Does mutual fund investment influence accounting fraud?

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1 Introduction

Does mutual fund investment deter accounting fraud in China? Mutual funds emerged in China two decades ago and with government support have experienced high growth, becoming the largest type of institutional investor in Chinese capital markets (Chi et al., 2014). Compared to individual investors, mutual funds can diversify investment risks and have expertise in monitoring firms' decision making process, serving as an external corporate governance mechanism (Chan et al., 2014). Mutual funds have been previously examined with respect to improving firm performance (Ng et al., 2009; Lin and Fu, 2017), corporate transparency (Chan et al., 2014) and stock price informativeness (Ding et al., 2013). However, little is known about the association between mutual fund investment and accounting fraud, especially in the context of China, where legal enforcement is relatively low and protection of investors' rights is weak.

Using a bivariate probit model, this study examines fraud commission and detection separately for Chinese listed firms from 2007 to 2014. It is reported mutual fund investment reduces listed firms' propensity to commit fraud and increases the likelihood of fraud detection. This validates Chinese regulators' efforts to develop mutual funds to reduce fraud. Open-end fund investment has a stronger influence on disciplining listed firms than closed-end fund investment and redeemable shares exert considerable discipline on managers. However, state ownership moderates the benefits of the external governance mechanism provided by mutual funds. The ability of mutual funds monitoring is reduced as the State-owned Enterprises (SOEs) answer more to the state than to the stock market.

This study makes the following contributions to the literature. First, ambiguity as to the monitoring role of mutual funds in Chinese capital markets is alleviated. Although mutual funds are often considered to be a monitor reducing information asymmetries, agency problems and maximizing shareholder value (Ding et al., 2013),

the existing empirical evidence is mixed. For instance, Jiang and Kim (2015) express concerns about the small size of mutual fund shareholdings, which may result in them not having the power or desire to engage in shareholder activism. Lin et al. (2017) find that a high level of information asymmetry in China's capital markets results in greater costs of monitoring and mutual funds may act passively. Distinctly this paper reports mutual fund investment is capable of disciplining firms detecting potential fraudulent behaviours.

Second, this study highlights the constraining roles played by mutual fund investment and state ownership in monitoring managers and shaping the corporate information environment. Most Chinese listed firms have a highly concentrated ownership structure, with a single owner having the effective control of the listed firms. Many of these controlling shareholders are state and quasi-state institutions. State ownership has been previously portrayed as beneficial to listed firms by offering financial support (Wang and Yung, 2011), improving firm performance (Peng and Luo, 2000), attracting greater investments (Shen and Lin, 2016) and facilitating business in uncertain environments (Hou et al., 2013). This research illuminates a negative side of state ownership: its role in constricting monitoring by mutual funds. In China, the state either directly or indirectly owns virtually all mutual funds' management firms and more importantly, mutual funds engage in voting on behalf of minority shareholders. As a consequence, the state can apply pressure to mutual funds and the ability of mutual funds to discipline dishonest managers is significantly reduced (Firth et al., 2010; Ding et al., 2013).

Third, a bivariate probit model is used to accommodate partial observability. Fraud studies (see Jia et al., 2009; Hou and Moore, 2010, Chen et al., 2013) typically rely on the detection of fraud for evidence of its existence. However, fraud can only be observed when fraudsters are punished. Past studies only consider detected fraud rather than the underlying population of all fraudulent activities (Stuart and Wang, 2016). In this study, the probability of detected fraud is considered to be the product of two latent probabilities: the probability of fraud commission and fraud detection. A bivariate

probit model is thus adopted to quantify not only the determinants of fraud commission and detection but also the interaction between these two latent processes (Wang, 2013).

The remainder of the paper is organized as follows. The next section outlines the context of the study and reviews the relevant literature. The third section develops hypotheses, discusses the variables employed and the research model. The fourth section reports the empirical results and the final section concludes the paper.

2 Literature review

2.1 Characteristics of mutual funds

Mutual funds are created through a contractual relationship between a fund management institution, a fund custodian and investors. Commercial banks are licensed by the CSRC to act as fund custodians and assume the responsibilities of monitoring fund managers' investment activities (Neftci et al., 2007). Fund management institutions mainly perform duties of raising capital and handling the sale and registration of fund shares (Yang et al., 2014).

China's mutual funds industry differs from that of the U.S.A in several ways. First, the size of mutual funds is different: by the end of 2016, mutual funds in the U.S. were about 13 times larger than mutual funds in China. There were 850 registered U.S. fund companies with total fund holding of $16.3 trillion, accounting for about 60% of stock market capitalization (ICI, 2017). In contrast, there were 108 fund management companies in China and mutual funds' assets accounting for only 18% of domestic market capitalization (AMAC, 2017). This gap reflects the dominance of individual investors in Chinese domestic stock markets (Hu and Chen, 2016).

Second, mutual funds in the U.S.A are corporate entities with a specific board of directors (or trustees) overseeing each fund. In contrast, mutual funds in China are not corporate entities but contract funds, implying fewer voting rights are provided to

investors (Rao et al., 2016).

Third, management fees in U.S. mutual funds are negotiated by the board of directors and fluctuate according to market competition and fund performance. Distinctly management fees in China's mutual funds are fixed at 1.5% of total assets under management since 2002. Subsequently, management fees do not reveal much about the mutual funds' performance in China (Rao et al., 2016).

Fourth, mutual funds in China are mostly distributed through fund management companies, commercial banks or securities companies. Insurance firms play a very little role in the distribution of funds (Jun et al., 2014). However, in the U.S.A, mutual funds can be allocated through a variety of channels such as the direct channel, the advice channel, the retirement plan channel, the supermarket channel and the institutional channel (Jiang et al., 2008).[1]

Fifth, the turnover among Chinese fund managers is nearly three times that of their U.S. counterparts. For instance, the average duration of fund managers in China is 1.68 years while the duration of fund managers in U.S.A is about 4.8 to 4.9 years. The high turnover among Chinese fund managers is largely due to high labour competition, poor prior fund performance and job-hopping when new funds are issued (Wang and Ko, 2017).

Sixth, compared to the U.S. SEC, the CSRC has more power to regulate the mutual funds industry, including approving the establishment of fund management companies and electing senior managers of fund management companies (Rao et al., 2016).[2]

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[1] In the direct channel, investors carry out transactions directly with mutual funds. In the advice, retirement plan and supermarket channels, individual investors use third parties that conduct transactions with mutual funds on their behalf. Businesses, financial institutions, foundations and other institutional investors use the institutional channel to conduct transactions either directly with mutual funds or through third parties (Reid and Rea, 2003).

[2] Considerable differences exist between the CSRC and the SEC with regard to approving the establishment of fund management firms (See Article 13 and 14 of the *Securities Investment Fund Law*) and electing senior managers of fund management firms (See Article 17). Available at: http://english.gov.cn/services/investment/2014/08/23/content_281474982978075.htm (last visited on 5 June 2018).

Lastly, mutual funds in China have low incentives to fulfill their monitoring roles in firms with strong government connections. Compared to U.S. firms, a typical Chinese listed firm is often controlled by a large shareholder such as the state (Wong, 2016). Firms with state-owned background have more government connections than private firms. In particular, *Guanxi* is often used as an informal governance mechanism. These social ties, while applauded by locals as an important channel through which one can build trust between parties, have been criticized by outsiders as fostering favoritism and collusion (Gao et al., 2014). Firms with government connections in China can be treated more favourably and even escape from regulatory punishments (Hou and Moore, 2010). Subsequently, mutual funds are reluctant to perform their monitoring roles. Nevertheless, as government connections do not feature in U.S. firms, mutual funds face lower costs of monitoring and perform their disciplinary function more effectively.

2.2 Can mutual funds play a monitoring role? A theoretical review

Multiple theories have advocated mutual fund investment is an important corporate governance mechanism to deter fraud. Compared with individual investors, mutual funds present greater incentives to monitor managers. This prompts firm managers to be more concerned about performance and shareholders, discouraging them from opportunism (Ding et al., 2013). In addition, as large institutional shareholders, they have greater voting power and more influence on share price movements than other institutional investors in China (Chan et al., 2014). They actively participate in corporate governance through proposing shareholder bills and soliciting proxy voting rights (Dai et al., 2013). Subsequently, incentives exist to collect information and monitor management, minimizing information asymmetry and reducing the likelihood of fraud (Lin and Fu, 2017).

From a ‘gatekeeper’ perspective, in a universal sense, mutual funds can deter clients’ wrongdoing and promote compliance (Coffee, 2006). Kraakman (1986) defines

gatekeepers as third parties who are able to disrupt misconduct by withholding their cooperation from wrongdoers. As gatekeepers, mutual funds have significant reputational capital to preserve and a lot to lose if they collude with fraudsters. They only make a sell decision after a careful and impartial review of a firm's prospects, as a threat of exit by mutual funds is expected to cause negative stock returns (Firth et al., 2016). Subsequently, mutual funds use their knowledge, monitoring abilities and competence to prevent corporate wrongdoings, to whistle-blow, to resign from, discharge or punish wrongdoers and to rescue individuals or organizations in dangerous situations (Alzola, 2017).

Distinctly 'cognitive evaluation' research argues mutual funds do not play an active monitoring function universally (Shi et al., 2016). Here external pressures affect internal motivations to do what is right, leading mutual funds to only focus on short-term investments. When a listed firm has a poor financial performance, mutual funds are therefore more likely to 'vote with their feet' through selling firm shares. To prevent the exit of mutual funds, firm managers are under continuous pressure to meet the short-term earnings expectation, and engage in accounting fraud even though they know it is wrong (Kazemian and Sanusi, 2015). Fund managers may also pressure firm managers to forego long-term investments in favor of increasing short-term financial profitability to enhance job security and the likelihood of promotion (Graves, 1988). Mutual funds can therefore prompt managers to shift from an internal to an external locus of causality, shifting focus from honest corporate financial reporting to providing an outward perception of compliance (Shi et al., 2016).

In China, the monitoring efficiency of mutual funds may also be shaped by '*Guanxi*' and political connections. Building *Guanxi* (relationship) is an important element of China's business culture and key to effectively executing a business plan (Lin and Fu, 2017). As *Guanxi* dominates social life, it leads to self-interested behaviours such as behind-the-scenes and one-to-one meetings with firm management. In Chinese listed firms, fund managers are more likely to engage in more 'informal communications' with firm managers, where firm managers may secretly disclose

price-sensitive information and fund managers reciprocate by endorsing the firms' stocks (Ding et al., 2016). Managers with strong political connections may also restrict mutual funds from monitoring listed firms in China. Thus, the incentives of firms to provide high-quality financial reporting reduce and the likelihood of fraud increases with the extent of political connections (Wang et al., 2017).

2.3 A review of Chinese mutual fund studies

Prior Chinese empirical findings are mixed regarding the role of mutual funds in corporate monitoring. Some studies claim that mutual funds have more incentives and ability to monitor firms and minimize agency problems. For example, Aggarwal et al. (2015) note Chinese mutual funds face lower costs of monitoring and acquiring information and can conduct in-depth analysis when investing in stocks. They hire their own buy-side analysts to evaluate firms, which reduces the likelihood of collusion between sell-side analysts and firms. Subsequently, they have incentives and abilities to discourage financial fraud. Chan et al. (2014) show that mutual fund ownership helps to reduce the incidence of modified audit opinions in Chinese listed firms. This is because investors attach a higher discount rate to listed firms with higher information asymmetry, which not only reduces the market value of less-transparent firms but also deteriorates the performance of mutual funds that invest in these firms. Under such circumstances, mutual funds have incentives to monitor firms, assisting to avoid whistle blowing by external auditors through modified audit opinions.

On the other hand, some studies argue that mutual funds are short-term speculators and are interested in obtaining short-term trading profits based on their information advantages (Lin and Fu, 2017). For instance, Jiang and Kim (2015) reveal that mutual funds in China also have a high turnover,[3] and are more likely to assume speculative roles and not monitor investee firms. In addition, Chen et al. (2018) find China's mutual

[3] For instance, the turnover rate of mutual funds in Chinese stock market was 319%, 260% and 207% respectively in 2009, 2010 and 2011 (Jiang and Kim, 2015).

funds are largely managed by solo fund managers rather than teams,[4] which makes easier for individual fund managers extracting private benefits at the expense of minority shareholders.

3 Development of hypotheses, variables and methods

3.1 Hypotheses development

Mutual funds are effective institutional investors for several reasons. First, fund managers are pressured to provide investors with superior stock returns as their income is related to fund performance and size (Aggarwal et al., 2015). Fraudulent firms generally experience a negative stock market reaction when punishments are publicly disclosed, which in turn has an adverse impact on the performance of mutual funds and reputation of fund managers. Subsequently, mutual funds have incentives to discourage corporate opportunistic behaviours. Second, Chinese mutual funds are subject to regulatory scrutiny, required to make quarterly disclosures regarding portfolio compositions and adhere to pre-determined investment styles and objectives (Yuan et al., 2008; El Kalak et al., 2016). Third, fund managers are sophisticated investors with managerial skills and professional knowledge facilitating the detection of fraudulent activities. Using their resources to monitor and remove managers believed to be using fraudulent techniques to manipulate earnings, mutual funds can constrain self-serving managerial manipulation (Wang, 2014). In an interview conducted by Yuan et al. (2009), directors and senior management confirm that mutual funds are active shareholders and exercise influence, whereas other institutional investors tend to be passive. Fourth, analysts in mutual fund firms act as whistleblowers to raise suspicions of fraud to

[4] This contrasts with the mutual funds industry in the U.S.A where team management has become the dominant management structure. The proportion of single managed funds in China's mutual funds was approximately 70% in 2016 (Chen et al., 2018). In contrast, more than 70% domestic equity mutual funds have been team managed in U.S.A. (Patel and Sarkissian, 2017).

regulators based on their assessment of firms' abnormal performance and communication records with employers and employees. Subsequently, regulatory investigation is triggered (Dyck et al., 2010; Sun and Liu, 2011). Therefore, this study posits:

H_1: Mutual fund ownership is negatively related to a firm's propensity to commit fraud and positively associated with the detection of fraud.

Mutual funds are then divided into open-end funds and closed-end funds to examine their monitoring efficiency separately. Close-end funds have a fixed number of shares traded on stock markets and fund shares cannot be redeemed by investors upon request during the term of the fund contract. In contrast, the number of shares outstanding in open-end funds is continuously changing and investors are allowed to redeem shares at the time agreed in the fund contract (Chan et al., 2008; Wei, 2016).[5]

For open-end funds, the ability of investors to redeem shares can unilaterally remove assets from managerial control. In this way, liquid open-end funds provide excellent discipline to mutual fund managers: if the fund managers behave opportunistically and tactically collude with fraudulent firms, they will find themselves managing funds with less or no assets, as investors can redeem fund shares to withdraw the capital during the open-end fund contract and thus fund size declines (Aguilera and Crespi-Cladera, 2016). Subsequently, fund management fees, a major source of income for fund managers, decrease as the size of fees is linked to the size of assets they manage in China.[6] In contrast, for closed-end funds, as shares cannot be redeemed during the fund contract, the size of fund assets and fund management fees remain unchanged. Subsequently, closed-end funds cannot effectively discipline listed firms and have a

[5] Unlike closed-end funds, open-end funds do not trade on stock exchanges. Investors buy fund shares from investment companies and sell their shares back to the companies.

[6] This is different from western countries as management fees fluctuate based on market competition and fund performance. In addition, although the 'rate' of management fees is not negotiated in China, the monetary amounts of fees will depend on the amount of money being managed.

lesser impact on fraud commission or detection (Lu et al., 2008). In addition, fund management firms often direct their best managerial talent to open-end funds rather than closed-end funds, with open-end funds outperforming closed-end funds both statistically and economically (MacKay and Wu, 2012). Therefore, this study posits:

H_2: Open-end fund ownership is negatively related to a firm's propensity to commit fraud and positively associated with the detection of fraud; whereas closed-end fund ownership has no impact on fraud commission and detection.

The monitoring effect of mutual funds may be less pronounced in SOEs for several reasons. First, SOEs are charged not only to maximize shareholder interests but to shoulder policy burdens, such as increasing employment rate and wages, promoting regional development, ensuring national security and providing low-prices goods and services (Wu et al., 2016). Mutual funds investing in SOEs are therefore less able to challenge managers' decisions that incorporate such political considerations.

Second, the ability of mutual funds to deter accounting fraud is expected to be more pronounced in firms concerned with external shareholders' opinions. A drop in stock returns due to reputational losses and rising discount rates following the public disclosure of fraud, has more influence on the listed firms which are more reliant on external equity financing (Hou et al., 2013). Compared to non-SOEs, SOEs are more likely to receive financial support from government authorities and less likely to rely on the stock markets to provide funding. In particular, SOEs have preferential access to bank loans and face less pressure from debt covenant constraints (Shen and Lin, 2016). As a result, non-SOEs are more reliant on acquiring external funding for investment projects and growth opportunities.

Third, managers in SOEs may restrict the monitoring role of mutual funds for their future promotion. Successful executives in Chinese SOEs are generally rewarded with promotion to government positions. When accounting fraud is revealed, managers in SOEs face a higher probability of being dismissed than managers in private firms since

the announcement of fraud damages the image of the state. These higher costs result in managers reducing the role of mutual funds in detecting accounting fraud (Wu et al., 2016).

Fourth, SOEs have more political and regulatory resources than non-SOEs, blunting mutual funds' demands for high quality accounting information. In particular, SOEs are treated more favorably because of the political affiliation and links between them and the regulators (Chen et al., 2011). This can result in favorable enforcement outcomes or even help SOEs escaping from regulatory punishments (Hou and Moore, 2010). Mutual funds thus have lower incentives to fulfill their monitoring role. Therefore, this study posits:

H_3: The monitoring role of mutual funds is moderated in SOEs.

3.2 Data and variables

The study data include all the firms listed on the China's two stock exchanges from 2007 to 2014. This hand-collected dataset of accounting fraud is based on the sanction reports issued by regulators, and downloaded from the CSRC, 'CNINFO' website, and the Shanghai and Shenzhen Stock Exchange websites. Corporate governance and firm characteristics data is obtained from the CSMAR database, and ownership data is downloaded from the Resset database.[7] An 8-year period from 2007 to 2014 is used to accommodate the new accounting standards adopted in 2007 (Zhang et al., 2013).[8] This paper excludes observations from the financial industry due to

[7] There are differences regarding the proportion of institutional ownership of listed firms between the CSMAR and the Resset database. This is mainly caused by the distinct classification of institutional ownership and different definitions of 'other institutional investors'. In an untabulated test, data relating to institutional ownership is collected from the CSMAR database to re-estimate the monitoring efficiency of mutual funds. The main results are not changed.

[8] The new accounting standards have largely converged with the International Financial Reporting Standards (Zhang et al., 2013).

different data structures and where data is unavailable.[9] The final sample consists of 13,054 observations.

The dependent variable is fraud commission. Fraud commission receives the value of 1 if a firm commits accounting fraud and zero otherwise. As fraud commission is not directly observable, a bivariate probit model is introduced to solve this partial observability problem. To implement the bivariate probit model, another dependent variable is introduced: fraud detection. Fraud detection equals to one if a firm is subject to a sanction decision imposed by regulators and zero otherwise in a firm year.

Mutual fund ownership is captured using several variables. To examine hypothesis 1, test variables include the ownership of mutual funds and other institutions. Other institutions refer to the proportion of total outstanding shares held by Qualified Foreign Institutional Investors, securities firms, insurance firms, pension, trust firms, financial firms and other institutional investors.[10] To examine hypothesis 2, mutual funds are divided into open-end funds and closed-end funds based on the redeemability of the fund shares. Samples are divided into SOEs and non-SOEs to examine the hypothesis 3. The identification of SOEs is based on the nature of a firm's actual controller. Mutual funds related variables are included in both fraud commission and detection models.

Following Wang (2013), control variables associated with the likelihood of fraud commission are included. First, this study controls for firm size using the natural logarithm of firm total assets. Relative to large listed firms, small listed firms are subject to less regulatory scrutiny and are more likely to commit fraud in order to satisfy analysts and investors' expectations (Shi and Wang, 2016). CEO duality is controlled as CEOs who are also chairmen may have more discretion to falsify financial statements (Aggarwal et al., 2015). Board meeting frequency is included to predict fraud

[9] The original sample includes 14,499 observations in total. This study first excludes 361 observations from the financial industry and then excludes 1,084 observations with unavailable data.

[10] Other institutional investors include: state-owned asset management organizations, universities, government agencies, labour unions, research institutions, futures firms, banks and other asset management firms. However, as the Resset database groups them all together, the details of individual ownership cannot be obtained.

commission, as this can reflect some of the external pressures imposed on managers (Shi et al., 2016). Large auditors are also included as these can be more effective in disciplining managers and would suffer a loss of market share if they failed to so (Lisic et al., 2015). Supervisory board size is controlled since a larger supervisory board may have greater expertise in financial accounting and would be likely to stand up to a CEO who adopts aggressive or fraudulent accounting (Firth et al., 2007).

The variables relating to fraud detection are included following Wang (2013). This paper controls for firm leverage, calculated as the ratio of total liabilities to total assets, as firms with higher financial leverage tend to be more closely monitored by regulators (Khanna et al., 2015). A firm's sales growth rate is controlled as higher-growth firms can attract more attention from regulators and investors. Return on assets (ROA) as a firm performance predictor is included because firms with desirable financial performance may not attract much attention from the CSRC (Shi and Wang, 2016). Stock returns are also controlled to predict the likelihood of fraud detection. If a manager manipulates financial statements to mislead investors, regulators may trigger investigations. 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 greater probability of being complained by investors because the likelihood of a big investment loss is higher. Similarly, abnormal stock turnover measured as the demeaned monthly stock turnover in a year is considered. Abnormal stock turnover measures the extent that investors are affected by firms' stock prices (Wang, 2013).

Two control variables are included in both fraud commission and detection equations. Following Wang (2013), the ratio of research and development expenditures (R&D) to total assets is considered. Wang (2013) finds that firms with high R&D are less likely to get caught for fraud and are more likely to commit fraud. Political connections are also controlled in two equations. Due to lower level of investor protection and regulatory enforcement in China, politically connected firms are more likely to use illegal measures to manipulate financial statements and are expected to be less frequently targeted by the CSRC (Wang et al., 2017).

This study includes corporate governance variables only in the commission model as a firm's internal governance mechanisms are more likely to affect managers' propensity to commit fraud rather than to trigger regulatory investigation. This is especially the case in China, where the board of directors, supervisors and auditors may persuade firm managers from committing fraud through private meetings due to the existence of *Guanx*i rather than whistle blowing on corporate misconduct to the outside parties i.e. regulators (Chen et al., 2006).

Financial variables are included in the detection equation as firms with bad or abnormal corporate financial performance are more likely to become the target of regulatory investigation rather than because they affect firms' incentives to commit fraud. Firms sometimes commit fraud due to financial pressure based on the fraud triangle theory. While this study incorporates leverage, ROA and sales growth into both commission and detection equations (see robustness tests), the main findings on mutual funds remain unchanged. Table 1 summarizes the definition of the variables.

3.3 Research model

Empirical studies on accounting fraud typically adopt a single probit or logit model with matched pairs, which captures the joint probability of fraud being committed and detected. Yet, there are two latent processes relating to accounting fraud: listed firms that commit fraud and those are caught by regulators. By treating detected fraud as all fraud, traditional methods are restricted to examining observations that have been caught by regulators, overlooking firms that have engaged in fraud but have not yet been caught (Shi et al., 2016). Moreover, there is strategic interdependence between a firm's motivations to commit fraud and the extent of detection by regulators. Specifically, a firm's management would estimate the likelihood of being caught prior to committing accounting fraud. Conversely, a regulator's decision to investigate potential managerial misconduct relies on its estimation of the firms' propensity to commit fraud. In other words, factors that increase the propensity of detection may

affect the propensity of fraud commitment. A single probit equation cannot model this strategic interdependence; therefore, a bivariate probit model is used to address the partial observability of fraud (Yu, 2013).[11]

Table 1

Variable definitions.

Variable Type	Variable name	Description
Dependent variable	Accounting Fraud	A dummy variable which is coded 1 if a firm commits accounting fraud and zero otherwise
Test variables	Mutual funds	The proportion of total outstanding shares held by mutual funds
	Other institutional investors	The proportion of total outstanding shares held by qualified foreign institutional investors, securities firms, insurance firms, pension funds, trust firms, financial firms and other institutional investors
	Open-end funds	The proportion of total outstanding shares held by open-end funds
	Closed-end funds	The proportion of total outstanding shares held by closed-end funds
	SOEs	SOEs is a dummy variable that equal to one if a firm is controlled by the state, and zero otherwise
Control variables	Firm size	Natural logarithm of a firm's total assets
	Duality	Equals to one if CEOs also serve as chairmen and zero otherwise
	Board meetings	The number of board meetings held in a year
	BIG4	A dummy variable coded one if the firm auditor is one of the four biggest auditors and zero otherwise
	SBSIZE	The number of members on the supervisory board
	R&D	Ratio of research and development expenditures to total assets
	Political ties	A dummy variable equals to one if the CEO 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
	Leverage	Total liabilities divided by the 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

[11] Poirier (1980) proposes a bivariate probit model to address partial observability. Addressing this problem is important for two reasons. First, because the fraud detection process is not perfect, the probability of detected fraud can be very different from the probability of fraud. Second, equating these two probabilities can lead to incorrect assessment of regulatory policies. For example, when a policy leads to a lower probability of observed fraud, we do not know whether this is because the policy decreases the likelihood of fraud being committed or it decreases the likelihood of fraud being detected and observed.

Some pre-tests are undertaken to examine the appropriateness of a bivariate probit model. First, the variance inflation factor diagnostic statistics indicate that there is no excessive multicollinearity with mean VIF less than 2 for the different models. Akaike information criterion (AIC) values between a simple probit model and a bivariate probit model are compared. Lower values of AIC imply a better model fit[12] (Bromiley and Harris, 2014). The AIC statistics provide strong support for the use of bivariate probit models. A likelihood ratio (LR) test and a Wald test are used to evaluate the differences between models. The results of LR and Wald tests indicate that the mutual funds variables create a statistically significant improvement in the fit of the models. All test and control variables are lagged by one year to address potential reverse causality. Following Ariste et al. (2013), standard errors are clustered by firms in order to account for repeated observations on the same firm over time.

Following Wang (2013), the detected accounting fraud is modeled as a function of the joint realizations of the two latent variables: fraud commission and fraud detection. F_i^* represents the 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:

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

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

$x_{F,i}$ 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 getting 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 and v_i is

[12] The AIC statistic is often used for comparing maximum likelihood models and the formula is listed as follows. AIC=-2*ln (likelihood) + 2*k, where k is the number of parameters estimated. Subsequently, AIC can be viewed as measures that combine fit and complexity (Raftery, 1995). In the thesis, AIC values between bivariate probit models and single probit models for testing three different hypotheses are compared.

assessed to be ρ (Wang, 2013).

In order to model fraud commission, F_i^* is transferred 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 transformed 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

$$Z_i = F_i * \ D_i \qquad (3),$$

$Z_i = 1$ if the firm *i* has committed fraud and also 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:

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

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

where Φ is the bivariate standard normal cumulative distribution function. Full identification of the model parameters requires that $x_{F,i}$ and $x_{D,i}$ in the equations cannot include exactly the same variables. The model can be then estimated by using the maximum-likelihood method with the following log-likelihood function:[13]

[13] The bivariate probit model is estimated using STATA. With partial observability, only 503 outcomes that are positive for both F_i and D_i are known. Thus, this paper creates a variable Z that has 503 observations coded as 1 and 12,551 observations coded as 0. Then, STATA's 'biprobit' command is used to estimate this model. However, in order to use the biprobit command, two dependent variables are needed. Consequently, another variable that is identical to Z, i.e. Z_2 is created. The model can be realized through the following function: biprobit Z Z_2 X_1 X_2 X_n, partial.

$$L(\beta_F, \beta_D, \rho) = \sum_{z_i=1} \log\big(P(Z_i = 1)\big) + \sum_{z_i=0} \log\big(P(Z_i = 0)\big) \quad (6),$$

$$= \sum_{i=1}^{N} \{z_i \log\big[\Phi\big(x_{F,i}\beta_F, x_{D,i}\beta_D, \rho\big)\big] + (1 - z_i) \log\big[1 - \Phi\big(x_{F,i}\beta_F, x_{D,i}\beta_D, \rho\big)\big]\}$$

4 Results

4.1 Descriptive statistics

Table 2 displays the descriptive statistics. On average, mutual funds are the largest institutional investors owning 4.6% of stocks. The supervisory board on average has 3.89 directors and 8% of the listed firms in the sample hire big four auditors.[14] 17.3% CEOs have dual positions and 13.8% CEOs have political connections.

Table 2
Panel A: Descriptive statistics.

Variables	**Full sample**	**Fraud firms**	**Non-fraud firms**	**Mean difference**
Mutual funds	0.046	0.026	0.047	0.021***
Other institutions	0.118	0.110	0.118	0.008
QFII	0.001	0.001	0.001	0.001**
Securities firms	0.004	0.003	0.004	0.001
Insurance firms	0.003	0.002	0.003	0.001***
Pension funds	0.003	0.002	0.003	0.001**
Trust firms	0.003	0.005	0.003	-0.002***
Financial firms	0.001	0.000	0.001	0.001
Other institutional investors	0.104	0.097	0.104	0.007
Open-end funds	0.040	0.039	0.040	0.001
Closed-end funds	0.002	0.002	0.001	-0.001
SOEs	0.565	0.445	0.570	0.124***
Firm size	21.763	21.375	21.778	0.403***
Duality	0.173	0.223	0.171	-0.051***
Board meetings	9.191	9.328	9.186	-0.142
BIG4	0.080	0.048	0.082	0.034***
SBSIZE	3.894	3.682	3.902	0.220***

[14] Chinese government issued favourable policies to encourage the development of local auditors and suggested certain firms to give priority to local auditors. Subsequently, market shares of big four auditors are relatively low (Yang and Sung, 2017). The big four auditors include Deloitte, PwC, Ernst & Young and KPMG.

R&D	0.008	0.007	0.008	0.001
Political ties	0.138	0.145	0.138	-0.007
Leverage	0.656	0.721	0.653	-0.068
Growth	12.678	1.809	13.113	11.304
ROA	0.040	0.009	0.041	0.032
Stock returns	0.427	0.253	0.434	0.181***
Abnormal volatility	-0.002	0.012	-0.002	-0.014**
Abnormal turnover	0.002	0.053	0.000	-0.053***

Panel B: Mutual fund quintile-portfolio (MF) and weighted mean

	Fraud firms			**Non-fraud firms**			
Portfolio	**Observation**	**Relative weight**	**Weighted MF mean**	**Observation**	**Relative weight**	**Weighted MF mean**	**Difference**
1 (Low)	174	0.0233	0.0001	2,661	0.3956	0.0001	0.0000
2	104	0.0264	0.0011	2,283	1.3027	0.0015	0.0004*
3	89	0.0224	0.0089	2,522	1.6730	0.0115	0.0026*
4	82	0.0375	0.0427	2,529	1.9027	0.0449	0.0022**
5 (High)	54	0.0505	0.1743	2,556	2.5656	0.1851	0.0108*

Panel C: Mutual fund quintile-portfolio (MF) and stock returns

	Fraud firms			**Non-fraud firms**			
Portfolio	**Observation**	**Weighted MF mean**	**Stock returns**	**Observation**	**Weighted MF mean**	**Stock returns**	**Return difference**
1 (Low)	174	0.0001	0.3590	2,661	0.0001	0.5477	0.1527
2	104	0.0011	0.1390	2,283	0.0015	0.2542	0.1152
3	89	0.0089	0.1033	2,522	0.0115	0.2819	0.1786*
4	82	0.0427	0.0881	2,529	0.0449	0.3697	0.2816*
5 (High)	54	0.1743	0.5086	2,556	0.1851	0.6875	0.1789

Mutual funds (4.6%) include open-end funds (4.0%) and closed-end funds (0.2%).[15] In the paper, the reason that the proportion of total outstanding shares held by open-end and closed-end funds is less than the proportion held by mutual funds is the existence of exchange-traded funds. The exchange-traded funds (ETFs) are a special form of open-end funds that can be traded on stock exchange. ETFs are an indexation

[15] Closed-end funds, when set up, issue a fixed number of shares that are traded on secondary markets. Open-end funds, on the other hand, are not traded on the stock exchanges and the fund shares can be redeemed.

of investment instrument and invest in the constituent stocks of an index.[16] However, as the proportion of shares held by ETFs is relatively small and such data is unavailable in the databases, the paper focuses on open-end and close-end funds only.

Although the CSRC encourages the development of institutional investors, they do not own sufficient shares to exert influence or control over listed firms, as evidenced by the proportion of total outstanding shares: 16.5%. China's capital markets are still dominated by the state controlling shareholders and individual investors. According to Jiang et al. (2017) in the last decade, state and legal person investors own more than 45% of listed firms' shares on average, and retail individual investors who are often characterized as short term-oriented and uninformed investors hold about 38% of listed firms' shares.

The characteristics of fraudulent versus non-fraudulent firms are also compared in Panel A. The sample consists of 12,551 firm-year observations not involved in accounting fraud and 503 firm-year observations punished because of accounting fraud. The average mutual fund ownership for the fraud sub-sample is 2.6% and 4.7% for the non-fraud subsample. The difference is statistically significant, implying firms are less likely to commit fraud when they have high mutual fund ownership. Similarly, fraudulent SOEs (1.0%) have significantly lower mutual fund ownership than non-fraudulent SOEs (2.7%). Firm size is larger for the non-fraud sub-sample than for the fraud sub-sample. Fraudulent firms also have significantly higher CEO duality, but significantly lower supervisory board size than non-fraudulent firms. For ex-post financial performance, fraudulent firms have worse stock return performance, abnormally higher stock return volatility and higher stock turnover than the non-fraudulent firms.[17] Pearson correlation coefficients are also examined. The Appendix reports that the absolute values of all coefficients are lower than 0.35, indicating

[16] The first exchange-traded fund was introduced in 2004 and listed on the Shanghai Stock Exchange. The ETFs have become an increasingly important way for many international institutional investors and retail investors to access the China's A-share market (Li, 2010).

[17] T-test is used to measure the significance in the differences of means.

multicollinearity is not a problem.

Panel B divides mutual funds into five quintiles and compares their weighted average investments between fraud firms and non-fraud firms. Relative weights that consider the differences among firms' market shares are applied to estimate the mean value of mutual fund investment in each quintile-portfolio. It is revealed that the quintile-portfolio has higher level of investment in non-fraud firms than fraud firms and their differences are statistically significant. The dual-entry table in Panel C presents five quintiles of mutual fund investment and corresponding stock returns. It is reported that when the level of mutual fund investment is higher, it is not necessary that the corresponding stock returns are higher. In addition, in most of the quintile-portfolios, differences in stock returns between fraud firms and non-fraud firms are either non-significant or marginally significant. This further implies high mutual fund investment in non-fraud firms is not caused by fund managers' anticipation of future performance.

4.2 Regression results

Table 3 presents results for hypothesis 1. The coefficients of mutual fund ownership are significantly negative in the fraud commission equation and significantly positive in the fraud detection equation. This result indicates that when a greater proportion of a firm's shares are owned by mutual funds, the probability of revealing fraudulent activities is significantly higher and the likelihood of listed firms committing fraud is significantly lower. This result supports Chinese policy to develop mutual funds. In contrast, other institutional investors such as foreign investors, securities firms, trust firms and financial firms are passive investors. This is perhaps due to their small shareholdings, recent entry into the market and less independence of business relationships with investee firms.

Table 4 reports the results for hypothesis 2. Open-end funds are negatively related to a firm's propensity to commit fraud and positively associated with the likelihood of fraud detection. In contrast, closed-end funds have no impact on fraud commission and

detection. These results suggest that redeemability is a powerful form of governance, which can hold managers accountable. The average percentage of ownership held by open-end funds (4.03%) is higher than that held by closed-end funds (0.15%), which may be the reason why open-end funds are more active in disciplining listed firms.[18]

Table 5 presents the results for hypothesis 3. Samples are divided into SOEs and non-SOEs to capture whether the monitoring function of mutual funds is shaped by state ownership. It is reported that the coefficients for mutual funds in SOEs are positive in the commission model but negative in the detection model. This indicates that mutual funds in SOEs have adverse impact on monitoring and detecting managers' opportunistic behaviours. Some mutual funds may even tacitly collude with controlling shareholders or managers to expropriate minority shareholders' interests. Government intervention therefore reduces the role of mutual funds in deterring accounting fraud, consistent with hypothesis 3.

Turning to the control variables in the fraud commission equations, the results are consistent with the prior research (Jia et al., 2009, Shi and Wang, 2016). Larger firms are less likely to commit fraud, as these firms tend to be mature, diversified, operate with less profit volatility and receive tighter regulatory scrutiny. The coefficients of CEO duality are significantly positive in all models, indicating that CEOs with more internal power are more likely to commit fraud. Supervisory board size is negatively associated with fraud commission, implying large supervisory boards have incentives to monitor managers against accounting fraud. In addition, firms with higher R&D intensity are less likely to be caught by regulators. Subsequently, lower costs of fraud

[18] As the closed-end fund ownership only represents 0.15% of the sample, the insignificant coefficients of closed-end funds may be due to their lack of power. Subsequently, this study uses the propensity score matching method to re-examine whether the findings hold. A control sample of open-end funds is created to match the set of treated firms with closed-end fund investment. The nearest matching method (1:1 matching) is applied and the prior model is re-estimated using propensity score-matched observations. It is reported that with 5,084 observations, open-end funds can significantly reduce the likelihood of fraud while closed-end funds have no impact on fraud commission or detection. Results are available upon request.

detection provide higher incentives for firms to commit fraud.[19]

The fraud detection equation uses financial performance measures as control variables. It is reported that firm leverage is significantly and positively related to fraud detection. Sales growth is significantly and positively associated with fraud detection, indicating firms with high growth rates are more likely to trigger regulatory investigations. The coefficients of ROA are significantly negative. 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 abnormal high return volatility and high stock turnover are more likely to be targeted for fraud detection. Specifically, firms experiencing higher return volatility are more likely to be complained by investors, thus triggering regulatory investigation. Firms with higher stock turnover imply more investors are affected by the firms' stock prices and it is easier to identify a class of plentiful investors. As a result, investigations will be launched as regulators regard this behaviour as an indicator of fraud (Wang, 2013).

4.3 Addressing endogeneity: a propensity score matching model

So far the interpretation of the results has assumed that mutual fund ownership is exogenous. However, mutual funds might be endogenous as there are observable differences between firms with high versus low mutual fund shareholdings. For example, Wang (2014) concludes that mutual funds block-holders virtually become corporate insiders and collude with managers to expropriate minority shareholders' interests. Firth (2016) suggests that mutual funds with high shareholdings have more incentives to affect corporate decisions, contradicting to Wang (2014)'s argument. In

[19] The reason R&D loses so much significance in Tables 4 and 5 is that the variable R&D is sensitive to the total number of variables included in the commission and detection equations. For instance, if the proportion of other institutional ownership is not controlled, three models yield consistent and significant R&D coefficients in fraud commission and detection equations. Therefore, the statistical significance of R&D coefficients needs to be interpreted with caution as they are sensitive to the model specification.

addition, prior studies using Chinese data have also reported mutual funds may be attracted to well-performing firms (Aggarwal et al., 2015). Therefore, the selection effects are mitigated using a propensity score matching approach (Lian et al., 2011).

Table 3

Regression results: mutual funds and accounting fraud.

Variables	P(F)	P(D|F)
Mutual funds	-3.082***	4.383***
	(0.535)	(0.704)
Other institutions	-0.308	0.417
	(0.465)	(0.689)
Firm size	-0.054***	
	(0.013)	
Duality	0.062**	
	(0.031)	
Board meeting	0.030	
	(0.034)	
Big4	-0.021	
	(0.052)	
SBSIZE	-0.022*	
	(0.013)	
R&D	10.307**	-13.433***
	(4.022)	(4.675)
Political tie	-0.104	0.202
	(0.206)	(0.303)
Leverage		0.573***
		(0.140)
Growth		0.026**
		(0.013)
ROA		-0.742***
		(0.183)
Stock returns		-0.101***
		(0.026)
Abnormal volatility		0.759***
		(0.272)
Abnormal turnover		0.292**
		(0.125)
Constant	0.081	0.997***
	(0.281)	(0.190)
Log likelihood		-2015.365
Chi-squared (d.f.)		103.30(19)
Prob > chi2		0.000
Observations	13,054	13,054

All of the variables are defined in the Table 1. ***, ** and *, denote statistical significance at the 1%, 5% and 10% levels respectively. P(F) is the probability of fraud commitment and P(D|F) is the probability of fraud detection conditional on fraud commitment.

Table 4

Regression results: Open-end and closed-end funds and accounting fraud.

Variables	P(F)	P(D|F)
Open-end funds	-2.198***	4.104***
	(0.569)	(1.330)
Closed-end funds	11.994	-14.020
	(8.160)	(9.405)
Other institutions	-0.337	0.500
	(0.594)	(0.982)
Firm size	-0.070***	
	(0.016)	
Duality	0.081*	
	(0.043)	
Board meeting	0.044	
	(0.044)	
Big4	-0.013	
	(0.072)	
SBSIZE	-0.032**	
	(0.016)	
R&D	5.516	-7.510
	(5.674)	(7.015)
Political tie	0.221	-0.279
	(0.270)	(0.389)
Leverage		0.852***
		(0.209)
Growth		-0.001
		(0.001)
ROA		-1.109***
		(0.312)
Stock returns		-0.148***
		(0.044)
Abnormal volatility		1.257***
		(0.367)
Abnormal turnover		0.370**
		(0.176)
Constant	0.451	0.623**
	(0.345)	(0.307)
Log likelihood		-2019.724
Chi-squared (d.f.)		66.56(21)
Prob > chi2		0.000
Observations	13,054	13,054

All of the variables are defined in the Table 1. ***, ** and *, denote statistical significance at the 1%, 5% and 10% levels respectively. P(F) is the probability of fraud commitment and P(D|F) is the probability of fraud detection

conditional on fraud commitment.

Table 5

Regression results: mutual funds, SOEs and accounting fraud.

	SOEs		Non-SOEs	
Variables	P(F)	P(D|F)	P(F)	P(D|F)
Mutual funds	3.538*	-6.142**	-3.543***	0.074*
	(2.299)	(2.398)	(1.279)	(1.049)
Other institutions	-1.527***	2.997***	-2.018***	0.817*
	(0.406)	(0.922)	(0.525)	(0.475)
Firm size	-0.058*		0.091	
	(0.033)		(0.105)	
Duality	0.090		0.104	
	(0.161)		(0.208)	
Board meeting	-0.018		0.635***	
	(0.101)		(0.215)	
Big4	-0.639		0.460	
	(0.398)		(0.576)	
SBSIZE	-0.011		-0.301***	
	(0.034)		(0.103)	
R&D	-19.630*	28.571	-3.838	1.963
	(11.238)	(22.950)	(3.976)	(2.944)
Political tie	0.534**	-0.426	-0.729**	0.204
	(0.269)	(0.329)	(0.334)	(0.165)
Leverage		1.566***		0.607***
		(0.477)		(0.120)
Growth		0.069***		-0.003
		(0.025)		(0.002)
ROA		-2.184*		-0.796***
		(1.158)		(0.186)
Stock returns		-0.239***		-0.088**
		(0.086)		(0.044)
Abnormal volatility		3.356*		0.373
		(1.943)		(0.408)
Abnormal turnover		0.265		0.582***
		(0.358)		(0.213)
Constant	0.484	-1.322	-2.878	-1.971***
	(0.635)	(1.757)	(1.771)	(0.099)
Log likelihood		-917.715		-1062.903
Chi-squared (d.f.)		98.56(19)		83.59(19)
Prob>chi2		0.000		0.000
Observations	7,373	7,373	5,681	5,681

All of the variables are defined in the Table 1. ***, ** and *, denote statistical significance at the 1%, 5% and 10%

levels respectively. P(F) is the probability of fraud commitment and P(D|F) is the probability of fraud detection conditional on fraud commitment.

Table 6
Endogeneity tests: propensity score matching results.

Variables	P(F)	P(D|F)
HI_Mutual	-0.426**	0.626**
	(0.194)	(0.290)
Other institutions	-0.035	0.021
	(0.499)	(0.728)
Firm size	-0.065***	
	(0.022)	
Duality	0.053	
	(0.042)	
Board meetings	0.062	
	(0.048)	
Big4	-0.019	
	(0.064)	
SBSIZE	-0.028	
	(0.017)	
R&D	10.583**	-14.499**
	(5.128)	(6.036)
Political ties	-0.089	0.175
	(0.223)	(0.346)
Leverage		0.654**
		(0.316)
Growth		0.038
		(0.028)
ROA		-0.846**
		(0.409)
Stock returns		-0.126**
		(0.064)
Abnormal volatility		0.672
		(0.551)
Abnormal turnover		0.328
		(0.240)
Constant	0.222	0.997***
	(0.428)	(0.302)
Log likelihood		-1395.509
Chi-squared (d.f.)		41.55(19)
Prob > chi^2		0.002
Observations	9,884	9,884

HI_Mutual is a dummy variable which is coded one if mutual funds hold at least 5% of a firm's equity and zero otherwise. The remaining control variables are defined in the Table 1. ***, ** and *, denote

statistical significance at the 1%, 5% and 10% levels respectively. P(F) is the probability of fraud commitment and P(D|F) is the probability of fraud detection conditional on fraud commitment.

This study constructs a set of control firms that can be matched optimally to the set of treated firms with high mutual fund shareholdings. To capture high mutual fund shareholdings, an indicator variable (HI_Mutual) coded one if mutual funds hold at least 5% of a firm's equity and zero otherwise is created (Lin and Fu, 2017). A probit model is performed using HI_Mutual as the dependent variable and all other financial control variables as regressors.[20] 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 effect of mutual funds blockholding on fraud occurrence.

The difference between the treated and control groups is -0.02 and is statistically significant (t= - 5.13) in the unmatched samples. After matching, the difference narrows to -0.01 yet remains statistically significant (t= - 2.35). The results indicate that large mutual funds can monitor and discipline managers. T-tests are conducted to verify whether differences between two groups remain large after conditioning of the propensity score. Balancing is evidenced by insignificant financial control variables after matching, indicating that treated and untreated groups have similar financial characteristics. The bivariate probit model of fraud commission and fraud detection is re-estimated using propensity score-matched observations. Results are reported in Table 6 and are consistent with prior evidence.

4.4 Additional analysis

The following robustness tests are also conducted. First, the dependent variable accounting fraud is replaced with corporate fraud to re-estimate the impact of mutual

[20] This is because mutual funds prefer firms that are well-performing, such as having positive earnings, high return on assets and low risks (Yang et al., 2014).

funds on fraud commission and detection. Corporate fraud includes both accounting fraud and market manipulation (e.g. insider trading, illegal purchase and sale of shares and price manipulations). Results are presented in the Panel A of Table 7 and are consistent with prior findings and hypotheses. Mutual funds are active monitors against fraudulent activities and lead investee firms to better compliance with accounting and securities regulations.

Second, the relationship between power balance and accounting fraud is examined. The balance of power between mutual funds and controlling shareholders is a shareholding arrangement over the controlling power of a firm (Xie and Zeng, 2010). To capture the impact of power balance on fraud, an indicator (Mutual fund/Top1) is created and calculated as the ratio of mutual fund ownership to largest shareholder ownership of a listed firm. The results are reported in the Panel B. When the degree of power balance between mutual funds and largest shareholder is higher, listed firms are more likely to become the targets of fraud detection. Subsequently, they commit less fraud.

Third, the impact regarding the changes of mutual fund ownership on accounting fraud is examined. An indicator variable (Mutual_diff) is created to measure the changes of mutual fund ownership between year *t* and year *t-1*. The results are reported in the Panel C and are consistent with Aggarwal et al. (2015)'s findings. The coefficient of Mutual_diff is significantly negative in the fraud commission equation and significantly positive in the fraud detection equation. Therefore, an increase of a firm's mutual fund shareholdings can better detect fraud and reduce the likelihood of fraud commission.

Fourth, following Khanna et al. (2015), corporate governance variables are included in both fraud commission and fraud detection equations to re-estimate hypotheses. The results are reported in the Panel D and are in line with main findings: mutual funds have expertise to monitor managers' activities.[21]

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[21] Financial variables are only included in the detection equation as firms with bad or abnormal

Table 7
Additional analysis.

Panel A: Mutual funds and corporate fraud		
Variables	P(F)	P(D|F)
Mutual funds	-2.600***	3.853***
	(0.560)	(1.174)
Control variables	Yes	Yes
Log likelihood		-4442.623
Chi-squared (d.f.)		156.56(19)***
Observations	13,054	13,054
Panel B: Power balance		
Variables	P(F)	P(D|F)
Mutual funds/ Top 1 ownership	-0.547***	0.826***
	(0.139)	(0.242)
Control variables	Yes	Yes
Log likelihood		-2017.174
Chi-squared (d.f.)		75.59(19)***
Observations	13,054	13,054
Panel C: Impact of changes in mutual fund ownership on accounting fraud		
Variables	P(F)	P(D|F)
Mutual_diff	-4.170***	5.401***
	(1.345)	(1.938)
Control variables	Yes	Yes
Log likelihood		-2018.096
Chi-squared (d.f.)		87.72(19)***
Observations	13,054	13,054
Panel D: Governance variables in both fraud commission and detection models		
Variables	P(F)	P(D|F)
Mutual funds	-4.592***	9.025***
	(0.969)	(1.544)
Control variables	Yes	Yes
Log likelihood		-1993.223
Chi-squared (d.f.)		216.74(29)***
Observations	13,054	13,054
Panel E: Changes in mutual fund ownership following accounting fraud		
Variables	Value	
Accounting fraud	-0.005**(0.002)	
Control variables	Yes	
R-squared	0.073	
Observations	13,054	

Mutual funds/Top 1 ownership is calculated as the ratio of mutual fund ownership to largest shareholder's ownership of a listed firm. Mutual_diff measures the changes of mutual fund ownership between year t and year t-1. The remaining variables are defined in the Table 1. ***, ** and *, denote statistical

corporate financial performance are more likely to become the target of regulatory investigation rather than because they affect firms' incentives to commit fraud. Firms sometimes commit fraud due to financial pressure based on the fraud triangle theory. While this paper incorporates leverage, ROA and sales growth into both commission and detection equations, the main findings on mutual funds remain unchanged.

significance at the 1%, 5% and 10% levels respectively. Panel A to Panel D show the results of bivariate probit model: P(F) is the probability of fraud commitment and P(D|F) is the probability of fraud detection. Panel E displays the result of an OLS regression model.

Fifth, changes in mutual fund ownership following fraud are examined. If mutual funds punish listed firms for their fraudulent behaviours, a decrease in ownership held by mutual funds after accounting fraud is expected. The changes of mutual fund ownership between year *t+1* and year *t* are used as the dependent variable and regressed on *accounting fraud* and control variables. Panel E reports the regression results, which are consistent with expectations. Therefore, evidence that mutual funds significantly reduce their shareholdings of listed firms after the firms have committed accounting fraud is revealed.[22]

5 Conclusions

Mutual funds are an increasingly important presence in Chinese capital markets. They have considerably increased their ownership levels since the last decade and become more vocal and more likely to vote on corporate events with their voice rather than with their feet and exit (Aggarwal et al., 2015). Using a bivariate probit model, the relationship between mutual fund ownership and accounting fraud is examined between 2007 and 2014. This study finds evidence that mutual fund ownership is associated with

[22] Besides the five robustness tests, this study also uses the 'disastrous stock returns' to replace the 'raw stock returns' in the detection equation to re-estimate prior models. Although poor ex-post financial performance is an indicator of fraud detection, it may not satisfy the exclusion restriction for identification between fraud commission and fraud detection due to fund managers' ability to predict future corporate financial performance based on their private information. If this is the case, managers' expectation about future stock returns may affect firms' ex-anti incentives to commit accounting fraud. Therefore, disastrous stock returns are used to address this concern. Disastrous stock returns is a dummy variable that equals to one if annual stock return is below the bottom 10% of the sample distribution (i.e., <-50.8%) and zero otherwise (Wang, 2013). This is because it is difficult for mutual fund managers to predict disastrous events in the future, even with private information. Results are consistent with prior findings and are available upon request.

higher ability of fraud detection. Thus, the efforts of the CSRC in promoting mutual funds to invest in capital markets have additional benefits of restricting managerial opportunistic behaviours. In addition, compared to closed-end funds, open-end funds help reduce fraud and promote financial reporting quality. This evidence is consistent with the notion that redeemable shares can exert strong discipline on managers and they are a powerful form of governance. However, state ownership moderates the positive impact of mutual funds on fraud commission and fraud detection. Amongst firms with greater state ownership and control, the ability of mutual funds to discipline and influence managerial opportunistic behaviours is significantly reduced as managers in SOEs answer more to the state than to the stock market. Relative to mutual funds, other institutional investors such as QFII, securities firms, trust firms and financial firms are passive investors. This probably due to their small shareholdings, higher monitoring costs and conflicts of business interests with investee firms.

These results are robust to alternative measures of fraud and mutual funds. Endogeneity concerns are addressed using a propensity score matching approach. Firms with high mutual fund shareholdings have active monitoring roles. Moreover, when mutual fund ownership is changed into alternative measures, such as power balance between mutual funds and controlling shareholders and the changes of mutual fund ownership, results remain unchanged. Mutual funds are likely to punish listed firms for the fraudulent behaviours they committed, which is evidenced by the reduced shareholdings of listed firms following fraud.

These results have implications for future research. First, while mutual funds can restrict accounting fraud, the channels through which mutual funds carry out monitoring activities are not examined. For instance, mutual funds' meetings with internal audit committee members and independent directors who have financial expertise could be the plausible channels through which mutual funds affect managers' activities of investee firms (Wang, 2014). It would also be interesting to identify the channels of mutual funds monitoring. As some of these meetings are behind closed-doors and are not quantified, future studies would benefit from hand-collected data of

mutual funds' meetings.

Second, this study classifies mutual funds into open-end funds and closed-end funds based on the redeemability of the shares. There are other classification methods based on portfolio turnover (Dai et al., 2013) and past investment behaviours (Chi et al., 2014). Dai et al. (2013) find that relative to short-term mutual funds, long-term mutual funds play a stronger supervisory role and reduce negative management behaviours. Chi et al. (2014) report that transient mutual funds' ownership is positively related to firms' earning management activities. A future study using these different classifications of mutual funds could highlight the possible impacts on deterring accounting fraud.

Third, whether mutual funds can collect and analyze information, and thereby select outperforming stocks and earn risk-adjusted excess returns, is an important question for the financial industry as well as for academia due to its practical implications for investors and its theoretical implications for market efficiency. Compared with developed economies, Chinese markets are dominated by speculative individual investors. In addition, Chinese markets experience frequent and large fluctuations relative to developed markets like the U.S. (Li et al., 2017). Therefore, it would be interesting if future research can examine the stock-picking ability of mutual fund managers in China.

The results provide insights for regulators and policy makers. First, mutual fund ownership plays a beneficial role in detecting fraud and limiting expropriation by firm managers. This endorses the CSRC's efforts in promoting mutual funds as a major institutional investor to enhance corporate governance in China. However, compared to capital markets in the U.S.A, mutual funds in China remain small, implying a development gap. In addition, China's capital markets are dominated by individual investors who cause 'herding behaviours' and strong stock price fluctuations (Hu and Chen, 2016). Therefore, regulators should encourage individual investors' collective investments in mutual funds to reduce fraud and improve financial reporting quality.

Second, as closed-end funds cannot be redeemed, opportunities exist for firm managers engaging in accounting fraud. Therefore, regulators should monitor closed-end funds closely as they have the potential to overlook fraud. Open-end funds should be given priority to develop in China to reduce the dominance of individual investors. In an institutional environment with weaker legal enforcement and imperfect shareholder protection, the external governance function played by open-end funds is especially important.

Third, state ownership appears to impede the monitoring efficiency of mutual funds and transfer agency costs to minority shareholders. For regulators, a reduction of state influence over listed firms could strengthen mutual funds' disciplining function (Chan et al., 2014). Chinese standard setters are currently undertaking a 'mixed-ownership' reform on central SOEs. The reform includes diversifying the shareholding structure of SOEs through bringing in professional and general institutions to create a flexible and efficient market-oriented mechanism and improving management of SOEs (Xinhua, 2017). Such a reform can provide mutual funds greater say in corporate decision making and enhance firm financial reporting quality.

To conclude, accounting fraud erodes market confidence, undermines trust and damages the image of accounting profession. Over the last decade, international experience has confirmed the importance of improving corporate governance in deterring fraud. This paper identifies mutual funds can detect managers' opportunistic behaviours, thus reducing listed firms' propensity of engaging in fraud. It is hoped that the results assist regulators in developing remedies that are suitable for the healthy development of the Chinese capital market.

Appendix: Correlation matrix

	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]
[1]Accounting fraud	1									
[2]Mutual funds	-0.051***	1								
[3]Other institutions	-0.01	-0.039***	1							
[4]Firm size	-0.058***	0.221***	0.057***	1						
[5]Duality	0.026***	0	0.020**	-0.132***	1					
[6]Meetings	0.01	0.065***	0.008	0.166***	-0.009	1				
[7]Big4	-0.024***	0.034***	0.100***	0.348***	-0.035***	0.047***	1			
[8]SB size	-0.033***	0.032***	0.046***	0.225***	-0.131***	-0.030***	0.079***	1		
[9]R&D	-0.011	0.116***	0.021**	-0.044***	0.117***	-0.039***	0.030***	-0.089***	1	
[10]Political ties	0.004	0.050***	0.035***	0.031***	0.244***	0.021**	0.018**	-0.057***	0.052***	1
[11]Leverage	0.002	-0.012	-0.001	-0.103***	0.016*	0.001	-0.005	-0.009	-0.016*	-0.009
[11]Growth	-0.002	-0.004	0.029***	-0.001	-0.001	0.004	-0.003	-0.007	-0.005	0
[13]ROA	-0.008	0.027***	0.007	0.012	0.005	0.002	0.004	-0.002	0.012	0.005
[14]Stock returns	-0.034***	0.120***	-0.043***	-0.099***	-0.021**	-0.011	-0.039***	0.028***	-0.085***	-0.048***
[15]Volatility	0.022**	-0.046***	-0.011	-0.075***	0.018**	0.024***	-0.034***	-0.020**	-0.009	0.004
[16]Turnover	0.054***	-0.206***	-0.125***	-0.310***	0.023***	-0.026***	-0.182***	-0.071***	-0.037***	-0.026***

	[11]	[12]	[13]	[14]	[15]	[16]
[11]Leverage	1					
[11]Growth	0	1				
[13]ROA	-0.041***	0	1			
[14]Stock returns	0.004	-0.002	0.011	1		
[15]Volatility	0.007	0.004	0	0.288***	1	
[16]Turnover	0.01	-0.008	0.008	0.092***	0.106***	1

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