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Anticorruption efforts and corporate fraud

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ABSTRACT

This study examines whether and how anticorruption efforts may mitigate the risk of corporate fraud. Based on a sample of Chinese publicly listed firms over the period of 2008 to 2017, we find that anticorruption efforts reduce the likelihood of fraud commission and increase the likelihood of detection given fraud. These effects are driven by state-owned enterprises and politically connected firms through politician board members. We also find that firms located in regions with well-developed market and legal institutions are less likely to commit fraud in the post anticorruption period. Firms increasing internal monitoring by appointing local independent directors with accounting background help to explain the reduction of fraud in these regions. This study contributes to the literature on corporate wrongdoing and the design of strategies to mitigate the risk of corporate fraud in an emerging economy context.

Keywords: Corporate fraud, Anticorruption, Corporate governance, Firm heterogeneity, Internal monitoring

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INTRODUCTION

Corporate misconducts and securities fraud are pervasive in the world and generate enormous welfare losses. While much efforts have been devoted in examining factors affecting the likelihood of fraud and its detection ¹, recent studies show that a firm's tendency towards fraudulent behavior is deeply rooted in its corporate corruption culture (Liu, 2016), suggesting that corporate institutional environment affects a firm's ethical boundaries regarding corporate wrongdoings. With few notable exceptions (Hutton, Jiang and Kumar, 2015; Zhang, 2018), we still know little about how the general institutional environment may affect corporate fraud. We address this research gap by focusing on an important domain of the general institutional environment - the governmental tolerance of corruption – in this paper.

In an environment with prevalent corruption, firms may have committed numerous frauds but with only few being revealed: On the one hand, managers have stronger incentives to extract private rent by lowering corporate governance standard in such an environment (Shleifer and Vishny, 1994), leading to a higher likelihood of fraud. On the other hand, corruption weakens regulatory oversight and undermines legal enforcement (Ng, 2006), resulting in ineffective detection and possibilities for collusion. In the presence of high anticorruption efforts, however, fraud is likely to be revealed because regulatory authorities may detect financial irregularities more effectively. Higher likelihood of detection also lowers managers' incentive to commit fraud. Thus, high anticorruption efforts are likely to increase the expected costs of committing fraud and the likelihood of detection.

¹ A large body of literature has examined factors affecting corporate fraud such as board structure (Beasley, 1996; Agrawal and Chadha, 2005), executive compensation and managerial incentives (Peng and Röell, 2007; Efendi, Srivastava and Swanson, 2007), CEO connections in the boardroom (Khanna, Kim and Lu, 2015) and business conditions (Wang, Winton and Yu, 2010; Wang and Winton, 2012). This literature has highlighted the importance of corporate governance on mitigating corporate fraud.

In this paper, we set out to analyze the effect of governmental tolerance of corruption on corporate fraud in China. Empirically, we measure governmental tolerance of corruption through the government-led anticorruption campaign under Xi Jinping's administration. Our sample covers 15,044 firm-year observations for 2,399 unique firms between 2008 and 2017. Thus, we observe same listed firms experiencing different levels of anticorruption efforts: *i.e.* both in the pre- (low level) and post-Xi (high level) periods. Like other criminal activities, we only observe detected fraud, rather than the population of fraudulent activities. Hence, each detected fraud is a product of two distinct but latent processes: The commission of a fraud and the detection of this fraud. Following Wang et al (2010), Wang (2011) and Khanna et al (2015), we employ a bivariate probit model to disentangle the impact of high anticorruption efforts on fraud commission and fraud detection.

Three observations stand out. First, we find that high anticorruption efforts are negatively associated with the likelihood of fraud commission and positively associated with the likelihood of fraud detection. Our estimates show that in the period with high anticorruption efforts, firms are 17.4% less likely to commit fraud and are 55.6 % more likely to be detected if they had committed fraud. Second, we find that the effects are driven by state-owned enterprises (SOEs) and politically connected firms through politician board members. In the presence of high anticorruption efforts, these firms are significantly less likely to commit fraud. Finally, we find that firms located in regions with well-developed market intermediaries and legal institutions are associated with smaller likelihood of fraud in the post anticorruption period. Further analysis suggests that firms' increasing internal monitoring by appointing local independent directors with accounting background is a plausible explanation on why we observe less fraud in these regions.

Our paper mainly relates to the literature on corporate fraud. Many scholars have examined factors affecting the likelihood of fraud and its detection within the corporation (Gande and Lewis, 2009; Karpoff and Lott, 1993; Karpoff, Lee and Martin, 2008a, 2008b; Liu, 2016; Yu, 2013). We contribute to this literature by examining one important domain of the institutional environment, that is the governmental tolerance of corruption, operated through high anticorruption efforts. We show that firms are less likely to commit fraud when the government has low tolerance of corruption (*i.e.* in the presence of high anticorruption efforts). Thus, our results extend Liu (2016) who finds a positive relationship between corporate corruption culture and the likelihood of corporate misconduct to go beyond the firm boundary. We also complement to Hutton et al (2015) who show that regional environment can be used to identify a firm's ethical boundaries regarding corporate wrongdoings in the US. Furthermore, our paper is closely related to Zhang (2018) who also examines the effect of anticorruption campaign on corporate fraud in China. However, we extend his paper in two aspects: First, unlike Zhang (2018) who assumes detected fraud as the full population of fraudulent activities, we join the still small but growing literature on addressing the partial observability of fraud data (Wang et al, 2010; Wang, 2011; Khanna et al, 2015). This is important because disentangling fraud commission and fraud detection provides us a more thorough understanding of how changes in the institutional environment affects corporate wrongdoing. Second, armed with 5-year data in the post-anticorruption period (compared with only 2-year data in Zhang (2018)), we put the effect of high anticorruption efforts in a broader perspective. Thus, our results complement to Zhang (2018) and shed new lights on the mitigating role of high anticorruption efforts on corporate fraud.

The rest of this paper proceeds as follows: Section I provides the background information on the anticorruption campaign under Xi Jinping's administration. Section II provides a

theoretical framework that guide our empirical analysis and the interpretation of our findings. Section III introduces data, the empirical strategy and descriptive statistics. Section IV presents our main results and the heterogeneous effects at firm and regional level. We also explore the underlying mechanism in this section. Section V starts with a discussion and then concludes.

ANTICORRUPTION CAMPAIGN IN THE POST-XI ERA

On November 14th, 2012, President Xi Jinping became the General Party Secretary of the Chinese Communist Party during the 18th National Congress of the Communist Party of China. Shortly after taking the office, he vowed to crack down on “tigers” and “flies”, which refers to party-member cadres who have committed violations of discipline. On December 4th, 2012, the Party-state announced the “Eight-point Regulation” which provides clear guidance for the party and government officials to tackle corruption ². A week later, Li Chuncheng, the governor of Sichuan province was investigated due to serious violations of party discipline. Xi’s assumption to the leadership, followed by the issuance of the “Eight-point Regulation” and the fall of Li are generally marked as the beginning of the anticorruption campaign (Magnus, 2015).

It is not the first time that the party leadership criticized the severe corruption problems and tried to combat corruption. However, the anticorruption campaign under Xi’s administration has several distinct features. First, this campaign was implemented very fast and is by far the “most sustained and intensive driver against corruption” since 1978 (Wedeman, 2014: p. 4). The issuance of “Eight-point Regulation” and the fall of Li happened only within one month after Xi took the office. The Central Commission for Discipline Inspection (CCDI) has sent out central inspection teams to inspect all provinces in mainland China between May 2013 and November 2014. Until

² An English translation of the eight-point regulation is provided by the China Daily. Available at: http://cpcchina.chinadaily.com.cn/2012-12/05/content_15992256.htm

March 2017, CCDI has carried out 12 waves of inspection. One year later, the 13th National People's Congress approved the proposal of establishing the State Committee of Supervisory of China which has become the highest anticorruption agency in China. Second, the current anticorruption campaign broke the unwritten rule of „no punishment for politburo standing committee”. The fall of “four big tigers” in 2014, especially the fall of General Xu Caihou and former politburo standing committee member Zhou Yongkang, signals what Xi emphasized “...all who violate party discipline and state laws, regardless of who they are and regardless of how high their position, will be subject to strict investigation and severe penalties” (Wang, 2016: p. 461.) Third, the scale of current anticorruption campaign is by far the largest one in China. Until 2018, more than 200 “Tigers” fall from their positions (China File, 2018). According to the state-media Xinhua News Agency, more than 620,000 people have been investigated, in which about 526,000 people have received party discipline punishment by the end of 2018 (Xinhua News Agency, 2019). To sum up, since Xi came to power, the anticorruption efforts have increased dramatically and have sustained till now.

There is substantial controversy surrounding the motives of this campaign. Anecdotal evidence shows that this campaign serves to against political opponents and to consolidate political power (The Economist, 2014a, 2014b). However, others argue that the campaign indeed primarily targets at people who engage in corruption (Li, Cheng and McElveen, 2014; Magnus, 2015). While examining the underlying motives of the campaign is beyond the scope of this paper, bits of evidence show that the anticorruption campaign has lowered the level of corruption in China. For example, Qian and Wen (2015) find that jewelry imports dropped by 55% over the first seven months after the anticorruption campaign. Chen and Kung (2019) find a reduction in land market corruption between 43.6% and 31.5% in provinces either targeted by the central inspection team

or whose party secretary was replaced by one appointed by Xi. A nationwide survey reveals that respondents perceive less corruption in the society in the post anticorruption period, thereby more willing to invest in the financial market (Bu et al, 2019). Similarly, Giannetti and Wang (2017) show that people are more likely to engage in entrepreneurial activities as the corruption level lowers in the post anticorruption period. Prior research show that entertainment and travelling costs are a reliable measure of corporate corruption (Cai, Fang and Xu, 2011), yet Griffin, Liu and Shu (2016) observe a substantial drop in the corporate business traveling and entertainment costs between 2013 and 2014, compared with that in 2011. Therefore, firms seem to refrain from engaging in corruption activities in the presence of high anticorruption efforts. And this may have an impact on corporate fraud.

THEORETICAL FRAMEWORK

We rely on Becker (1968)'s seminal work on the economics of crime to guide our empirical analysis. In this framework, there is one government and many firms. Firms conduct business activities. Firms may engage in fraudulent activities which generate social losses. The government's objective is to minimize social losses. To do so, the government exert efforts to monitor firms. A firm's probability of committing fraud increases in the expected benefit of fraud and decreases in the expected costs of fraud, which depends on the likelihood of detection and the corresponding punishment upon detection.

Losses generated by fraudulent activities O

We begin by specifying losses generated by fraud. Each fraud generates some losses H . The losses tend to increase in the number of frauds and the marginal loss also increases in the number of frauds. Thus, we have losses as a function of fraudulent activities O as follows:

$$H(O) \text{ with } H'(O) = \frac{dH}{dO} > 0 \text{ and } H''(O) < 0$$

By committing fraud, firm managers obtain some private gains G . We assume that private gains increase in the number of frauds, but the marginal gains decrease in the number of frauds.

Therefore, the private gains as a function of fraudulent activities O is as follows:

$$G(O) \text{ with } G'(O) = \frac{dG}{dO} > 0 \text{ and } G''(O) < 0$$

The total losses D from fraudulent activities are the losses generated by frauds minus the private gains from fraud: *i.e.* $D(O) = H(O) - G(O)$ and we assume that the marginal loss increases in the number of fraudulent activities: $D'(O) = H'(O) - G'(O) > 0$.

The government's monitoring costs C

Let $C = C(A)$, in which A represents all related activities from police, court, judge and monitoring agents. The monitoring costs increase in the number of or the scale of these government activities, *i.e.* $C' = \frac{dC}{dA} > 0$. Let's assume that the activities can be expressed by a function of the probability of detection p and the number of fraudulent activities O . Also, the number of or the scale of activities increases in the likelihood of detection and the number of fraudulent activities.

Thus: $A = h(p, O)$, in which $A'_p = h_p > 0$; $A'_o = h_o > 0$. Thus, $C = C(A) = C(p, O)$, and the marginal cost of activities increases in p and O : *i.e.* $C_{pp} > 0$; $C_{oo} > 0$.

The supply of fraudulent activities O

We assume that the supply of fraudulent activities depends on (1) the probability of detection p and (2) the corresponding punishment f of given fraud ³: *i.e.* $O = O(p, f)$. We assume that the supply of fraud decreases if p increases and if the punishment for a given fraud is high, thus:

³ Becker (1968) has a third component u which represents other variables that may affect the supply of crime. For example, real estate inheritance or other sources of income. Adding this does not change the interpretation, but for simplicity, we do not consider it here.

$$O_p = \frac{\partial O}{\partial p} < 0; \quad O_f = \frac{\partial O}{\partial f} < 0$$

The social costs of a fraudulent activity f'

Let f' be the social cost of punishment and let $f' = bf$ in which b is a coefficient that transforms f to f' . Let b a given constant that is greater than 0 to capture the social costs for punishment. In case of fine, for example, social costs could be collection costs.

The government's objective: minimizing total social losses from fraudulent activities

The government's objective is to minimize total social losses from fraudulent activities. Thus, the government's objective is a function of total losses from fraudulent activities, the costs of monitoring and the social costs from punishment, *i.e.*:

$$L = L(D, C, O, f'), \text{ in which } \frac{\partial L}{\partial D} > 0, \frac{\partial L}{\partial C} > 0, \frac{\partial L}{\partial O} > 0$$

We can rewrite the objective function as follows:

$$L = D(O) + C(p, O) + p * bfO$$

To minimizing the objective function, we can take the first order condition of L with respect to p :

$$\frac{\partial L}{\partial p} = D'O_p + C'_p + C_p + bfO + bfpO_p = 0 \quad (1)$$

Rewrite this first order condition:

$$D' + C' + C_p \frac{1}{O_p} = -p_1 bf(1 - \frac{1}{\varepsilon_{p'}}) \quad (2)$$

in which $\varepsilon_p = -\frac{p}{O} O_p$. ε_p is the elasticity of the supply of fraud with respect to the likelihood of detection. In equation (2), the left-hand side is the marginal cost of increasing the number of frauds through a reduction in detection probability p , whereas the right-hand side is the marginal

revenue.⁴ This determines the costs on monitoring (by identifying p) and the number of fraud supply in the market. Figure 1a illustrates this idea.

In our empirical setting, we seek to understand how the governmental tolerance of corruption, operated through high anticorruption efforts affects corporate fraud commission and fraud detection. According to this theoretical framework, there is a positive relationship between government's monitoring costs and the probability of detection. Thus, when the government exerts high anticorruption efforts, the probability of detection p increases. On the other hand, when the detection probability p increases from p_0 to p_1 , the marginal revenue of fraud commission decreases, thereby leading to a smaller number of fraud supply. Therefore, in the presence of high anticorruption efforts, we expect a higher likelihood of fraud detection and a smaller likelihood of fraud commission. Figure 1b illustrates this prediction.

Insert Figure 1a and Figure 1b about here

DATA, EMPIRICAL STRATEGY AND SUMMARY STATISTICS

Data

Our fraud data are enforcement actions against corporate fraud issued by Chinese Security and Regulatory Commission (CSRC). Unlike in the US where shareholders may also bring civil lawsuits, it is very uncommon to see private litigations against listed firms for financial fraud in China. The CSRC is the primary regulatory agency of securities markets since 1998. In order to strengthen its monitoring role, the CSRC has established a local office in every province or province-equivalent administrative region. Instead of lawsuits, CSRC mainly issue administrative

⁴ . Note that $D' + C' > 0$, $C_p > 0$, $O_p < 0$. Thus, the margin cost could be negative if C_p is sufficiently large. For non-negative marginal cost, $(1 - \frac{1}{\varepsilon_p})$ should be smaller than zero, i.e. $\varepsilon_p < 1$.

proceedings for detected fraud. Common fraudulent activities include misreported financial statement, inflated profit, false disclosure, major information omission, insider trading, stock price manipulation and other violations against the China Securities Law. Punishment against corporate fraud are mainly public criticism, warning, public condemnation, fine and/or confiscation of illegal gains. The CSRC may demand a substantial change in financial reporting and/or an improvement in corporate governance if the violation raises important legal questions. Moreover, the CSRC may prohibit individuals who are named as respondents for a fraud from entering the securities market for years. To sum up, in China, it is the CSRC that monitors, investigates and punishes corporate fraudulent activities, thus, enforcement actions are the main source for fraud data.

It is worth mentioning that the CSRC only issues enforcement actions if they find solid evidence, therefore, there is no false accused case in the sample. Following Karpoff et al (2014), when multiple enforcement actions are issued against one fraudulent activity, we grouped these actions together so that only one case is identified. After identifying the fraud data, we merged the firm-level fraud data with all listed firms' financial statement, corporate governance, and board member data from the CSMAR database. Importantly, we excluded all firms which are listed since 2013 as they have no experience in the pre anticorruption period. Following the literature (Wu, Johan and Rui, 2014; Zhang, 2018), we also excluded all firms in the financial industry. To avoid outliers, we winsorized all continuous variables at 1% and 99% percentiles. As a result, our sample contains 15,044 firm-year observations over the period of 2008 to 2017 with 3,780 firm-year observations for the fraud sample.

Empirical Strategy

In order to analyze the effect of high anticorruption efforts on both fraud commission and fraud detection, we employ a bivariate probit model to address the partial observability issue of fraud

data (Wang et al, 2010; Wang, 2011; Khanna et al, 2015). Let C_{it}^* denote firm i 's likelihood of committing a fraud in year t . Let D_{it}^* denote the likelihood of detecting it. The latent variables determining the processes of fraud commission and fraud detection are as follows:

$$C_{it}^* = X_{C,it}\beta_C + u_{it} \quad (1a)$$

$$D_{it}^* = X_{D,it}\beta_D + v_{it} \quad (1b)$$

in which $X_{C,it}$ is a vector of variables that explain firm i 's likelihood of committing a fraud in year t , and $X_{D,it}$ is a vector of variables that explain firm i 's likelihood of being detected in year t . The error terms u_{it} and v_{it} are zero-mean disturbances following a bivariate normal distribution. The correlation between these two error terms is ρ .

Denote $C_{it} = 1$ if $C_{it}^* > 0$ and $C_{it} = 0$ if otherwise. Denote $D_{it} = 1$ if $D_{it}^* > 0$ and $D_{it} = 0$ if otherwise. Instead of the population of fraudulent activities, we can only observe detected frauds. This means that we cannot directly observe C_{it} and D_{it} , instead, we only observe:

$$Z_{it} = C_{it} * D_{it} = \begin{cases} 1 \\ 0 \end{cases} \quad (2)$$

in which $Z_{it} = 1$ if firm i has committed a fraud and has been detected; and $Z_{it} = 0$ if firm i did not commit a fraud or has committed a fraud but has not been detected.⁵

Let Φ denote the bivariate standard normal distribution function and ρ is the correlation between u_{it} and v_{it} , then the empirical model for detected fraud Z_{it} is the following:

$$P(Z_{it} = 1) = P(C_{it} = 1, D_{it} = 1) = \Phi(X_{C,it}\beta_C, X_{D,it}\beta_D, \rho) \quad (3a)$$

$$P(Z_{it} = 0) = P(C_{it} = 1, D_{it} = 0) + P(C_{it} = 0, D_{it} = 0) = 1 - \Phi(X_{C,it}\beta_C, X_{D,it}\beta_D, \rho) \quad (3b)$$

The log-likelihood function is:

⁵ Mathematically, it is possible to have $P(Z_{it} = 0) = P(C_{it} * D_{it} = 0) = P(C_{it} = 0, D_{it} = 1)$. This means, that a firm did not commit a fraud but has been detected. Empirically, this situation is impossible in our setting because the CSRC only issues enforcement actions if they find solid evidence of fraudulent activities. Thus, there is no frivolous claim: i.e. $P(C_{it} = 0, D_{it} = 1) = 0$.

$$L(\beta_C, \beta_D, \rho) = \sum \log(P(Z_{it} = 1)) + \sum \log(P(Z_{it} = 0)) \quad (4)$$

The bivariate probit model can be estimated with maximum likelihood. The identification strategy for separating the process of fraud commission from that of fraud detection relies on factors that may affect a firm's *ex-post* likelihood of being detected but not the firm's *ex-ante* incentive to commit fraud (Wang, 2011). We will discuss this in detail in the next section.

Variables

Dependent variable: Fraud commission and fraud detection

For each detected fraud, we know when this fraud was committed and when this fraud was detected. Thus, in process of fraud commission, we set a dummy variable equal to one if a firm i committed fraud in year t and zero otherwise. Similarly, in the process of fraud detection, we set a dummy variable equal one if a firm i was detected with fraudulent activities in year t and zero otherwise.

Independent variable: High anticorruption efforts

We measure high anticorruption efforts through the government-led anticorruption campaign. We set a dummy variable $PostAC_{it}$ equal to one if observations are drawn from 2013 and onwards. Based on the theoretical framework, we expect that high anticorruption efforts affect both fraud commission and fraud detection. Therefore, we consider $PostAC_{it}$ as an independent variable in both the commission equation and the detection equation.

Control variables

According to our empirical strategy, we employ a bivariate probit model to disentangle fraud commission from fraud detection. Each process requires control variables. As the expected costs of committing fraud depend on likelihood of detection, in the following, we first specify the control variables for fraud detection and then specify the control variables for fraud commission. The variables are chosen based on prior theoretical and empirical works in the corporate fraud literature

(Chen, Firth, Gao and Rui, 2006; Jia, 2009; Khanna et al, 2015; Nguyen et al, 2015; Wang, 2011; Wang et al, 2010; Zhang, 2018)

Fraud detection

Both internal and external monitoring may play an important role in detecting fraud. We therefore include five variables related to monitoring by the board and shareholders. First, prior literature has documented extensively the monitoring role of independent directors (e.g. Beasley, 1996). We therefore control for the share of independent directors in the board, *%_IndepDirectors*. As corporate frauds are mainly financial frauds, directors with specialized expertise may affect the quality of monitoring. Therefore, we include the share of directors with finance or accounting background, *%_FinAccountDirectors*. A large body of empirical research shows the advantages of institutional investors and large shareholders on monitoring firms. Specifically, institutional investors and large shareholders have both incentives and power to impose effective monitoring on the management (Schleifer and Vishny, 1997; Zhang, 2018). Effective external monitoring should reduce the likelihood of fraud and increase the likelihood of detection given fraud. To capture the strength of external monitoring, we use ownership concentration among top 2 to top 10 shareholders (*OC_top2_10*) and a dummy variable equal to one if top 10 shareholders are connected (*Top10Connected*) (Jia et al, 2009). CEO who also chairs the board is more powerful, which may help prevent the detection of frauds. For example, Khanna et al (2015) show that CEO duality is negatively associated with the likelihood of fraud detection. We therefore include a dummy variable equal to one if the CEO chairs the board (*CEO_Chair*) in order to control for this aspect.

We also control for *firm age*, *firm size* and *industry*. Larger firms are more likely to be detected for fraudulent activities because they attract more attention from the media and

investors (Wang et al, 2010). We measure firm size with log of total assets. To account for the industry heterogeneity, we included industry dummies. We also control for industry Tobin Q (Ind_Q) and its squared term because fraud is more likely to be revealed during industry downturns. With the squared term we intend to capture the non-linear effect of industry prospects.

Lastly, we include variables which are likely to affect the *ex-post* probability of fraud detection but are unpredictable when the fraud decision was made. These variables are crucial to the analysis because they provide a natural identification to separate fraud commission from fraud detection. Following Wang (2011) and Nguyen et al (2015), we include the abnormal industry litigation intensity ($Abn_Ind_Litigation$) and the abnormal return of asset (Abn_ROA) in the fraud detection process. Industries differ in their litigation intensity. A fraudulent firm is more likely to be detected when regulatory authorities look closer into this firm's industry. In other words, when an industry has unexpected high litigation intensity, fraudulent firms in this industry may be more likely to be detected. However, the *ex-post* unexpected high litigation intensity is unlikely to affect a firm's *ex-ante* incentive to commit fraud. To generate this measure, we first calculate the average litigation intensity for each industry, as measured by the log of total market value of detected firms in an industry for the whole sample period. The abnormal industry litigation intensity is *the yearly deviation* from the average litigation intensity in each industry. Unexpected bad firm performance can be a trigger for fraud investigations too (see e.g. Dechow, Ge, Larson and Sloan, 2011; Dyck, Morse and Zingales, 2010). Following Wang (2011), we calculate disappointing firm performance relative to the recent past with the following model for each firm: $ROA_{it} = \beta_0 + \beta_1 ROA_{i,t-1} + \beta_2 ROA_{i,t-2} + \varepsilon_{it}$. The abnormal ROA is captured by the residual term ε_{it} .

Fraud commission

Variables related to monitoring not only affect the likelihood of fraud detection, but also directly influence the likelihood of fraud commission. Therefore, we include the same set of monitoring variables in the fraud commission process. Similarly, we also control for firm age, firm size, industry dummies, industry Tobin Q and its squared term.

Moreover, we include a set of variables which affect a firm's *ex-ante* incentive to commit fraud. These are firms' *profitability*, *leverage* and the need for external financing (*Need_ExternFin*). Poorly performing firms or financially distressed firms may be more likely to commit fraud in order to inflate earnings (Nguyen et al, 2015). Crutchley, Jensen and Marshall (2007) find that firms subject to the Accounting and Auditing Enforcement Releases (AAERs) tend to have significant growth before committing fraud. Thus, manipulations could be driven by managers' desire to hide a modest performance. We control for profitability (ROA) using the ratio of net profit divided by total assets and control for leverage using the ratio of total debt divided by total assets. Another trigger for committing fraud is the need for external financing. For instance, Dechow et al (2011) find that firms subject to AAERs are actively seeking for new financing. In another study, Teoh, Welch and Wong (1998) show that firms are likely to engage in earnings management before public equity offers. Hence, we control for the need for external financing for each firm, using the ratio of ROA divided by $(1 - ROA)$. This ratio captures not only the growth in the firm, but also the firm's projected need for external financing (Wang, 2011).

Summary Statistics

Table 1 shows the full sample of firm-year observations. Panel A reports the sample distribution by year. The number of firms has increased considerably from 2008 to 2012 and remains stable after 2013 as we have excluded all newly listed firms. It is worth mentioning that the year of fraud in this panel indicates when fraud was committed. In the first few observation years, the number

of firms committing fraud is large in number and percentage. The peak was in 2012, the year when Xi took the office. Since 2013, there is a sharp decrease in the number of firms committing fraud. Thus, in the presence of high anticorruption efforts, we observe less corporate fraud. Panel B shows the sample distribution by industry.

Insert Table 1 and Table 2 about here

Table 2 contains summary statistics for all key variables. Panel A reports the summary statistics for the full sample, whereas Panel B presents the univariate comparisons between the fraud sample and the non-fraud sample. On average, we observe that fraudulent firms are younger and smaller. They have worse performance, higher leverage as well as more entertainment and travelling costs. They are more likely to have CEOs who chair the board and are less likely to be state-owned enterprises. Surprisingly, they have smaller abnormal shocks both in terms of firm performance and industry litigation intensity.

ANTICORRUPTION EFFORTS AND FRAUD

Main results

Table 3 reports our bivariate probit estimation regression results. Column 1 reports the likelihood of committing fraud ($P(C = 1)$) and column 2 reports the likelihood of detection given fraud ($P(D = 1|C = 1)$). In both columns, we include industry and year dummies, and control for firm fixed effects (Blundell, Griffith and Van Reenen, 1999). Robust standard errors are clustered at the firm level and are reported in parentheses.

Insert Table 3 about here

The coefficients of our key variable of interest – *PostAC* – are statistically significant. Consistent with our expectation derived from the theoretical framework, high anticorruption efforts are associated with lower likelihood of fraud commission and higher likelihood of detection. The estimated coefficients suggest that, compared with the pre- anticorruption period, firms in the presence of high anticorruption efforts have 17.4% lower probability of committing fraud and 55.6% higher probability of detection given fraud.

Turning to the control variables, we find many control variables are statistically significant and are consistent with our conjectures: poorly performing firms, as measured by *ROA*, and firms with higher leverage are more likely to be associated with fraud. Older, larger firms are less likely to commit fraud and are more likely to be detected. Consistent with previous studies (e.g. Khanna et al, 2015; Nguyen et al, 2015), we also find that firms with powerful CEOs, as measured by CEO chairing the board, are more likely to commit fraud and yet are less likely to be detected. Moreover, having more directors with finance or accounting background seems to be an effective internal monitoring devise, because it is associated with lower likelihood of fraud and higher likelihood of detection. We do not find any significant association between external monitoring and corporate fraud. This is somewhat surprising yet consistent with previous studies (see e.g. Nguyen et al, 2015; Wang, 2011). Furthermore, industry *Q* and its squared term show a U-shape in fraud detection, which means that firms are more likely to be detected for fraudulent activities when it is in the industry downturn or when the industry shows a very promising prospect. Finally, the variables excluded from the commission equation, *Abn_Ind_Litigation* and *Abn_ROA*, are negatively and significantly related to the likelihood of detection. This is also consistent with previous findings (see e.g. Nguyen et al, 2015; Wang, 2011).

Do firms respond differently to high anticorruption efforts?

In this section, we look at firm heterogeneity and examine which firms are more responsive to high anticorruption efforts. Recall the marginal revenue of fraud: i.e. $-pbf(1 - \frac{1}{\varepsilon_p})$, from the theoretical framework. Since $\varepsilon_p < 1$, the marginal revenue is smaller for firms with high elasticity of fraudulent activities with respect to the detection probability p . As illustrated in figure 2, an increase in detection probability reduces fraud supply, and this reduction is especially strong when firms have high elasticity ε_p .

Insert Figure 2 about here

While Xi's anticorruption campaign is a nationwide intervention and targets primarily at officials in the government administration, in the party organization and in the military, firms differ in their risk of being affected by the anticorruption campaign. Specifically, politically connected firms are more likely to be affected by the anticorruption campaign and therefore are likely to have higher elasticity with respect to the anticorruption efforts.

In China, SOEs, especially large and central SOEs are heavily controlled by the government. Top executives in SOEs are often appointed by the government. However, this is not the case for private firms. Politically connected firms are argued to gain preferential treatments from the regulatory authorities (Cumming, Rui and Wu, 2016; Faccio, 2006; Fisman, 2001; Li, Xia and Zajac, 2018). For instance, Chen and Kung (2019) find that firms with connections to the Politburo obtain a price discount ranging from 55.4% to 59.9% in the Chinese land market, compared with firms without such connections. In the presence of high anticorruption efforts, such political connections may fall back on firms. Therefore, we expect that firms with politician board members may respond stronger to high anticorruption efforts, compared with firms without any

politician board member over the sample period. Lastly, firms with high entertainment and travelling costs (ETC) in the pre anticorruption period are more likely to be associated with corporate corruption (Cai et al, 2011). Thus, in the presence of high anticorruption efforts, these firms may react stronger, compared with firms with low ETC costs.

To analyze the heterogeneity, we set a dummy variable equal to one if a firm is a SOE, and zero otherwise. Second, we set a dummy variable equal to one if a firm has at least one politician board member who currently serve at the national government agencies ⁶ within the sample period, and zero otherwise. Finally, we calculate the ratio of ETC costs divided by total profit for every firm between 2008 and 2012 and take the median split of this ratio. We then set a dummy variable equal to one if a firm has above median level of ETC costs, and zero otherwise.

Insert Table 4 about here

Table 4 presents our bivariate probit model estimations for the heterogenous effects. Odd-numbered columns correspond to the fraud commission equation, even-numbered columns to the fraud detection equation. Our key interest in this table are the interaction terms between *PostAC* and variables indicating firm heterogeneity. Compared with non-SOEs, we find that in the presence of high anticorruption efforts, SOEs are associated with smaller likelihood of fraud, and are more likely to be detected if they had committed fraud. This is consistent with our conjecture. Moreover, in the presence of high anticorruption efforts, firms with politician board members are significantly associated with smaller likelihood of fraud, compared with firms without any politician board members throughout the sample period. Yet, there is no difference in the likelihood of detection between these two groups. Lastly, we do not find any statistical differences in fraud commission

⁶ National-level government agencies include: State Council; Ministries; National People's Congress; National Communist Party Congress and National Political Consultation Congress.

and fraud detection between firms with high and low ETC costs prior to the anticorruption campaign.⁷

To sum up, high anticorruption efforts warrant our attention. In the presence of high anticorruption efforts, firms are associated with smaller likelihood of fraud and are associated with higher likelihood of detection given fraud. These effects are mainly driven by firms who are exposed to a higher risk of being affected by Xi's anticorruption campaign: *i.e.* SOEs and politically connected firms through politician board members.

Do firms in different regions respond differently to high anticorruption efforts?

Our sample covers firms from all provinces in mainland China and interestingly, we do not observe any firms relocating the headquarter to another province. Given substantial regional heterogeneities in China, firms located in different provinces may respond differently to the government intervention.

We use the NERI index on the development of market intermediaries and legal institutions across provinces in 2008 (Wang, Fan and Yu, 2016), and take the median split of the ranking index to examine regional heterogeneity. This index includes three sub-indicators: the development of market intermediaries such as law firms and accounting firms; the quality of legal institution as measured by firms' perception on local court justice and efficiency; and the extent to which intellectual property rights are protected. Considering a firm as a fraudulent firm in year t if this firm is detected with fraud in that year, figure 3 illustrates the share of fraudulent firms by regions over time. There are fewer fraudulent firms in regions with well-developed market intermediaries

⁷ This null effect may be explained by a general sharp reduction in ETC costs after Xi took the office, no matter whether a firm had high or low ECT costs before. In this sense, there are no differential treatment effects for both groups.

and legal institutions throughout the whole sample period. While there is no statistical difference in the share of fraudulent firms before 2012 across these two groups, the reduction of fraudulent firms is significantly larger in better regions after Xi’s anticorruption campaign. This suggests heterogeneous regional responses to high anticorruption efforts.

Insert Figure 3 about here

To corroborate this finding, we employ the bivariate probit model to disentangle the processes of fraud commission from fraud detection. Similar to prior analysis on firm heterogeneity, we set a dummy variable $BRegion_p$ equal to one if firm i located in region p with above median index score, and zero otherwise and interact $PostAC_{it}$ with $BRegion_p$. Our key variable of interest is the interaction term. Table 5 reports the regression results. Column 1 reports the estimated result for the likelihood of fraud commission ($P(C = 1)$). Column 2 reports the estimated result for the likelihood of detection given fraud ($P(D = 1|C = 1)$). We find that in the presence of high anticorruption efforts, firms in better regions are associated with smaller likelihood of fraud commission and greater likelihood of detection given fraud, though the latter is not statistically significant.

Insert Table 5 about here

Skeptics may question our median-split approach of the provincial ranking index in 2008, because the ranking may change over time, and the differences between provinces close to the cut-off point may be moderate. To address this issue, we compared the ranking index in 2008 with that in 2011 and 2014. The ranking indices of these three years are highly correlated with each other and are generally stable over time. Despite variations in the exact ranking order, the split between above- and below median remains largely the same: Four provinces next to the median cut-off

point switched their positions between 2008 and 2014, with two provinces ranked above median in 2008 becoming below median in 2014, and vice versa. To rule out the potential influence of these provinces, we exclude them and replicate the estimations. The results are qualitatively similar to table 5 (results are available upon requested).

How do anticorruption efforts lower the likelihood of fraud in better regions?

Prior studies have shown that firms with corruption culture are more likely to engage in corporate misconducts such as earnings management, accounting fraud and opportunistic insider trading (Liu, 2016). High anticorruption efforts in the society may make corruption or misconducts in general less tolerable and induce firms to improve corporate governance accordingly (Schleifer and Vishny, 1994), thereby reducing corporate fraud. One important strategy of improving corporate governance is through internal monitoring, especially through independent directors (Fich and Shivdasani; Kuang and Lee, 2017; Nguyen et al, 2015; Reeb and Zhao, 2013). Independent directors' monitoring may be more effective if they are in the same city as the firm's headquarter, because geographical proximity not only reduces the logistic burden of travelling or monitoring from the distance, but also increases the interpersonal connectedness of independent directors to the top management team. Stronger connectedness may make it easier for them to see the telling sign of fraudulent activities and to help avoid wrongdoings (Intintoli, Kahle and Zhao, 2018). If increasing internal monitoring by appointing local independent directors with specialized expertise is one mechanism through which anticorruption efforts lower the incidence of fraud in better regions, we expect to observe that firms in these regions increase the appointment of local independent directors with specialized expertise after the anticorruption campaign.

To test for this conjecture, we collected data on the appointment of independent directors from the CSMAR database. We set a dummy variable ($Ind_Colocation_{it}$) equal to one if a firm's *all* independent directors with accounting background locate in the same city as the firm's headquarter in year t , and zero otherwise. Note that this strict definition aims to measure the lower-bound effect, because it counts co-location only if a firm's *all* independent directors with accounting background are in the same city as the firm headquarter. Empirically, we employ the dynamic Differences-in-Differences (DID) estimation strategy. The model is as follows:

$$Ind_Colocation_{it} = \alpha + \beta(\mu_t * BRegion_p) + \gamma X_{it} + \mu_t + \delta_i + \varepsilon_{it} \quad (5)$$

in which $Ind_Colocation_{it}$ is the outcome as defined above. μ_t is a series of year dummies. $BRegion_p$ equal to one if a firm is in regions with above-median index score. X_{it} is a vector of firm-specific control variables. δ_i are firm fixed effects. ε_{it} is the error term. Our key variables of interest are the interaction terms. We expect the interactions terms before 2013 to be indistinguishable from zero, whereas the interactions terms after 2013 to be positive and statistically different from zero.

Insert Figure 4 about here

Figure 4 depicts the coefficients of the interaction terms within the 95% confidence interval over time. This is consistent with our conjecture: Along with the introduction of Xi's anticorruption campaign, firms located in regions with well-developed market intermediaries and legal institutions become more likely to have *all* independent directors with accounting background who are in the same city as the firm location. The differences are the largest in 2014 and gradually disappear in 2017.

To sum up, we find that in the presence of high anticorruption efforts, firms in regions with well-developed market intermediaries and legal institutions have smaller likelihood of committing

fraud. Furthermore, we show that firms in these better regions are more likely to have *all* independent directors with accounting background co-locating in firm headquarter after the anticorruption campaign. Thus, increasing internal monitoring is likely a mechanism through which anticorruption efforts lower firms' likelihood of fraud commission precisely in these better regions.

DISCUSSION AND CONCLUSION

Theoretical implications

Corporate misconducts and securities fraud generate enormous welfare losses: Corporate fraud damages investor confidence and shareholder value, causes financial market instability, and generates negative consequences for top managers' own career prospects (Fich and Shivdasani, 2007; Kang, 2008; Karpoff and Lott, 1993; Yu, 2013). We set out to analyze how the governmental tolerance of corruption, operated by government-led anticorruption efforts, affects corporate fraud and to investigate the mechanisms through which anticorruption efforts affect corporate fraud.

Consistent with our expectation, we find that anticorruption efforts are positively related to the likelihood of fraud commission and negatively related to the likelihood of detection given fraud. The relationship is economically meaningful and statistically significant. Moreover, we show that politically connected firms react stronger to high anticorruption efforts and are likely to be more cautious about their corporate governance. These firms are SOEs and firms with at least one politician board members who currently serve at the national government agencies during the sample period. We further investigate how regional heterogeneity moderates the relationship between high anticorruption efforts and corporate fraud. Our results show that in the presence of high anticorruption efforts, firms in regions with well-developed market intermediaries and legal institutions are associated with smaller likelihood of fraud commission. We argue that firms'

increasing internal monitoring by recruiting local independent directors with accounting background after the anticorruption campaign is likely to explain why firms in these regions are less likely to commit fraud.

Our results have implications for related literature on corporate fraud and the design of strategies to mitigate the risk of corporate fraud in an emerging economy context. Previous work on corporate fraud has examined factors such as the role of independent directors or outside directors (Deng, Kanagaretnam and Zhou, 2017; Intintoli et al, 2018; Nguyen et al, 2015), investors belief about industry prospects (Wang et al, 2010), CEO duality, executives compensation and CEO's connections to the boardroom as well as to the executives suites (Efendi et al, 2007; Khanna et al, 2015), managers' incentive (Johnson et al, 2009; Peng and Röell, 2007, 2014) and peer effects (Yiu et al, 2014). This literature has generally highlighted the importance of corporate governance. Our paper focuses on one important domain of the general institutional environment, namely the governmental tolerance of corruption operated through government-led anticorruption efforts. Hence, we extend Liu (2016)'s insights on corporate corruption culture to go beyond the firm boundary and shed lights on how the general institutional environment may affect corporate fraudulent behavior.

Our paper is closely related to Zhang (2018) who also examines the impact of Xi's anticorruption campaign on firms' incentive to commit fraud. However, our paper has two distinct features: One, instead of assuming detected fraud as the population of fraudulent activities, we address the partial observability issue of fraud data and disentangle the processes of fraud commission and fraud detection. Two, our sample covers a longer time period of post Xi era (*i.e.* 2012-2017, as compared with 2012-2014), which allows us to put the effect of anticorruption efforts in a broader perspective. Contrast to Zhang (2018) who find that privately held firms

respond stronger to high anticorruption efforts, our results show that SOEs, and politically connected firms through politician board react stronger to high anticorruption efforts. Our findings suggest that politically connected firms do not spare themselves from being investigated when the societal tolerance of corruption decreases. Instead, they may be even more likely to be affected precisely because of the political connections. This is consistent with what we observed in the field: For example, the CCDI targeted specifically at SOEs from the fifth to the eighth waves of inspection, a time period which is beyond the scope of Zhang (2018). Thus, our paper extends and complements to Zhang (2018) by examining firm heterogeneity in a broader perspective.

We further contribute to the literature on local independent directors' monitoring effectiveness. While the role of geographical proximity interests many researchers in finance and accounting (Ayers, Ramalingegowda and Yeung, 2011; Chhaochharia, Kumar and Niessen-Ruenzi, 2012; Kedia and Rajgopal, 2011), little previous work has related geographical proximity of independent directors to corporate fraud. Our results show that firms in regions with well-developed market intermediaries and legal institutions are more likely to appoint local independent directors with accounting background in the post anticorruption era. And it is precisely in these regions that we find firms are associated with smaller likelihood of fraud. We show that even in an emerging economy context, local independent directors may exert more effective monitoring. This complements to the findings with data from US corporations (Masulis, Wang and Xie, 2012). Finally, we also join the still small but growing methodological literature on addressing the partial observability issue of fraud data (Chen et al, 2006; Wang et al, 2010; Wang 2011; Khanna et al, 2015; Nguyen et al, 2015).

Policy and managerial implications

Our analysis shows the positive impact of high anticorruption efforts on mitigating corporate fraud. While skeptics may still question the rigor of Xi's anticorruption campaign, the campaign is argued to be effective in reducing corruption (Chen and Kung, 2019; Griffin et al, 2016; Qian and Wen, 2015). We find that high anticorruption efforts effectively mitigate the risk of corporate fraud and induce firms to improve the quality of corporate governance. Note that our results should not be interpreted as an endorsement for government-led anticorruption campaigns at all costs, as they may not sustain without certain institutional arrangements. Instead, we aim to identify how one important domain of the general institutional environment, namely the governmental tolerance of corruption, may affect firms' fraudulent behavior. On the other hand, if reducing corporate fraud is within a firm's managerial objective, appointing more local independent directors with accounting background may be a "ready-at-hand" strategy to tackle fraud.

Limitations and future research

One limitation of our study is that we are unable to separate the types of fraud (Chen et al, 2006; Zhang, 2018). While we believe it is important to do so, the enforcement actions data do not allow us to differentiate the types, as most fraud cases are associated with multiple violations. For instance, one fraud case may involve false disclosure, fabricated assets and inflated profit. At the same time, the concern of grouping multiple violations together needs to be counterweighted against the advantage of gaining insights into fraudulent activities of Chinese listed firms because enforcement actions are, to our best knowledge, the most comprehensive dataset for corporate fraud in China. A further concern is that our identification strategy for separating the process of fraud commission from fraud detection may not be "too exogenous". Following Nguyen et al (2015), Wang (2011) and Wang et al (2010), we argue that a firm's unexpected poor performance

and an industry's unexpected high litigating intensity may trigger regulatory authorities' *ex-post* investigation, but they are unlikely to affect a firm's *ex-ante* incentive to commit fraud. The implicit assumption is that managers may be unable to perfectly predict the future. An important area for future research is to conceptualize other more exogenous factors which may help to disentangle these two latent processes.

While these future research directions are important to develop a better understanding of factors affecting corporate fraud, our results underscore the importance of low tolerance of corruption, operated by high anticorruption efforts, in mitigating the risk of corporate fraud.

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TABLES

Table 1: Descriptive statistics of the firm-year sample

Panel A: Sample distribution by year			
Year	# of firms	# of firms with frauds	%_Fraud
2008	1549	255	16.5%
2009	1700	299	17.6%
2010	2050	324	15.8%
2011	2284	469	20.5%
2012	2413	543	22.5%
2013	2412	503	20.9%
2014	2411	430	17.8%
2015	2413	479	19.9%
2016	2413	327	13.6%
2017	2407	151	6.3%
Panel B: Sample distribution by industry			
Industry	# of firm-year observations	# of firm-year observations with frauds	%_Fraud
Agriculture	388	108	27.8%
Mining	583	95	16.3%
Manufacturing	13991	2494	17.8%
Power, gas and water	773	104	13.5%
Construction	548	109	19.9%
Wholesalers and retailers	1300	222	17.1%
Railway and transportation	757	77	10.2%
Lodging	100	25	25.0%
Information communication, software and information technology	1166	176	15.1%
Real estate	1219	205	16.8%
Leasing and business service	236	37	15.7%
Science and technological service	100	4	4.0%
Irrigation, environment and public property management	182	28	15.4%
Resident service	37	4	10.8%
Education	8	0	0.0%
Health and social work	37	3	8.1%
Culture, sports and entertainment	223	28	12.6%
Others	370	57	15.4%

Table 2: Summary statistics

Panel A: Summary statistics of all key variables						
Variables	Obs.	Mean	Median	S.D.	Min	Max
Fraud	22025	0.17	0.00	0.38	0	1
PostAC	22025	0.55	1.00	0.50	0	1
Profitability (ROA)	22018	0.04	0.04	0.06	-0.25	0.23
Need_ExternFin	22018	0.05	0.04	0.07	-0.21	0.28
Leverage	22023	0.45	0.45	0.23	0.05	1.22
CEO_Chair	16372	0.23	0.00	0.42	0	1
IndustryQ	22025	1.95	1.72	1.11	0.18	14.19
IndustryQ-squared	22025	5.03	2.95	7.65	0.03	201.41
%_IndepDirectors	22018	20.07	19.23	4.91	4.17	50.00
%_FinAccountDirectors	19065	24.86	23.81	9.38	2.70	69.23
OC_top2_10	21988	0.27	0.21	0.16	0.11	1.00
Top10Connected	22018	0.47	0.00	0.50	0	1
Firm age	22025	11.11	11.00	6.44	1.00	28.00
Total assets (log)	22025	21.96	21.81	1.31	18.86	25.55
Abn_ROA	20050	0.00	0.00	0.07	-0.32	0.22
Abn_Ind_Litigation	21129	-0.70	-0.72	0.86	-2.79	3.39

Panel B: Univariate comparison between the fraud and non-fraud sample					
	Fraud sample		Non-fraud sample		t-test (p)
	Obs.	Mean	Obs.	Mean	
Profitability (ROA)	3,776	0.02	18242	9.04	0.000
Need_ExternFin	3776	0.03	18242	0.05	0.000
Leverage	3780	0.49	18243	0.45	0.000
CEO_Chair	2947	0.27	13425	0.23	0.000
IndustryQ	3780	1.94	18245	1.95	0.404
IndustryQ-squared	3780	4.88	18245	5.06	0.189
%_IndepDirectors	3776	20.05	18242	20.07	0.859
%_FinAccountDirectors	3573	24.85	15492	24.86	0.971
OC_top2_10	3773	0.26	18215	0.27	0.002
Top10Connected	3776	0.45	18242	0.47	0.010
Firm age	3780	10.92	18245	11.15	0.047
Total assets (log)	3780	21.68	18245	22.01	0.000
Abn_ROA	3429	-0.02	16621	0.01	0.006
Abn_Ind_Litigation	3774	-0.82	17355	-0.67	0.000

Table 3. Anticorruption effort and corporate fraud (Bivariate probit model)

	(1) P(C=1)	(2) P(D=1 C=1)
<i>PostAC</i>	-0.492*** (0.157)	3.720*** (0.655)
<i>ROA (lag 1)</i>	-1.001* (0.548)	
<i>Need_ExternFin (lag 1)</i>	0.320 (0.560)	
<i>Leverage (lag 1)</i>	0.364*** (0.088)	
<i>CEO_Chair</i>	0.244*** (0.076)	-0.199** (0.084)
<i>IndustryQ</i>	0.110 (0.083)	-0.162* (0.091)
<i>IndustryQ2</i>	-0.011 (0.008)	0.018** (0.008)
<i>%_IndepDirectors</i>	0.000 (0.005)	-0.006 (0.006)
<i>%_FinAccountDirectors</i>	-0.007** (0.003)	0.006* (0.004)
<i>Top10Connected</i>	-0.020 (0.059)	0.037 (0.065)
<i>OC_top2_10</i>	-0.152 (0.207)	0.040 (0.240)
<i>Firm age (lag 1)</i>	-0.030*** (0.009)	0.021** (0.010)
<i>Log of total assets (lag 1)</i>	-0.065** (0.030)	-0.047 (0.037)
<i>Abn_ROA (forward 1)</i>		-1.530*** (0.440)
<i>Abn_Ind_Litigation (forward 1)</i>		-0.043* (0.023)
<i>Industry, Year, Firm FE</i>	Yes	Yes
<i>Constant</i>	2.277*** (0.829)	-2.227** (0.922)
<i>Rho (p)</i>	/	0.000
<i>Log pseudolikelihood</i>	-6287	-6287
<i>Observations</i>	15044	15044

Note: This table reports bivariate probit model estimation results. Column (1) reports the estimated relation between anticorruption effort and the incidence of fraud. Column (2) reports the estimated relation between anticorruption effort and the likelihood of detection given fraud. The sample covers a period of 2008 to 2017. All regressions included industry and year dummies, and controlled for firm fixed effects (Blundell, Griffith and Van Reenen, 1999). Robust standard errors are clustered at the firm level and are reported in parentheses. *p<0.1; **p<0.05; ***p<0.01.

Table 4. Anticorruption efforts and corporate fraud – Firm heterogeneity (Bivariate probit model)

	(1) P(C=1)	(2) P(D=1 C=1)	(3) P(C=1)	(4) P(D=1 C=1)	(5) P(C=1)	(6) P(D=1 C=1)
<i>PostAC</i>	-0.409** (0.164)	2.861*** (0.562)	-0.403** (0.158)	3.890*** (0.756)	-0.745 (0.468)	2.572* (1.387)
<i>SOE</i>	-0.010 (0.087)	-0.280** (0.122)				
<i>PostAC*SOE</i>	-0.227** (0.100)	0.417*** (0.139)				
<i>Politboard at the national level</i>			0.141* (0.084)	-0.046 (0.095)		
<i>PostAC*Politboard at the national level</i>			-0.230** (0.105)	0.115 (0.125)		
<i>High ETC costs</i>					0.203** (0.094)	-0.198** (0.100)
<i>PostAC*High ETC costs</i>					0.012 (0.113)	0.102 (0.117)
<i>Other controls</i>	Yes	Yes	Yes	Yes	Yes	Yes
<i>Industry, Year, Firm FE</i>	Yes	Yes	Yes	Yes	Yes	Yes
<i>Constant</i>	2.189** (0.888)	-1.989** (0.914)	2.163** (0.857)	-2.305** (1.046)	2.344** (1.046)	-1.141 (1.688)
<i>Rho (p)</i>	/	0.000	/	0.000	/	0.006
<i>Log pseudolikelihood</i>	-6778	-6778	-6713	-6713	-6024	-6024
<i>Observations</i>	15201	15201	15044	15044	13231	13231

Note: This table reports bivariate probit model estimation results. Odd-numbered columns report the estimated relation between anticorruption effort and the incidence of fraud. Even-numbered columns report the estimated relation between anticorruption effort and the likelihood of detection given fraud. The sample covers a period of 2008 to 2017. Other controls are the control variables in table 3. All regressions included industry and year dummies, and controlled for firm fixed effects (Blundell, Griffith and Van Reenen, 1999). Robust standard errors are clustered at the firm level and are reported in parentheses. *p<0.1; **p<0.05; ***p<0.01.

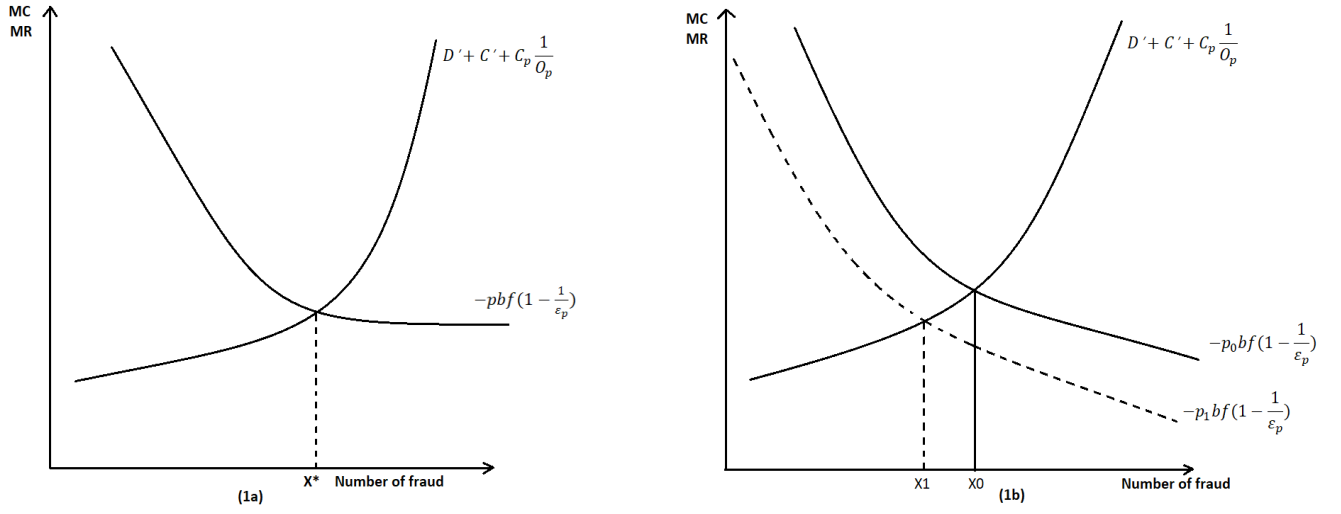
Table 5: Anticorruption efforts and corporate fraud – regional heterogeneity (Bivariate probit model)

	(1) P(C=1)	(2) P(D=1 C=1)
<i>PostAC</i>	-0.478 (0.496)	2.412 (1.755)
<i>BRegion</i>	0.079 (0.095)	-0.085 (0.108)
<i>PostAC*BRegion</i>	-0.235** (0.113)	0.139 (0.126)
<i>Other controls</i>	Yes	Yes
<i>Industry, Year, Firm FE</i>	Yes	Yes
<i>Constant</i>	2.383** (1.012)	-2.305** (1.046)
<i>Rho (p)</i>	/	0.001
<i>Log pseudolikelihood</i>	-6789	-6789
<i>Observations</i>	15201	15201

Note: This table reports bivariate probit model estimation results. Column (1) reports the estimated relation between anticorruption effort and the incidence of fraud. Column (2) reports the estimated relation between anticorruption effort and the likelihood of detection given fraud. The sample covers a period of 2008 to 2017. Other controls are the same as controls in table 3. All regressions included industry and year dummies, and controlled for firm fixed effects (Blundell, Griffith and Van Reenen, 1999). Robust standard errors are clustered at the firm level and are reported in parentheses. *p<0.1; **p<0.05; ***p<0.01.

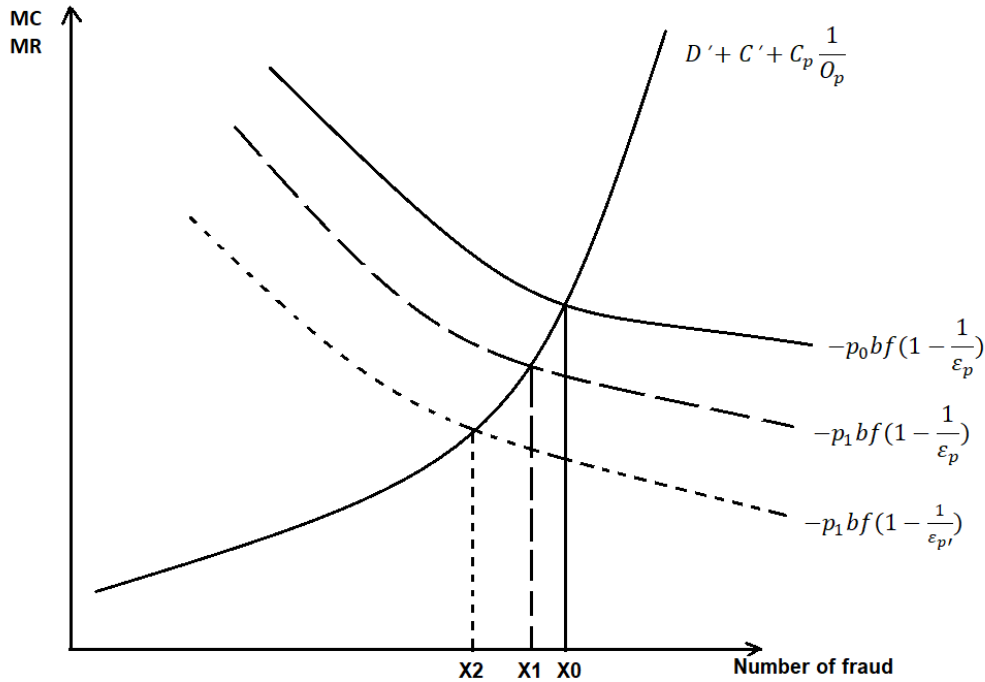
FIGURES

Figure 1: Marginal costs and marginal revenue of fraudulent activities



Note: Figure 1a shows the marginal costs and marginal revenue of fraud, which determines the number of fraud supply X^* . Figure 1b shows that a higher probability of fraud detection (changes from p_0 to p_1) leads smaller marginal revenue. Consequently, the number of fraud supply decreases from X_0 to X_1 .

Figure 2: Heterogeneous effects on fraud supply



Note: Figure 2 shows the marginal costs and marginal revenue of fraud, which determines the number of fraud supply. A higher probability of fraud detection (changes from p_0 to p_1) leads smaller marginal revenue. Consequently, the number of fraud supply decreases from X_0 to X_1 . Conditional on the same probability of fraud detection (i.e. holding p_1 constant), an increase in the elasticity of frauds with respect to p_1 (i.e. $\varepsilon_{p'}$) decreases the number of frauds (from X_1 to X_2). Thus, firms with high elasticity of frauds with respect to detection probability will respond stronger to high anticorruption efforts, compared with their counterparts.

Figure 3: Share of fraudulent firms by regions over time

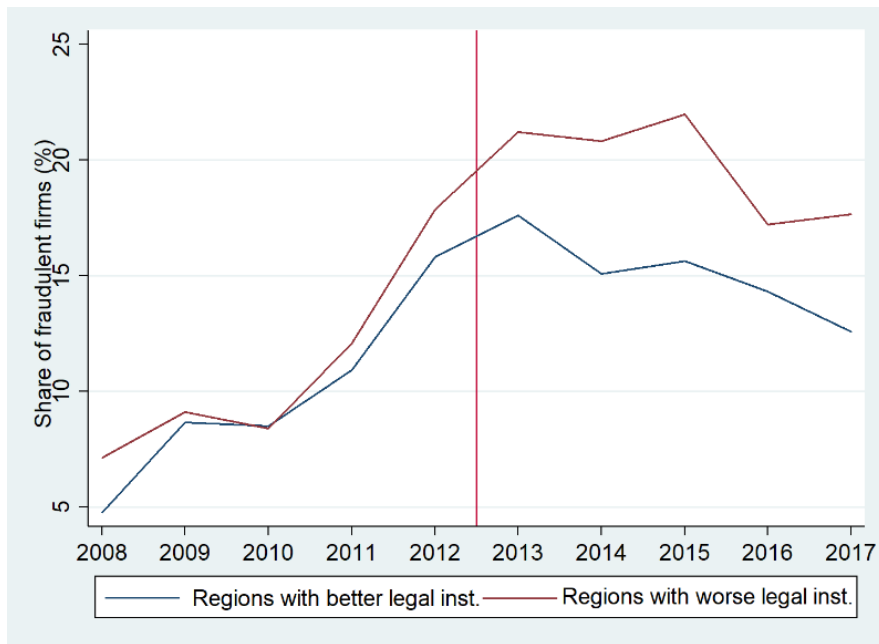


Figure 4: Differences in the probability of having co-located independent directors between better and worse regions over time (2008 as the benchmark)

