sum_{z_i=0} \log(P(Z_i = 0)) \\ &= \sum_{i=1}^{N} \{z_i \log[\Phi(x_{F,i}\beta_F, x_{D,i}\beta_D, \rho)] + (1 - z_i) \log[1 - \Phi(x_{F,i}\beta_F, x_{D,i}\beta_D, \rho)]\} \end{aligned} \tag{6}$$

5. Results

5.1. Descriptive statistics

Table 2 records the descriptive statistics. On average, state owners hold 9.2% of firm shares with 16.3% and 34.8% of listed firms in China ultimately controlled by central and local governments, respectively. Supervisory

Table 2. Descriptive statistics.

Variables	Full sample	Non-fraud firms	Fraud firms	Mean difference
State	0.092	0.093	0.070	0.024***
Central	0.028	0.029	0.018	0.011***
Local	0.059	0.060	0.046	0.014**
SOE	0.511	0.515	0.413	0.102***
Central SOE	0.163	0.165	0.121	0.044***
Local SOE	0.348	0.350	0.292	0.058***
Political connections	0.025	0.026	0.019	0.007*
Institution	0.236	0.238	0.190	0.047***
Duality	0.197	0.196	0.224	−0.028**
BIG4	0.152	0.153	0.130	0.023*
SBSIZE	3.799	3.804	3.660	0.144***
SB Meeting	4.718	4.722	4.637	0.085
Board	0.063	0.063	0.062	0.000
Firm size	22.020	22.035	21.639	0.396***
CEO	0.023	0.023	0.023	0.000
Age	3.865	3.865	3.857	0.008***
R&D	0.010	0.010	0.008	0.002***
Leverage	0.580	0.575	0.723	−0.148
Growth	1.672	1.683	1.400	0.282
ROA	0.037	0.039	−0.013	0.052**
Stock returns	0.343	0.346	0.269	0.078**
Abnormal volatility	−0.004	−0.005	0.010	−0.015***
Abnormal turnover	0.000	−0.002	0.042	−0.044***

Notes: All of the variables are defined in Table 1. There are 21,848 firm-year observations in total, including 832 fraud firm-year observations and 21,016 non-fraud firm-year observations.

boards on average have 3.80 directors, 15.2% of sample firms hire big four auditors and 19.7% of CEOs have dual positions and hold 2.3% of firm shares.

The characteristics of fraudulent versus non-fraudulent firms are compared. The sample consists of 21,016 firm-year observations not involved (or not detected) in financial statement fraud and 832 firm-year observations detected and punished for financial statement fraud. The average state ownership for the detected fraudulent sub-sample is 7.0% and 9.3% for the non-detected sub-sample. This difference is statistically significant, implying fraud is less likely to be detected for firms with higher levels of state ownership. Firm size and stock returns are greater for the non-fraudulent sub-sample than for the fraudulent sub-sample. Fraudulent firms also have significantly higher CEO duality, but significantly lower supervisory board size than non-fraudulent firms.

Table 3 reports the distribution of financial statement fraud.[4] A total of 832 firm-year observations have committed 1814 fraud cases, indicating that several firms used multiple fraud techniques simultaneously to manipulate financial statements. There are six major types of financial statement fraud committed by the Chinese listed firms, including false income statements, false balance sheets, false cash flow statements, improper financial statement consolidation, delayed disclosure of annual and interim reports and insufficient and false disclosure of information. 'Insufficient or false disclosure of information' has the highest incidence among the six types of fraudulent financial reporting. This is mainly committed through 'insufficient and false disclosure of the related party relationship and transactions' and 'insufficient and false disclosure of the investment status'. Income statement fraud has a higher incidence than balance sheet fraud, probably because income performance in China is an important criterion for firm authorization of IPO and right issues and for the avoidance of delisting (Wang, Ashton, and Jaafar 2019; Wang, Ashton, and Jaafar 2023).

5.2. Regression results

Table 4 presents results for hypotheses 1 and 2. In Model 1, the coefficients of state ownership are significantly positive in the fraud commission equation and significantly negative in the fraud detection equation. Therefore,

Table 3. Types of financial statement fraud.

Types of financial statement fraud	Total
Panel A: False Income Statement	
Fictitious revenue recognition	140
Fictitious operating costs and expenses recognition	184
Fictitious asset impairment losses recognition	76
Fictitious investment profits and losses recognition	20
Improper accounting for sales returns, trade discounts and rebates	15
Fictitious non-operating income and expenses recognition	29
Others	20
Panel B: False Balance Sheet	
Timing difference recognition of assets	5
False asset valuation	78
Mis-classification and improper accounting for assets	83
Timing difference recognition of liabilities	3
False liabilities valuation	43
Mis-classification and improper accounting for liabilities	12
False equities valuation	3
Panel C: False Cash Flow Statement	
False cash flow relating to operating activities	8
False cash flow relating to investing activities	5
False cash flow relating to financing activities	3
False cash, cash equivalents and cash flow supplement materials	12
Panel D: Improper financial statement consolidation	
Not bringing a subsidiary in the scope of consolidation	15
Internal transactions not fully eliminated	11
Bringing a subsidiary which the parent firm has loss of control	5
Others	9
Panel E: Delayed disclosure of annual and interim reports	25
Panel F: Insufficient and false disclosure of information	
Related party transactions	279
Investment status	79
Financial status and operating results in the director report	26
Mortgage, seal and freeze of assets or equities and restricted assets	34
Assets that haven't obtained the ownership certificates or use rights	16
Receivables or payables by types, amounts and risks	39
Contracts and the fulfillment of contracts	33
Guarantee events	81
Lawsuits events	32
Commitment events	13
Directors, supervisors and senior management information	42
Accounting policies and accounting estimates	70
Customers and suppliers	23
Shareholders, shareholding and actual controllers	70
Internal control and corporate governance	16
External loans events	33
Others	124
Total	1814

when a significant proportion of a firm's shares are owned by the state, the probability of detecting fraudulent activities is significantly lower and the likelihood of listed firms committing fraud is significantly higher.

Models 2 and 3 report the results for hypothesis 2. State ownership in SOEs controlled by the central government is negatively related to a firm's propensity to commit fraud. In contrast, state ownership in SOEs controlled by local government is positively associated with a firm's propensity to commit fraud and negatively related to the likelihood of fraud detection. These results indicate SOEs controlled by local government are more likely to engage in fraud and escape regulatory punishments than central government SOEs.

Table 5 presents the results for hypothesis 3(a). Samples are divided into politically connected firms and non-politically connected firms to re-estimate the impact of state ownership on fraud. It is reported that state ownership is not related to fraud commission or fraud detection in politically connected firms. In contrast, state

Table 4. State ownership, central and local government ownership.

	Model 1: State ownership		Model 2: Central SOEs		Model 3: Local SOEs	
Variables	*P*(F)	*P*(D|F)	*P*(F)	*P*(D|F)	*P*(F)	*P*(D|F)
State	1.068***	−2.198***	1.285***	−2.439***	0.255	−1.125
	(0.315)	(0.458)	(0.354)	(0.481)	(0.512)	(0.864)
Central			−0.957*	1.126		
			(0.582)	(0.778)		
Local					1.240**	−1.521*
					(0.636)	(0.894)
Institution	−0.650**	0.826	−0.638**	0.817	−0.599**	0.727
	(0.260)	(0.526)	(0.260)	(0.533)	(0.273)	(0.543)
Duality	0.064		0.065		0.065	
	(0.049)		(0.049)		(0.048)	
Big4	0.028		0.029		0.030	
	(0.051)		(0.051)		(0.051)	
SBSIZE	−0.024		−0.024		−0.024	
	(0.018)		(0.017)		(0.017)	
SB Meeting	0.001		0.001		−0.001	
	(0.008)		(0.008)		(0.008)	
Board	0.151		0.153		0.149	
	(0.180)		(0.181)		(0.176)	
Firm size	−0.088***		−0.088***		−0.087***	
	(0.018)		(0.018)		(0.018)	
CEO	−0.134		−0.134		−0.134	
	(0.323)		(0.323)		(0.316)	
Age	0.186		0.196		0.189	
	(0.275)		(0.275)		(0.270)	
R&D		−3.791*		−3.866*		−3.852*
		(2.092)		(2.122)		(2.065)
Leverage		1.256***		1.274***		1.235***
		(0.296)		(0.301)		(0.295)
Growth		0.098***		0.099***		0.099***
		(0.026)		(0.027)		(0.026)
ROA		−2.079***		−2.107***		−2.048***
		(0.550)		(0.557)		(0.551)
Stock returns		−0.117**		−0.116**		−0.115**
		(0.046)		(0.046)		(0.045)
Ab. volatility		1.636***		1.727***		1.742***
		(0.538)		(0.591)		(0.599)
Ab. turnover		0.107		0.106		0.099
		(0.154)		(0.157)		(0.152)
Constant	0.178	−0.057	0.117	−0.052	0.139	0.013
	(1.077)	(0.609)	(1.071)	(0.625)	(1.053)	(0.596)
Log likelihood	−3364.159		−3363.274		−3362.393	
χ^2 (d.f.)	62.48(19)***		74.67(21)***		90.98(21)***	
Observations	21,848		21,848		21,848	

Notes: Variables are defined in Table 1. ***, ** and *, denote statistical significance at the 1%, 5% and 10% levels. *P*(F) is the probability of fraud commission and *P*(D|F) is the probability of fraud detection conditional on commission.

ownership is positively related to fraud commission and negatively related to fraud detection in non-politically connected firms. Therefore, for firms with political connections to government, the role of state ownership in encouraging fraud commission and escaping from regulatory punishments is diluted, consistent with hypothesis 3(a).

Table 6 (Models 1–4) shows the results for hypothesis 3(b) and reports the level of central government ownership in SOEs is not related to fraud commission and detection for either politically or non-politically connected firms. This arises as central SOEs have more resources and fewer incentives to commit fraud (Wang et al. 2022). Local government ownership is not linked to fraud commission or fraud detection for politically connected firms. In contrast, without political connected CEOs or chairmen, local SOEs have a positive relationship with fraud commission and a negative association with fraud detection. This indicates that state ownership in non-politically connected local SOEs increases the commission of fraud and reduces regulatory detection, consistent with hypothesis 3(b).

Table 5. Regression results: state ownership, political connections and fraud.

	Model 1: Political connected firms		Model 2: Non-political connected firms	
Variables	*P*(F)	*P*(D|F)	*P*(F)	*P*(D|F)
State	0.322	−0.860	1.506***	−2.756***
	(1.243)	(1.853)	(0.391)	(0.482)
Institution	−0.708	−0.071	−0.580*	0.865
	(2.129)	(4.967)	(0.304)	(0.645)
Duality	0.227		0.076	
	(2.197)		(0.065)	
Big4	0.094		0.023	
	(0.490)		(0.065)	
SBSIZE	0.010		−0.034	
	(0.221)		(0.025)	
SB Meeting	0.015		−0.001	
	(0.154)		(0.010)	
Board	0.919		−0.040	
	(5.001)		(0.230)	
Firm size	−0.209		−0.087***	
	(0.635)		(0.021)	
CEO	−0.348		−0.039	
	(1.605)		(0.426)	
Age	1.296		−0.173	
	(2.472)		(0.375)	
R&D		−5.506		−3.222
		(14.341)		(2.625)
Leverage		1.303		1.268***
		(4.012)		(0.360)
Growth		−0.004		0.113***
		(0.009)		(0.032)
ROA		−1.815		−2.267***
		(2.558)		(0.744)
Stock returns		−0.041		−0.181***
		(0.113)		(0.057)
Ab. volatility		1.418		2.230***
		(2.265)		(0.828)
Ab. turnover		−0.014		0.162
		(0.223)		(0.210)
Constant	−1.545	−1.799	1.489	−0.148
	(4.603)	(2.223)	(1.540)	(0.979)
Log likelihood		−1111.365		−2239.903
χ^2 (d.f.)		111.86 (19)***		78.52 (19)***
Observations	7021	7021	14,827	14,827

Notes: Variables are defined in Table 1. ***, ** and *, denote statistical significance at the 1%, 5% and 10% levels. *P*(F) is the probability of fraud commission and *P*(D|F) is the probability of fraud detection conditional on commission.

Turning to the control variables in the fraud commission and detection equations, the results in the baseline regressions are consistent with prior studies. Institutional ownership is negatively related to fraud commission. Larger firms are less likely to commit fraud, as these firms are often mature, diversified, operate with less profit volatility, and receive tighter regulatory scrutiny. Firm leverage is significant and positively related to fraud detection. The ROA coefficient is negative and statistically significant, indicating that the likelihood of fraud detection is therefore significantly lower for highly profitable firms. Firms with higher annual stock returns are less likely to be caught for fraud and firms that experience abnormally high return volatility are more likely to be targeted for fraud detection.

5.3. Addressing endogeneity

So far, the interpretation of the results assumes state ownership is exogenous. As there are observable differences between firms with high versus low state shareholdings, state ownership may be endogenous. These selection effects are mitigated using a propensity score matching approach (Wang, Ashton, and Jaafar 2019).

Table 6. Regression results: state ownership, political connections, fraud and endogeneity.

	Model 1 Political firms		Model 2 Non-political firms		Model 3 Political firms		Model 4 Non-political firms		Model 5 Endogeneity	
Variables	*P*(F)	*P*(D|F)	*P*(F)	*P*(D|F)	*P*(F)	*P*(D|F)	*P*(F)	*P*(D|F)	*P*(F)	*P*(D|F)
Central	0.557	−1.251	0.214	−0.640						
	(7.445)	(6.334)	(0.712)	(0.968)						
Local					0.119	−0.642	2.123***	−3.322***		
					(0.555)	(0.795)	(0.474)	(0.567)		
State Control									0.552**	−1.240***
									(0.222)	(0.362)
Institution	−0.851	0.638	−0.547	0.752	−1.009**	1.112	−0.445	0.633	−0.611**	0.992
	(3.176)	(11.153)	(0.678)	(1.133)	(0.483)	(1.242)	(0.315)	(0.652)	(0.306)	(0.670)
Duality	0.090		0.049		0.060		0.076		0.091	
	(0.930)		(0.038)		(0.105)		(0.059)		(0.077)	
Big4	0.062		0.024		0.045		0.028		−0.010	
	(0.262)		(0.043)		(0.083)		(0.060)		(0.081)	
SBSIZE	−0.013		−0.021		−0.012		−0.034		−0.037*	
	(0.058)		(0.015)		(0.027)		(0.022)		(0.022)	
SB Meeting	0.005		−0.001		0.003		−0.002		0.007	
	(0.061)		(0.007)		(0.013)		(0.010)		(0.012)	
Board	0.548		0.010		0.398		−0.001		−3.901**	
	(4.089)		(0.145)		(0.414)		(0.211)		(1.912)	
Firm size	−0.131		−0.062***		−0.111*		−0.084***		−0.079***	
	(0.730)		(0.014)		(0.058)		(0.019)		(0.024)	
CEO	−0.318		0.001		−0.251		−0.035		−0.421	
	(1.855)		(0.267)		(0.537)		(0.386)		(1.773)	
Age	0.826		−0.080		0.643		−0.156		0.448	
	(4.992)		(0.232)		(0.666)		(0.333)		(0.363)	
R&D		−5.140		−1.373		−4.958		−3.483		1.098
		(14.089)		(1.294)		(4.381)		(2.464)		(3.492)
Leverage		1.445		0.691***		1.332*		1.186***		1.266***
		(2.653)		(0.162)		(0.730)		(0.336)		(0.400)
Growth		−0.005		0.064***		−0.004		0.111***		0.089***
		(0.010)		(0.020)		(0.003)		(0.034)		(0.030)
ROA		−1.937		−1.264***		−1.683		−2.108***		−2.352***
		(4.784)		(0.449)		(1.330)		(0.701)		(0.881)
Stock returns		−0.048		−0.115***		−0.040		−0.180***		−0.124**
		(0.143)		(0.034)		(0.061)		(0.056)		(0.062)
Ab. volatility		1.483		0.993***		1.283		2.374**		1.343***
		(3.958)		(0.364)		(1.036)		(0.994)		(0.506)
Ab. turnover		0.042		0.159		0.008		0.192		0.075
		(0.248)		(0.122)		(0.208)		(0.205)		(0.237)
Constant	−1.147	−0.946	0.739	0.616*	−0.865	−0.397	1.358	0.149	−1.094	0.033
	(5.215)	(15.139)	(0.924)	(0.333)	(1.909)	(1.596)	(1.341)	(0.734)	(1.330)	(0.832)
Log likelihood	−1112.886	−2251.867	−1112.377	−2239.183	−1839.753					
χ^2 (d.f.)	34.90(19)**	55.97(19)***	24.02(19)	79.12(19)***	45.47(19)***					
Observations	7021	7021	14,827	14,827	7021	7021	14,827	14,827	12,338	12,338

Notes: 'State control' equals to one if a firm's state owners hold at least 20% of equity and zero otherwise. Other variables are defined in Table 1. ***, ** and *, denote statistical significance at the 1%, 5% and 10% levels. *P*(F) is the probability of fraud commission and *P*(D|F) is the probability of fraud detection conditional on commission.

We construct a set of control firms that can be matched optimally to the set of treated firms with high state shareholdings. High state shareholdings are represented by an indicator variable (State control) coded one if state owners hold at least 20% of a firm's equity and zero otherwise (Cornett et al. 2010). A probit model is estimated using 'State control' as the dependent variable and all other control variables as regressors. Subsequently, a firm's propensity score is obtained, and control samples are matched to treated samples based on the computed propensity scores. The nearest neighbor matching method (i.e. one to four matching) is applied to estimate average treatment effect of state shareholding on fraud occurrence.[5]

The bivariate probit model of fraud commission and fraud detection is re-estimated using propensity score-matched observations. The results in Model 5 (Table 6) are consistent with prior findings: firms with high level of state shareholdings have more propensity to commit fraud and are captured less frequently by regulators.

To further address the endogeneity concerns, we adopt a two-stage least squares (2SLS) approach using two instrumental variables (IVs) to re-estimate the main hypothesis one. Initially, we use the industry average proportion of state ownership per province per year as the first IV. The classification of different industries is based on the listed firms' 2-digit CSRC industrial classification code. The rationale for using this IV is that listed firms in the same sector may have a similar proportion of state ownership at the provincial level. In other words, the proportion of state ownership in each firm may depend on the industrial and provincial elements rather than firm-specific elements. This IV is assumed to be exogenous because the industry average proportion of state ownership itself in each region is not expected to have any impact on financial statement fraud commission or detection (Wang et al. 2022). The second IV used in the 2SLS model is the number of firms with state-owned background per industry per year. It is generally believed that firms in a specific industry with state owners being the ultimate controllers are more likely to receive greater investment from the state or state-related agencies, leading to a greater level of state ownership in corporate ownership structure. In addition, the number of state-owned firms in each industry is not expected to affect individual firm's propensity of fraud commission or regulatory detection. Subsequently, this IV is expected to meet the exogeneity requirement.

The results are presented in Table 7, with Column 1 presenting the first-stage results. In Column 1, the dependent variable is the proportion of state ownership, and the independent variables include two IVs mentioned above. The same set of control variables in the baseline regression model are also included. It is reported that both IVs are positively and significantly related to state ownership proportion at 1% level, which is consistent with the rationale behind these two IVs. In addition, two IVs have met the instrumental exogeneity and instrumental relevance conditions. For instance, the Cragg-Donald's Wald F-statistic significantly exceeds the Stock-Yogo weak identification test of 10% critical value of 19.93, supporting the strength of the two IVs (Stock and Yogo 2005). Moreover, the p-value of the Sargan-Hansen statistic is 0.330, suggesting that the IVs are valid, i.e. they are uncorrelated with the error terms. The second-stage results are presented in Columns 2–3 where the dependent variables are fraud commission and fraud detection, respectively. It is observed that the predicted values of state ownership proportion are significantly and positively related to the likelihood of fraud commission, but negatively related to the likelihood of fraud detection. These results are consistent with our previous estimations, indicating that higher level of state ownership reduces the likelihood of effective fraud detection, increasing the likelihood of fraud commission.

5.4. Additional analysis

Several additional robustness tests are also conducted. Firstly, we examine the channel that state ownership affects financial statement fraud while considering the influence of political connections. We propose that favorable audit opinion is the channel that state ownership increases the likelihood of fraud commission. Specifically, Liu, Wang, and Wu (2011) find that state-owned enterprises tend to have a greater probability of receiving a clean audit opinion in China from external auditors. In general, audit opinion reflects an auditor's professional judgment on whether a client firm's financial statement presents its financial condition in a true and fair manner. An unclear or modified audit opinion sends negative signals to market participants, which damages the reputation of the firm and its management and increases the likelihood of regulatory investigation. Compared to non-SOEs, SOEs receive greater financial and political support from the government (Wang, Ashton, and Jaafar 2019). Under this circumstance, when external auditors indicate that they disagree with the firm's financial

Table 7. Instrumental variable approach.

Instrumental variable regression			
Variables	1st stage State	2nd stage Fraud	
		P(F)	*P*(D|F)
State_Industry_location	0.977***		
	(0.005)		
No. of state-owned firms	0.001**		
	(0.001)		
State		0.676**	−1.753***
		(0.341)	(0.548)
Other variables	Controlled	Controlled	Controlled
R-squared	0.669		
Log likelihood			−3367.318
F-statistics	2449.37***		
Sargan statistic test (*p*-value) (overidentification test of all instruments)	0.947 (0.330)		
Cragg-Donald (CD) Wald *F*-statistic	1.7e + 04		
Stock and Yogo (2005) ID test for critical values: 10% maximal IV	19.93		
Anderson canon. corr. LM statistic for under-identification test	3105.889***		
Observations	21,848	21,848	21,848

Notes: This table reports the instrumental variable (IV) regression results. The endogenous variable is the proportion of state ownership. The instrumental variables are State_Industry_location and the number of state-owned firms. State_Industry_location is the proportion of state ownership in the firm's 2-digit CSRC-coded industry within each province per year. No. of state-owned firms refer to the number of listed firms with a state-owned ultimate controller background per industry per year. Column 1 reports the first-stage estimation results while Columns 2 and 3 report the second-stage results. *P*(F) is the probability of fraud commission and *P*(D|F) is the probability of fraud detection conditional on commission. ***, ** and *, denote statistical significance at the 1%, 5% and 10% levels.

statement prior to issuing a modified audit opinion, senior management tends to go to government for help so that they can put pressure on the audit firms to change opinions (Liu, Wang, and Wu 2011). Subsequently, SOEs have greater incentives and opportunities to commit financial statement fraud.

To empirically examine this channel, a variable '*Opinion*' is introduced, which is a dummy variable that equals to one if a firm receives a clean audit opinion and zero if a firm receives a modified audit opinion. A two-step approach to examine this channel is employed, and the results are presented in Table 8. Model 1 shows the first-step results: the dependent variable is replaced to '*state ownership*', and regressed against '*Opinion*' and other control variables. It is reported that there is a significant and positive relationship between audit opinion and state ownership. Models 2–3 show the second-step results: the baseline regression model for Hypothesis 3 is re-estimated by incorporating the interaction variable of 'State∗Opinion' (state ownership multiplied by audit opinion) as the main independent variable. The channel analysis results are in line with our previous findings. For instance, it is reported that the interaction variable is not related to fraud commission or fraud detection in the politically connected firms. In contrast, the interaction variable is positively related to fraud commission and negatively related to fraud detection in the non-politically connected firms. In other words, for non-politically connected firms with higher levels of state shareholdings, they are more likely to receive clean audit opinions. Subsequently, it reduces the effectiveness of regulatory detection, increasing these firms' propensity to commit fraud.

In addition, we also replace the test variable state ownership with a dummy variable SOE to re-estimate the impact of state-owned enterprises on fraud commission and detection. SOE equals one if a firm is ultimately controlled by the state or state agencies, and zero otherwise. As shown in Model 1 of Table 9, the coefficient SOE

Table 8. Additional analysis: Channel of state ownership influence and political connected firms.

Variables	Model 1 State ownership	Model 2 Political firms		Model 3 Non-political firms	
		P(F)	*P*(D|F)	*P*(F)	*P*(D|F)
Opinion	0.031***	0.568		−0.619***	
	(0.005)	(0.887)		(0.113)	
State∗Opinion		−1.691	−0.316	1.543***	−2.967***
		(1.242)	(1.002)	(0.502)	(0.906)
Institution	−0.070***	−0.313	−0.352*	−0.502**	0.862
	(0.006)	(0.646)	(0.210)	(0.241)	(0.664)
Duality	−0.027***	0.161		0.057	
	(0.003)	(0.346)		(0.053)	
Big4	−0.023***	−0.051		0.005	
	(0.003)	(0.402)		(0.052)	
SBSIZE	0.021***	−0.005		−0.026	
	(0.001)	(0.263)		(0.021)	
SB Meeting	0.002***	0.031		0.000	
	(0.001)	(0.043)		(0.008)	
Board	−0.210***	3.402**		0.005	
	(0.006)	(1.348)		(0.178)	
Firm size	−0.001	0.227**		−0.032*	
	(0.001)	(0.091)		(0.017)	
CEO	0.092***	−1.114		0.017	
	(0.009)	(2.145)		(0.314)	
Age	0.092***	1.834		−0.080	
	(0.017)	(1.845)		(0.291)	
R&D	−0.793***		−3.990		−1.774
	(0.066)		(3.471)		(2.905)
Leverage	0.001**		0.814*		0.813
	(0.001)		(0.480)		(0.526)
Growth	−0.001*		−0.003*		0.096**
	(0.001)		(0.002)		(0.048)
ROA	0.002*		−0.977		−1.511**
	(0.001)		(1.049)		(0.767)
Stock returns	0.024***		−0.026		−0.148
	(0.002)		(0.060)		(0.092)
Abnormal volatility	0.008		0.976		1.901
	(0.014)		(0.664)		(1.180)
Abnormal turnover	−0.109***		−0.021		0.167
	(0.005)		(0.212)		(0.262)
Constant	−0.319***	−13.079**	6.417	0.255	1.156**
	(0.066)	(6.597)	(9.476)	(1.126)	(0.536)
Observations	21,843	7020	7020	14,823	14,823

Notes: This table examines the channel that state ownership affects financial statement fraud in politically connected firms (Model 2) and non-politically connected firms (Model 3). In Model 1, the dependent variable is state ownership. The channel variable is 'audit opinion', proxied as 'Opinion'. This is a dummy variable that equals one if a firm receives an unmodified (clean) audit opinion, and zero if a firm receives a modified audit opinion. The variable 'State' is controlled in Models 2 and 3. In Columns 2 and 4, the dependent variables are 'financial fraud commission'. In Columns 3 and 5, the dependent variables are 'financial fraud detection'. Other variables are defined in Table 1. ***, ** and *, denote statistical significance at the 1%, 5% and 10% levels, respectively.

is significantly negative in the fraud detection equation, indicating that regulators are reluctant to investigate and punish SOEs.

In Models 2 and 3 (Table 9) the dependent variable financial statement fraud is replaced with corporate fraud including financial statement fraud and market manipulation (e.g. insider trading, illegal purchase and sale of shares and price manipulation). The results are consistent with prior findings. For instance, for Model 2, state ownership in central SOEs is negatively related to a firm's propensity to commit corporate fraud. In Model 3, state ownership in local SOEs is negatively associated with the likelihood of corporate fraud detection.

As firms may commit fraud because of financial pressure stemming from third parties' expectations (Chen et al. 2016b), we re-estimate the baseline regression model including several financial performance variables (i.e.

Table 9. Additional Analysis: alternative variables and financial pressure.

Variables	Model 1 *P*(F)	Model 2 *P*(D|F)	Model 3 *P*(F)	Model 4 *P*(D|F)	*P*(F)	*P*(D|F)	*P*(F)	*P*(D|F)
State			0.632*	−1.551***	−0.129	−0.583*	1.200***	−2.224***
			(0.326)	(0.383)	(0.496)	(0.305)	(0.321)	(0.369)
SOE	0.235	−0.684***						
	(0.162)	(0.205)						
Central			−0.761*	0.773				
			(0.479)	(0.600)				
Local					0.359	−0.336***		
					(0.342)	(0.117)		
Institution	−0.262	0.260	−0.647**	0.910	−0.079	−0.160	−0.634**	0.670
	(0.565)	(0.848)	(0.329)	(0.616)	(0.452)	(0.310)	(0.270)	(0.534)
Duality	0.063**		0.101***		0.237***		0.075	
	(0.032)		(0.037)		(0.090)		(0.058)	
Big4	0.006		−0.004		−0.022		0.032	
	(0.034)		(0.037)		(0.084)		(0.059)	
SBSIZE	−0.005		−0.016		−0.051		−0.027	
	(0.012)		(0.014)		(0.034)		(0.020)	
SB Meeting	0.004		0.008		0.021		0.001	
	(0.005)		(0.006)		(0.015)		(0.009)	
Board	0.304**		0.581***		2.616*		0.177	
	(0.127)		(0.177)		(1.538)		(0.219)	
Firm size	−0.081***		−0.093***		−0.150***		−0.104***	
	(0.011)		(0.013)		(0.023)		(0.024)	
CEO	−0.277		−0.417*		−1.646		−0.173	
	(0.192)		(0.230)		(1.081)		(0.387)	
Age	0.309		0.102		0.551		0.197	
	(0.194)		(0.212)		(0.530)		(0.315)	
R&D		0.086		−0.284		−1.021	2.642	−7.406*
		(1.022)		(1.164)		(1.089)	(3.192)	(3.944)
Leverage		0.954***		1.032***		0.911***	−0.020	1.345***
		(0.152)		(0.162)		(0.229)	(0.013)	(0.251)
Growth		0.036		0.060***		0.046**	−0.001	0.106***
		(0.026)		(0.021)		(0.018)	(0.001)	(0.024)
ROA		−1.346***		−1.526***		−1.553***	−0.031	−2.196***
		(0.466)		(0.505)		(0.456)	(0.027)	(0.506)
Stock returns		−0.100***		−0.098***		−0.084***		−0.124***
		(0.022)		(0.023)		(0.025)		(0.045)
Abnormal volatility		0.542**		0.673*		0.536*		1.729***
		(0.247)		(0.353)		(0.277)		(0.490)
Abnormal turnover		0.231***		0.161*		0.205**		0.115
		(0.080)		(0.092)		(0.085)		(0.160)
Constant	0.030	0.408	1.187	−0.057	0.436	−1.155***	0.534	−0.533
	(0.722)	(0.301)	(0.782)	(0.292)	(1.977)	(0.073)	(1.266)	(0.780)
Log likelihood		−7688.168		−7703.941		−7701.854		−3360.616
Chi-squared (d.f.)	141.78(19)***	114.99(21)***	379.22 (21)***	138.94(23)***				
Observations	21,848	21,848	21,848	21,848	21,848	21,848	21,848	21,848

Notes: SOE is a dummy variable that equals one if a firm is ultimately controlled by the state or state agencies, and zero otherwise. The remaining variables are defined in Table 1. ***, ** and *, denote statistical significance at the 1%, 5% and 10% levels, respectively. *P*(F) is the probability of fraud commission and *P*(D|F) is the probability of fraud detection conditional on commission.

R&D, leverage, growth and ROA) in both the commission and detection equations. The results are presented in Model 4 (Table 9), which are consistent with the main findings.

Then, the impact of Split Share Structure Reform (SSSR) on fraud is examined. The split share structure that divides the shares of Chinese listed firms into non-tradable and tradable shares creates a misalignment of interests between state and private shareholders. Having realized the problems within this structure, the CSRC announced its SSSR in 2005 with the intention to carry out the conversion of non-tradable shares into freely tradable shares.[6] Most listed firms completed these negotiations by the end of 2008, and correspondingly the non-tradable shares became tradable by the end of 2011 (Chen et al. 2016a). We therefore create a variable called 'SSSR', which measures the proportion of state ownership in the years after the implementation of the

Table 10. Additional Analysis: SSSR reform and strong and weak legal environments.

	Model 1		Model 2 Strong level		Model 3 Weak level		Model 4 Marginal effect	
Variables	*P*(F)	*P*(D|F)	*P*(F)	*P*(D|F)	*P*(F)	*P*(D|F)	Strong level	Weak level
State			0.027	−0.918*	0.470	−1.266**	−0.375***	−0.448***
			(0.400)	(0.512)	(0.410)	(0.531)	(0.123)	(0.138)
SSSR	0.895**	−2.026***						
	(0.378)	(0.536)						
Institution	−0.740***	1.028*	−1.170***	1.841***	−0.508	0.470	0.517***	0.097
	(0.276)	(0.525)	(0.349)	(0.613)	(0.398)	(0.719)	(0.190)	(0.232)
Duality	0.052		0.065		0.124***		0.014	0.026*
	(0.038)		(0.048)		(0.047)		(0.009)	(0.013)
Big4	0.023		−0.022		0.034		−0.005	0.007
	(0.043)		(0.047)		(0.055)		(0.009)	(0.012)
SBSIZE	−0.020		−0.016		−0.019		−0.003	−0.004
	(0.015)		(0.020)		(0.017)		(0.004)	(0.003)
SB Meeting	−0.001		0.003		0.015**		0.001	0.003
	(0.007)		(0.008)		(0.008)		(0.002)	(0.002)
Board	0.135		0.462**		0.707***		0.097**	0.146**
	(0.144)		(0.211)		(0.229)		(0.038)	(0.059)
Firm size	−0.078***		−0.100***		−0.069***		−0.021***	−0.014**
	(0.013)		(0.020)		(0.016)		(0.008)	(0.007)
CEO	−0.100		−0.286		−0.374		−0.060	−0.078
	(0.264)		(0.268)		(0.361)		(0.057)	(0.076)
Age	0.160		−0.187		0.295		−0.039	0.061
	(0.230)		(0.274)		(0.285)		(0.061)	(0.065)
R&D		−2.989*		0.202		−0.883	0.084	−0.380
		(1.596)		(1.145)		(2.297)	(0.475)	(0.993)
Leverage		1.000***		0.744***		1.063***	0.308***	0.458***
		(0.196)		(0.198)		(0.210)	(0.073)	(0.077)
Growth		0.086***		−0.001		0.053*	−0.001	0.023*
		(0.022)		(0.001)		(0.030)	(0.001)	(0.012)
ROA		−1.683***		−1.782***		−1.170**	−0.738***	−0.504***
		(0.438)		(0.546)		(0.534)	(0.169)	(0.191)
Stock returns		−0.091**		−0.059**		−0.121***	−0.024**	−0.052***
		(0.038)		(0.026)		(0.033)	(0.011)	(0.013)
Abnormal volatility		1.302***		0.189		0.828**	0.078	0.357**
		(0.417)		(0.182)		(0.336)	(0.076)	(0.143)
Abnormal turnover		0.111		0.153		0.150	0.064	0.064
		(0.124)		(0.107)		(0.128)	(0.044)	(0.054)
Constant	0.116	0.336	2.776***	−0.219	−0.164	0.170		
	(0.875)	(0.311)	(1.049)	(0.274)	(1.058)	(0.325)		
Log likelihood		−3363.966		−3914.791		−3769.908		
Chi-squared (d.f.)		92.41(19)***		82.17(19)***		63.17 (19)***		
Observations	21,848	21,848	11,670	11,670	10,178	10,178	11,670	10,178

Notes: SSSR is defined as the proportion of state ownership for each firm in the years following the Split Share Structure Reform. Model 2 includes firm-year observations that operate in a strong legal environment and Model 3 includes firm-year observations that operate in a weak legal environment. Marginal effect refers to the average marginal effects for the conditional probability of fraud detection given the outcome of fraud commission for Model 2 (strong legal environment) and Model 3 (weak legal environment), respectively. The remaining variables are defined in Table 1. ***, ** and *, denote statistical significance at the 1%, 5% and 10%, levels, respectively. *P*(F) is the probability of fraud commission and *P*(D|F) is the probability of fraud detection conditional on commission.

SSSR, to investigate the impact of state ownership on fraud subsequent to the SSSR. Model 1 (Table 10) presents the results. It is observed that the variable 'SSSR' is positively associated with fraud commission and negatively associated with fraud detection. These findings suggest that when state shareholders have the option to trade their shares following the SSSR, their wealth becomes sensitive to the market value of the firms, leading to greater incentives for committing financial statement fraud.

Furthermore, we examine the role of state ownership on financial statement fraud whilst incorporating the impact of the legal environment in China. The institutional environment shapes corporate governance and this is especially the case in China, where the reform process among different provinces is unevenly distributed in terms of wealth, growth and legal development (Wu, Johan, and Rui 2016). Specifically, we argue that companies located in provinces with stronger legal environments demonstrate higher financial statement quality, primarily

due to stronger law enforcement levels and more effective regulatory detection of potential fraudulent behaviors. In such cases, the influence of state ownership in facilitating selective legal enforcement or evading regulatory detection may be diminished. Conversely, for firms situated in regions with relatively weaker legal environments, regulators may encounter greater challenges in effectively detecting financial statement fraud, thereby leaving more opportunities for fraudulent behaviors.

Following Wu, Johan, and Rui (2016), samples are divided into firms which operate in provinces with strong (Model 2 of Table 10) and weak legal environments (Model 3 of Table 10). This classification is based on a comprehensive index compiled by Fan, Wang, and Yu (2016).[7] In Models 2 and 3, it is reported that state ownership is negatively associated with fraud detection for firms operating in both weak and strong legal environments. The marginal effects are reported in Model 4, indicating the conditional probability of fraud detection given the occurrence of fraud commission. These marginal results reveal a larger absolute value of coefficients in the subgroup of firms located in weak legal environments. They indicate that the effect of state ownership on evading regulatory detection is more pronounced for firms operating in provinces with weaker legal environments than for those in stronger legal environments, consistent with our expectation.

Model 1 (Table 11) considers whether state or institutional investors punish listed firms for their fraudulent behaviors through reducing their ownership after a fraud is exposed. Changes of state ownership and institutional ownership between year $t+1$ (i.e. the year after financial fraud is revealed) and year t (i.e. the year that financial fraud is reported) are used as the dependent variable and regressed on fraud and control variables. It is reported that only institutional owners significantly reduce their shareholdings of listed firms after a fraud has been committed. Distinctly state owners appear to be passive investors and unresponsive to fraud events.

Model 2 (Table 11) considers if poor ex-post financial performance is an indicator of fraud detection; if this is the case it may not satisfy the exclusion restriction for identification between fraud commission and fraud detection. This arises from an insiders' ability to predict future corporate financial performance based on their private information. Specifically, managers can predict future stock returns better than minority shareholders. The managers' expectations about future stock returns can affect their ex-ante incentives to commit financial statement fraud. In other words, the ex-post stock returns in the fraud detection model are correlated with the error term in the fraud commission model. Following Wang (2013), a 'disastrous stock returns' measure rather than raw stock returns is used. This is defined as a dummy variable that equals to one if the annual stock return is below the bottom 10% of the sample distribution and zero otherwise. We find that the coefficients of state ownership are significantly positive in the commission equation and significantly negative in the detection equation.

6. Conclusions

After more than two decades of extensive reform and privatization, state-owned enterprises still dominate China's capital market. We examine different forms of government ownership and political connections held by senior management, and their impacts on the commission and detection of financial statement fraud between 2007 and 2018. Critically we address three significant methodological challenges facing in the literature: partial observability, defining fraud, and the complexity of fraud environments (Amiram et al. 2018). We report state ownership is associated with both a lower likelihood of fraud detection and an enhanced propensity to engage in fraud. Underlying this result is the nuanced role of different forms of state ownership and how this can act in combination with politically connected senior managers. SOEs controlled by central government are far less likely to be involved in fraud than SOEs controlled by the local government. We also identify a dilution in the potency of politically connected CEOs or chairmen in encouraging fraud commission and escaping from regulatory punishments when firms are also state-owned. Further examination shows the impact of local state ownership on fraud is only significant when CEOs or chairmen do not have political connections.

These findings are robust to alternative measures of fraud and state ownership. In addition, we find that clean audit opinions are the channel that state ownership increases the likelihood of fraud commission. Endogeneity concerns are addressed using a propensity score matching approach and a two-stage least squares approach. Firms with a high proportion of state shareholdings are more likely to commit fraud and are less likely to be captured by regulators. As state shareholders have the option to trade their shares following the SSSR, state

Table 11. Additional Analysis: institutional ownership and disastrous stock returns.

	Model 1		Model 2	
Dependent Variables	State	Institution	Financial statement fraud	
			P(F)	*P*(D|F)
Fraud	0.001	−0.012**	1.002***	−2.195***
	(0.004)	(0.005)	(0.323)	(0.466)
State				
Institution			−0.660**	0.874
			(0.263)	(0.536)
Duality	−0.001	0.003	0.065	
	(0.003)	(0.004)	(0.051)	
Big4	0.019***	0.045***	0.029	
	(0.003)	(0.004)	(0.052)	
SBSIZE	−0.008***	−0.002	−0.025	
	(0.002)	(0.002)	(0.018)	
SB Meeting	−0.001**	0.004***	−0.001	
	(0.001)	(0.001)	(0.008)	
Board	0.019***	−0.073***	0.172	
	(0.006)	(0.018)	(0.189)	
Firm size	0.003	0.028***	−0.085***	
	(0.002)	(0.002)	(0.018)	
CEO	0.014	−0.016	−0.139	
	(0.011)	(0.026)	(0.333)	
Age	0.110***	0.034	0.254	
	(0.020)	(0.025)	(0.276)	
R&D	0.279***	0.477***		−3.277
	(0.069)	(0.083)		(2.059)
Leverage	−0.001***	0.001***		1.250***
	(0.001)	(0.001)		(0.294)
Growth	0.001	−0.001**		0.096***
	(0.001)	(0.001)		(0.025)
ROA	0.001	0.003**		−2.171***
	(0.001)	(0.001)		(0.618)
Stock returns	0.005***	0.006***		
	(0.001)	(0.001)		
Disastrous stock returns				0.143*
				(0.086)
Abnormal volatility	0.002	−0.008		1.470***
	(0.006)	(0.016)		(0.547)
Abnormal turnover	0.017***	−0.040***		0.113
	(0.004)	(0.006)		(0.155)
Constant	−0.477***	−0.732***	−0.134	−0.183
	(0.075)	(0.092)	(1.082)	(0.672)
F-statistics	27.77***	49.49***		
Log likelihood				−3370.671
Chi-squared (d.f.)				60.71 (19)***
Observations	21,848	21,848	21,848	21,848

Notes: Fixed-effects models are reported in Model 1, and the dependent variables are state ownership and institutional ownership, respectively. All of the variables are defined in Table 1. ***, ** and *, denote statistical significance at the 1%, 5% and 10% levels, respectively. *P*(F) is the probability of fraud commission and *P*(D|F) is the probability of fraud detection conditional on commission.

shareholders are more likely to commit fraud and obtain private benefits. Moreover, these effects are the stronger in the parts of China with the weaker legal environments. Lastly, compared to state owners, institutional owners significantly reduce their shareholdings of listed firms after fraudulent behavior is revealed.

These results are important for financial professionals, regulators, and policy makers. Financial professionals should realize state ownership has multiple impacts on Chinese listed firms. While state ownership is beneficial to listed firms by offering a wide range of financial support, it also results in a higher incidence of fraud. SOEs are also treated more favorably by regulators, with fraudulent SOEs likely evade capture and punishment. Second, SOEs controlled by local government are more likely to engage in fraudulent activities. Greater

regulatory resources should be employed to monitor these firms. China's government also needs to take necessary measures to strengthen the CSRC's enforcement powers, independence, and impartiality in the fraud detection process. This is especially important for fraud cases handled by the CSRC regional offices. From a fraud prevention perspective, enhanced control of local SOEs by central government would not be a negative outcome.

Lastly, institutional and legal environments appear to exert a profound influence on the behaviors and governance of listed firms. There are significant disparities in the market development and legal protection of different Chinese provinces which require further research. We propose that associations between CSRC enforcement staff and firm managers need to be strictly monitored to prevent collusion and wrongdoing, especially for firms operating in regions with a weaker legal environment. Institutional investors also play a beneficial role in detecting and responding to fraud. Regulators should therefore encourage collective investments provided by professional institutions to improve financial reporting quality. These findings have relevance both for China and other nations with high levels of state ownership (Faccio and Lang 2002).

When considering future avenues for research, examining what occurs to firms and managers after fraud events is currently poorly understood. The role of recidivism in fraudulent behavior and organizational learning (Wang, Ashton, and Jaafar 2023) require further discussion. Equally, it is important to assess the efficacy of current policies in tackling financial statement fraud, be these programs to address fraud directly (He and Kryzanowski 2023) or other associated outcomes. Finally, we suggest the methods and procedures used within academic assessments of fraud require continued vigilance. Different methods need to be applied to address partial observability and new, reliable, and granular data sources are required to comprehend the evolving forms of financial statement fraud (Amiram et al. 2018).

Notes

1. According to the U.S. Statement on Auditing Standards No. 99, financial statement fraud involves the deliberate manipulation or exclusion of financial data or disclosures in reporting, with the aim of deceiving users of financial reports. This results in financial reporting that does not accurately adhere to the Generally Accepted Accounting Principles (Wang, Ashton, and Jaafar 2023).
2. This hand collected data is preferred to commercial databases (e.g. CSMAR and CCER). One of reasons is that the fraud classification provided by the CSMAR and CCER databases is general and simplistic. The CSMAR database classifies fraud into: profits make-up, fabrication of assets, false statements, disclosure postponement, major failure to disclose information, fictitious disclosure (others), fraudulent listing, violations in capital contribution, unauthorized changes in use of funds, major shareholders/related parties' embezzlement of firms' assets, insider trading, illegal purchase and sale of shares, price manipulations, illegal guarantees, accounting mistakes and others. In addition, punishments imposed by the CSRC regional offices, and their supervisory measures are simply recorded as 'others' in the CSMAR database. Subsequently, fraud related data is collected from original sanction reports and crosscheck with several other sources to ensure reliability.
3. The original sample includes 24,331 observations; 646 observations from the financial industry and 1837 observations without available data are excluded.
4. A content analysis method is applied to code different types of financial statement fraud. See Appendix for details of the content analysis method. Under a double-entry accounting system, a false income statement results in a false balance sheet. Our paper only focuses and codes the direct source that the fraud occurs (i.e. the source that is directly identified in the regulator's sanction report).
5. We adopt a one to four matching approach as this offers higher precision than one to one matching, with only a small increase in bias (Rassen et al. 2012). The difference between the treated and control groups is −0.02 and is statistically significant ($t = -4.40$) in the unmatched samples. After matching, the difference narrows to −0.01 yet remains statistically significant ($t = -3.12$). *T*-tests are conducted to check whether differences between two groups remain significant after conditioning the propensity score. Good balancing is evidenced by insignificant financial control variables after matching, indicating treated and untreated groups have similar financial characteristics. It is important to notice that changing the number of matches to any number between 1 and 4 has little impact on the results.
6. When a listed firm is selected to implement the reform, it begins with negotiations of compensation payout plan between non-tradable and tradable shareholders. In addition, the main purpose of the SSSR is not to terminate state ownership or control but to make state-owned shares more responsive to the market (Chen et al. 2016a).
7. The regional legal environment score is available for each province per year during the sample period. A strong legal environment is defined as province with a legal environment score above the sample median. Similarly, a weak legal environment is defined as province with a legal environment score below the sample median.

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Appendix. Content analysis method

Coding is conducted following a manifest approach to categorize fraud data into different groups. This procedure selects the sentence from sanction reports as the coding unit, including meaning of the whole sentences rather than a dictionary approach of using words in isolation. Initially, this study bases its categorization of financial statement fraud on Zhu and Gao (2011). For a fraud case that does not belong to any of the categories in Zhu and Gao (2011)'s paper, the additional groups are formulated. Subsequently, six major types of fraud are coded, including false income statements, false balance sheets, false cash flow statements, improper financial statement consolidation, delayed disclosure of annual reports and insufficient and false disclosure of information. Using a similar coding approach, within each of these six categories, a series of appropriate items are identified in order to establish relevant sub-categories. In total, 40 subcategories of specific fraud techniques are identified.

As this method is unavoidably subjective, one way to increase reliability is to have more than one person code the documents. Thus, an independent coder separately read and coded a randomly selected 10% of sanction reports. Training was provided as to the financial statement fraud terms and coding procedures. The intercoder reliability coefficients are calculated to ensure that stability and reproducibility meet the acceptable criteria. This study uses the 'Krippendorff's Alpha' to calculate inter-coder reliability coefficients as they consider the possibility that coders' agreement may be occurred by chance. The coding result shows a Krippendorff's Alpha of 0.932, indicating high reliability of the fraud classification.