Female CFOs and corporate accounting fraud: Evidence from China

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Abstract

We investigate the influence of female chief financial officers (CFOs) on corporate accounting fraud. Using a sample of Chinese listed firms for the period from 2003 to 2015, we find firms with female CFOs are significantly less likely to engage in accounting fraud. Further we find the negative relationship between female CFOs and accounting fraud is less significant in state-owned enterprises (SOEs), where political concerns are more pronounced. Additional tests show that the negative relationship is significant in firms with gender-mixed boards rather than male-only boards. In addition, the relationship is more pronounced when the firm has a less powerful CEO and when the CFO simultaneously holds a directorship in the same firm.

Key words: Female CFO, state control, corporate governance, corporate accounting fraud
JEL classification: G30, K42

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1. Introduction

This study examines whether the gender of chief financial officers (CFOs) has an impact on corporate accounting fraud in China. As CFOs oversee the firm's financial processes, they are likely to have the most direct impact among top management, on the firm's accounting related decisions (Ge, Matsumoto and Zhang, 2011). Motivations linking CFO gender with accounting fraud first comes from the literature exploring the CFO role in financial reporting quality (Barua, Davidson, Rama and Thiruvadi, 2010; Geiger and North, 2006; Francis, Hasan, Park and Wu, 2015). A second line of research examines whether executives' gender-based psychological differences influence firm risk-taking behaviour, but the results of this research are inconclusive (see, for example, Faccio, Marchica and Mura, 2016 and Sila, Gonzalez and Hagendorff, 2016). In a meta-analysis of 35 articles, Nelson (2015) finds that in many instances gender differences with respect to risk-taking, while statistically different, are substantively quite small. Therefore an empirical question of interest is whether the gender of CFOs has an impact on corporate accounting fraud.

China provides an interesting setting to examine this question, for a number of reasons. First, Nelson (2015) documents contextual influences, such as cultural effects, which appear to have a significant impact on observed gender differences. In Chinese culture, females are expected to be introverted (Wu, 2006) and the general expectation for female CFOs is that they are more cautious and conservative than men in making financial decisions (Riley and Chow, 1992). A conservative approach by female CFOs with respect to accounting fraud would be consistent with these aspects of Chinese culture. Moreover, Nelson (2015) points out that most of the studies reviewed in her paper investigate gender differences in Western industrialised societies, noting the argument of Henrich, Heine and Norenzayan (2010) that it may not be appropriate to draw more general conclusions about human behaviour based on such studies.

By conducting our study using evidence from China, we hope to make a further contribution to the literature on the impact of gender on risk-taking, but in a non-Western cultural context.

Second, if gender parity is a worldwide issue, then this is particularly so in China. China's gender gap with respect to achievements and well-being widened in 2017, and China's gender parity has deteriorated compared to other countries[1]. Women earn on average 36% less than men for doing similar work in China (Global Gender Gap Report, 2017). Further, males dominate in Chinese top management positions. For example, only 4.7% of firms in our sample have female CEOs, which is about half of the female CEO presence in US firms.[2] However, accounting is an area where women are more likely to play a role in Chinese corporations, with 49.35% of China's Chartered Accountants being female.[3] Our sample shows that 34.7% of CFOs were female in 2015.

Third, women have to meet a higher standard of effectiveness than men to attain executive positions and to retain them over time (Eagly and Johannesen-Schmidt, 2001), and this is particularly true in China. According to the Global Gender Gap Report (2017), the labour force participation of females as a percentage of males is 83%, but only 16.8% of Chinese firms have female top executives. Survey results indicate that more than 72% of women believe they were not hired or promoted due to gender discrimination (Yang, 2012). Such biases against women may create a better pool of female candidates. In addition, firms with better gender parity are more likely to hire the most talented female candidates (Lara, Osma, Mora and Scapin, 2017). Both male and female CFOs have strong incentives to avoid accounting fraud because it will damage their career development. However, due to the strong gender bias in the overall

[1] Based on the Global Gender Gap Index which measures the relative gaps between women and men in 144 countries, China's gender gap deteriorated from 63rd position in 2006, to 100th position out of 144 countries in 2017 (Global Gender Gap Report, 2017). The index is constructed on the areas of health, education, economy and politics.

[2] Faccio, Marchica and Mura (2016) examine the impact of CEO gender on firm risk-taking in US firms and report that 9.4% of the CEOs in the sample are women.

[3] The resource is from http://kjs.mof.gov.cn

Chinese environment, female CFOs have particularly strong incentives to avoid violations because of the barriers that female CFOs have to overcome to obtain an executive position.

Finally, state control is still strong in Chinese listed firms (Huang and Zhu, 2015) and 41.3% of our sample firms are state controlled. State controlled firms have additional political concerns, such as maximizing social stability, maximizing employment and wages, and promoting regional development (Boubakri, Cosset and Guedhami, 2008; Clarke, 2003). In addition, state shareholders may expropriate resources to fulfil social or political goals and the expropriation is typically rife in weak governance settings (Boubakri, Cosset, and Saffar, 2013). Thus female CFOs may perform differently in state-owned enterprises (SOEs) and private firms, respectively.

We find that firms with female CFOs in China are significantly less likely to engage in accounting fraud. Further, the negative relationship between female CFOs and accounting fraud is less significant in SOEs, where political concerns are more pronounced. We also perform additional tests to examine whether the relationship between female CFOs and accounting fraud is subject to board composition. Specifically, the CFO gender effect is only significant in firms with gender-mixed boards, but not in firms with male-only boards. When the firm appears to be gender-friendly in the boardroom, the negative relationship between female CFOs and accounting fraud is accentuated. Finally, we find that the CFO gender effect is more pronounced when the firm has a less powerful CEO and when the CFO simultaneously holds a directorship in the same firm.

Our main contribution is twofold. First, this study contributes to the ongoing debate on the importance of promoting gender diversity as a corporate governance mechanism by providing new evidence from an Asian culture in which females are expected to be introverted. Our findings highlight that the presence of female CFOs in Chinese firms is associated with lower likelihood of conducting accounting fraud. This result indicates that female CFOs perform their

managerial roles and basically conservative gender roles simultaneously to secure their leadership position in Chinese culture. Second, our results show that state ownership and control influence decision-making in Chinese SOEs. We find that the negative association between female CFOs and accounting fraud is more significant in private firms than in SOEs, suggesting the impact of political concerns are always critical for firm decision-making in the Chinese setting.

The remainder of the paper is organized as follows: Section 2 discusses the literature and hypotheses development. The data and methodology are explained in Section 3, while the main results and analysis controlling for endogeneity are presented in Section 4. Section 5 concludes the study.

2. Literature and hypotheses development

Neoclassical economic theory and agency theory both tend to support the view that managers of firms should behave rationally and therefore their personal attributes will not impact on the decisions they make (see for example Jensen and Meckling (1976) and Bamber, Jiang and Wang (2010)). In contrast, upper echelons theory proposes that differences in psychological factors such as managers' personal values, perceptions and biases, may in fact have implications for corporate decision-making (see for example Hambrick and Mason (1984); Hambrick (2007)). Demographic characteristics such as age, gender and educational background have been identified as proxies for these psychological characteristics (Bamber, Jiang and Wang, 2010). It then becomes an empirical question as to how particular demographic characteristics, such as gender, may impact on areas such as the accounting choices firms make.

There now exists a considerable body of literature that examines whether the presence of women in management and board of director roles, influences firm risk-taking. However, it is apparent that the results are not conclusive with respect to whether gender diversity has a

positive, negative or no impact at all. Nelson (2015) notes the findings of papers such as Croson and Gneezy (2009) and Charness and Gneezy (2012) which point to evidence of gender differences with respect to risk-taking. However, when the author re-examines 35 articles on the relationship between gender and risk, she finds that in many instances, even where mean differences between the genders with respect to risk preferences are statistically significant, the substantive difference is actually quite small. Byrnes, Miller and Schafer (1999) perform a meta-analysis of 150 studies comparing the risk-taking propensity of male and female participants. The results indicate that male participants are more likely to accept risk compared to female counterparts. In addition, Faccio et al. (2016) find that firms managed by female CEOs take on less debt, have less volatile earnings, and have better survival prospects; moreover, the appointment of a female CEO is associated with less risk-taking. On the other hand, Sila et al. (2016) find no evidence that female representation on the board has an impact on firm risk. Adams and Ragunathan (2015) examine evidence from the banking sector and conclude that women are not more risk averse than men, but also find that gender diversity results in better performance. Jacobsen, Lee, Marquering and Zhang (2014) document that the apparent gap between the genders with respect to holding risky assets disappears after they control for optimism and other variables.

Our paper focuses on the role of female CFOs in particular, and the literature that examines the association between female CFOs and accounting quality is also mixed. Francis et al. (2015) find that accounting conservatism increases significantly subsequent to the hiring of a female CFO. Female CFOs are less likely to receive equity-based compensation than their male colleagues, more likely to invest in tangible assets, and more likely to reduce dividend payouts. Barua et al. (2010) document that the presence of female CFOs is associated with higher quality financial reporting, including lower accrual estimation errors. Peni and Vahamaa (2010), on the other hand, find evidence of a relationship between female CFOs and income-decreasing

discretionary accruals, which may be indicative of a more conservative approach to earnings management. Ge et al. (2011) examine the impact of a range of CFO-specific factors on accounting practices and find only limited evidence that characteristics such as gender, age and education have an impact on accounting choices.

So far we have looked at papers that investigate the association between female CFO and accounting choices in general. A smaller strand of the literature examines the relationship between gender and accounting fraud, which is the focus of our paper. Sun, Kent, Chi and Wang (2017) study the association between CFO characteristics and fraudulent financial reporting using evidence from China. Their results include the finding that female CFOs are less likely to engage in fraudulent financial reporting. Wahid (2018) finds that boards that are more gender diverse are less likely to engage in financial manipulation. Thus there is some evidence to suggest that gender may have a mitigating effect on accounting fraud. Given that corporate governance in China is already relatively weak, and that gender diversity may be a partial remedy for such weakness (Gul et al., 2011 and Liu, Wei and Xie, 2014), we therefore propose the following hypothesis:

H1: the presence of female CFOs is associated with lower likelihood of conducting accounting fraud

3. Data and Variable construction

3.1 Data

Our initial sample includes all companies listed on the Shanghai and Shenzhen Stock Exchanges from 2003 to 2015. All data are from the China Listed Firms Research Database of China Stock Market and Accounting Research (CSMAR). We also hand collect the profiles of the CEOs from websites (e.g. Yahoo finance, Sina finance). We exclude financial firms, which is a common practice of similar studies (e.g., Lara et al., 2017). We remove observations with

missing information and delete the top and bottom percentile of observations. The final sample includes 2,290 listed firms that consist of 10,073 firm-year observations.

3.2 Variable construction

3.2.1 Accounting fraud

The CSMAR's Enforcement Actions Research Database details the punishment of violations cases of Chinese listed firms. Following literature studying corporate accounting fraud (Conyon and He, 2016; Liu, 2016; Sun et al., 2017), we first construct the accounting fraud dummy (*Fraud*) that equals one if the firm has conducted an accounting violation in the observation year and zero otherwise.[4] CSMAR provides data on the number of years affected by the violation. We also construct a *Serious Fraud* dummy that equals one if the enforcement action affects multiple financial years and zero otherwise (Conyon and He, 2016).

3.2.2 CFO characteristics

Ge, Matsumoto and Zhang (2011) document that firms' accounting choices vary systematically across individual CFOs. In this study, we focus on the impact of CFO gender on accounting fraud. We construct a dummy variable *Female CFO* equals one if the CFO of the firm is female and zero otherwise. We also control for CFO age and CFO directorships. *LnCFO age* refers to the natural logarithm of the age of the CFO. Risk aversion appears to increase with age (Palsson 1996) and older CFOs are less aggressive in their accounting choices (Ge et al., 2011). *CFO duality* is a dummy variable equal to one if the CFO also simultaneously holds directorships in the same firm and zero otherwise. It is interesting to explore whether CFOs holding a directorship have a more powerful decision-making role, and therefore are more likely to reduce accounting fraud.

[4] Accounting violations include Fictitious Profit; Fictitious Assets; False Recordation (Misleading Statements); Delayed Disclosure; False Information Disclosure; Fraudulent Listing; False Capital Contribution; Unauthorized Changes in Capital Usage; Occupancy of Company's Assets; Illegal Insider Trading; Illegal Stock Trading; Stock Price Manipulation; Illegal Guarantee; Mishandling of General Accounting.

3.2.3 CEO characteristics

We use four variables to measure CEO characteristics. Politicians serving on the board is captured by a dummy variable *Political CEO* equal to one if the CEO is currently or was formerly an officer within the central or local government, or within the military, and zero otherwise (Fan, Wong and Zhang, 2007). Government interference is suggested as a concern for Chinese corporate governance (Fan, Wong and Zhang 2007). Politicians strongly influence firms to pursue political objectives rather than value maximization (Shleifer and Vishny, 1994). Chaney, Faccio and Parsley (2011) show the quality of earnings reported by firms with politicians on the board is significantly poorer than that of non-connected firms. Bona-Sánchez, Pérez-Alemán and Santana-Martín (2014) also report that the presence of politicians on the board negatively affects earnings informativeness. Therefore, we expect firms that have politically connected CEOs are more likely to engage in accounting fraud. We also control for CEO duality, gender and age. *CEO duality* is a dummy equal to one if the Chairman of the Board also holds the position of CEO, and zero otherwise. The monitoring role of the board is weak when CEO duality is present (Tuggle, Sirmon, Reutzel and Bierman, 2010). *Female CEO* is a dummy variable equal to one if the CEO of the firm is female, and zero otherwise. Women are found to be more risk averse compared to men (Byrnes et al., 1999). We expect accounting fraud is less likely in firms with female CEOs. *LnCEO age* is calculated as the natural logarithm of the age of the CEO. Older CEOs may be more conservative, but Andreou, Louca and Petrou (2017) document that it is more costly for younger CEOs to disclose negative information.

3.2.4 Control variables

Following the literature, we employ a series of variables to control for other factors that may be related to accounting fraud (e.g., Conyon and He, 2016; Liu, 2016). We first include board composition variables. *LnBoard size* is calculated as the natural logarithm of total number of directors on the board. *Board independence* is the ratio of number of independent

directors to total number of directors. Smaller boards with more independent directors are associated with more efficient monitoring (Raheja, 2005). In line with the literature, board size (board independence) is expected to be positively (negatively) related to accounting fraud. We use two variables to proxy the gender diversity of boards. *Gender diversity* refers to the proportion of female directors to total number of directors on the board. *Female independence* refers to the proportion of female independent directors to total number of directors on the board. Board gender diversity has received considerable attention as a corporate governance issue in recent years. Lara et al. (2017) find that the percentage of female independent directors on the board is negatively related to earnings management measures in UK firms. We expect accounting fraud is less likely in firms with a higher proportion of female (independent) directors on the board. We also control for firm specific factors. *Firm size* is calculated as the natural logarithm of total assets. *Leverage* is total debt to total assets. *ROA* is calculated as the ratio of net profits to total assets. *State* is a dummy that equals one if the ultimate controller of the firm is a SOE or government agency, and zero otherwise. Conyon and He (2016) find state controlled firms are less like to conduct accounting fraud. We summarize the variable descriptions in Appendix A.

3.3 Summary statistics

Table 1 reports the summary statistics of the variables used in this study. On average, 28.7% of the sample firms have female CFOs. The average CFO age is 43 years with the youngest age 27 and the oldest 67. On average, 24.7% of CFO hold a directorship simultaneously. For CEO characteristic measures, 18.6% of CEOs are politically connected. CEOs also hold the dual role of chairman represents 22.3% of the sample. Males dominate the board composition, with females constituting only 4.7% of CEOs, 12.1% of directors on the board and only 5.1% of independent directors on the board. The average board size is nine directors with the minimum four and maximum 19. Chinese government agencies or SOEs maintain the ultimate

control in 41.3% of the sample firms.

Insert Table 1 here

Table 2 reports the time trend of the CFO and CEO characteristics and board composition variables included in the analysis. There is a slight increase of the presence of female CFOs from 2009 and the female CFO ratio reached 34.7% in 2015. Politically connected CEOs decline during the sample period, while dual role CEOs increased from 8.1% in 2003 to 32% in 2015. More females obtain directorships during the sample period, with the proportion of female directors on the board reaching 15.5% in 2015. Female independent director representation also increases from 3.3% in 2003 to 6.8% in 2015.

Insert Table 2 here

The pairwise correlation matrix of the key variables (not tabulated here), does not suggest any serious multicollinearity concerns, except the highly significant correlation between *Gender diversity* and *Female independence*, which are the two variables employed to measure board gender diversity.

4. Results, discussion and robustness checks

4.1 Female CFO and accounting fraud

Establishing a causal relationship between CFO gender and corporate fraud is challenging. Literature argues that executive characteristics are not always exogenous random variables; firms may choose executives with certain characteristics to suit their operating and contracting environment variables (Sila et al., 2016). The relationship between CFO gender and corporate fraud may be subject to possible endogeneity concerns. First, female CFOs may choose to serve in firms with better corporate governance that reduces the likelihood of accounting violation. Second, our models may not adequately account for possible selection bias. Put differently, the presence of female CFOs may not be assigned randomly. Third, it is possible to have unobservable factors related to both the presence of female CFOs and accounting fraud. For

example, some literature suggests that unobserved CEO abilities and preferences might relate to both board gender diversity and firm risk-taking behaviour (Sila et al., 2016).

4.1.1 Propensity score matching (PSM) analysis

As discussed, it is a concern that the presence of female CFOs may not be assigned randomly. For example, firms that have more female directors on the board may be more likely to recruit a female CFO. Following the literature (Angrist and Pischke 2009; Conyon and He, 2016), we first use propensity score matching (PSM) methods to address this type of selection concern. The PSM approach introduced by Rosenbaum and Rubin (1983) reduces model dependence in parametric causal inference (Ho, Li, Tam and Zhang, 2007).

Table 3 presents our estimates of the basic propensity score model using the sample of 2,290 listed firms comprising 10,073 firm-year observations. We first estimate a probit model to predict the likelihood of having a female CFO by incorporating a set of CEO characteristics, and firm specific variables as well as year dummies. Firm effects are addressed by clustering the errors at the firm level. The aim of the propensity score method is to produce two statistically similar samples with and without female CFOs, respectively. The initial regression specification is shown in Eq. (1) below:

$$\textit{Female CFO} = \alpha + \beta_1 \textit{Political CEO} + \beta_2 \textit{CEO Duality} + \beta_3 \textit{Female CEO} + \beta_4 \textit{LnCEO age} + \beta_5 \textit{Gender diversity/Female independence} + \beta_6 \textit{LnBoard Size} + \beta_7 \textit{Board independence} + \beta_8 \textit{Firm Size} + \beta_9 \textit{Leverage} + \beta_{10} \textit{ROA} + \beta_{11} \textit{State} + \varepsilon \quad (1)$$

As shown in Table 3, the likelihood of having a female CFO is significantly higher in firms with a higher proportion of female directors on the board. This relationship is confirmed by using female independent director ratio as an alternative measure of board gender diversity in Model 2. Politically connected CEOs and CEO duality are associated with a higher likelihood of having a female CFO. In addition, firms having a higher debt ratio are less likely to have a female CFO. The results are in line with expectations that the presence of female CFOs is influenced by a set of CEO characteristics and firm specific variables.

Insert Table 3 here

We then use the predicted propensity scores from Table 3 to perform a one-to-one PSM procedure and end up with the treatment group with female CFOs and the control group with male CFOs, which consists of 5,788 firm-year observations in total.[5] Although PSM reduces the sample size, this PSM sample enables us to compare the treatment group to statistically similar controls using a matching algorithm. If two firms have the same propensity category and they are in different groups (firms with a female or male CFO, respectively), then it indicates that these two groups of firms tend to be randomly assigned to the treatment (having a female CFO) (D'Agostino, 1998). [6]

Using the PSM sample, we examine the impact of female CFO on accounting fraud. We use a panel data probit specification to model the likelihood that a firm conducts a fraud (Eq. (2) below). We add year dummies into the regression and control for CFO effect by clustering standard errors by CFO. [7] The motivation for clustering standard errors by CFO is to incorporate the correlation of regression residuals across time for a given CFO.

$$\textit{Fraud/Serious Fraud} = \alpha + \beta_1 \textit{Female CFO} + \beta_2 \textit{LnCFO age} + \beta_3 \textit{CFO duality} + \beta_4 \textit{Political CEO} + \beta_5 \textit{CEO duality} + \beta_6 \textit{Female CEO} + \beta_7 \textit{LnCEO age} + \beta_8 \textit{Gender diversity/Female independence} + \beta_9 \textit{LnBoard Size} + \beta_{10} \textit{Board independence} + \beta_{11} \textit{Firm Size} + \beta_{12} \textit{Leverage} + \beta_{13} \textit{ROA} + \beta_{14} \textit{State} + \varepsilon \quad (2)$$

Table 4 reports the probit regression results. In line with our H_1, the Female CFO dummy is negatively related to *Fraud* and *Serious fraud*, and significant at the 1% and 5% level, respectively. This result indicates that firms with female CFOs are less likely to engage in fraud

[5] The PSM process is estimated based on Model 1 of Table 3. We use Model 2 for robustness checking of the impact of gender diversity on the likelihood of having a female CFO.
[6] We use t-test to compare the similarities of the treatment and control groups. The results show that all the differences of the independent variables included in Table 3 are minor and insignificant. This indicates that the treatment and control grouped are well matched through the PSM process.
[7] For robustness checking, we perform regressions controlling for industry and year effects for the analyses reported in Table 4. The results are qualitatively similar to the main results reported. We also perform regressions controlling for year effects with standard errors clustered by firm and again the results are qualitatively similar to those presented in Table 4.

and we argue this is because female CFOs are more conservative than their male counterparts[8]. It is harder for women than men to get leadership roles in China. When women attain top management positions, they will have a stronger incentive to avoid fraud, given that a failure to do so, might seriously damage their career. Our results provide further evidence to support the proposal that differences in managerial characteristics, in particular gender, have implications for corporate decision-making (Faccio et al., 2016).

In Models 1 and 2 in Table 4, we use the proportion of female directors on the board to proxy board gender diversity, while in Models 3 and 4 we use the proportion of female independent directors on the board as an alternative board gender diversity measure. However, neither measure is significantly related to the fraud measures. We find a negative relationship between politically connected CEO and *Fraud*, and other CFO or CEO characteristics and board composition variables are insignificant. Further, accounting fraud is less likely in better performing firms, large firms and firms controlled by the state, while firms with higher debt ratios are more likely to conduct accounting fraud. These results are in line with Conyon and He (2016).

Insert Table 4 here

4.1.2 The Heckman two-stage analysis approach

Next, we employ the Heckman two-stage procedure to address the concern that the observed association between female CFOs and accounting fraud is caused by unobservable correlated variables. The first stage regression analysis is the same as that reported in Table 3 to predict the likelihood of having female CFOs (the probit first-stage equation). We estimate the inverse Mills ratio (*Mills*), and in the second stage, include *Mills* as an additional

[8] For robustness checking, we control for Big 4 audit effect, given Big 4 audit firms are associated with higher audit quality (Sun et al., 2017). The results are qualitatively similar to the regression results reported in Table 4. Specifically, *Female CFO* is still negatively related to *Fraud* and *Serious fraud* when Big 4 audit is controlled for.

independent variable in the accounting fraud regression (Eq. (2)). *Mills* is expected to capture all unobserved differences between the treatment and control groups due to selection. Results of Table 5 show the coefficients of the female CFO dummy are negative and statistically significant when the inverse Mills ratio is controlled for. These results suggest that the identified relationship between CFO gender and accounting fraud is valid. [9]

Insert Table 5 here

4.1.3 Difference-in-difference approach

As discussed above, it is a concern that female CFOs may choose to serve in firms with better corporate governance. We address this reverse causality issue by using a difference-in-difference approach. We first select a sample based only on firms that have both male and female CFOs during the sample period. This yields 523 firms comprising 3,066 firm-year observations. This sample includes the firms having a female CFO for at least one observation year and therefore can potentially address the reverse selection issue. As such, the CFO gender effect captured in the following test is less likely driven by the reverse causality concern. We construct a *Loss* dummy equal to one if the firm changes from having a female CFO to a male CFO in any given year, and zero otherwise. *Loss* dummy is expected to have a positive relationship to fraud variables. We also include the interaction term *Loss*×*State* in the regression, because government control is always an important issue in the Chinese context. As stated earlier, firms with state-concentrated ownership are normally constrained by political and social objectives. These political concerns may influence the female CFOs' decision-making in state controlled firms. We interact the effect of losing a female CFO with state control because female CFOs may perform differently in state and private firms, respectively. The regression specification is as follows:

$$Fraud/Serious\ Fraud = \alpha + \beta_1 Loss + \beta_2 State + \beta_3 Loss \times State + \beta_4 LnCFO\ age +$$

[9] We use the proportion of female directors on the board to measure board gender diversity in Table 5. For robustness, we also employ the proportion of female independent directors on the board to measure board gender diversity; the results are qualitatively similar to the results reported in Table 5.

$\beta_5 CFO\ duality + \beta_6\ Political\ CEO + \beta_7 CEO\ Duality + \beta_8 Female\ CEO + \beta_9 LnCEO\ age + \beta_{10} Gender\ diversity + \beta_{11} LnBoard\ Size + \beta_{12} Board\ independence + \beta_{13} Firm\ Size + \beta_{14} Leverage + \beta_{15} ROA + \varepsilon$ (3)[10]

Consistent with our expectation, the results in Table 6 show that *Loss* dummy has a positive relationship with fraud variables. In Model 1, *Loss* dummy is positive and significant at the 5% level. This suggests changing from a female CFO to a male CFO significantly increases the likelihood of conducting accounting fraud. State control is negatively related to accounting fraud. In Model 2, we add the interaction term *Loss*×*State* into the regression. *Loss* dummy is still positively related to *Fraud* dummy, significant at the 1% level. The interaction term *Loss*×*State* has a negative coefficient in Model 2, but is not significant. In Model 3, *Loss* dummy is positive when regressing on *Serious fraud,* but not statistically significant. When adding the interaction term in Model 4, *Loss* dummy becomes significant at the 10% level, and the interaction term *Loss*×*State* has a negative coefficient. Overall, results reported in Table 6 confirm our main hypothesis that female CFOs are less likely to conduct accounting fraud compared to their male counterparts.

Insert Table 6 here

4.2 Female CFO and accounting fraud: does state control matter

State controlled firms have additional political concerns, such as maximizing social stability, maximizing employment and wages, and promoting regional development (Boubakri, Cosset and Guedhami, 2008). Therefore, we conduct subsample analysis to further explore whether political concerns associated with SOEs, influence female CFOs' decision-making. We split the propensity score matched 5,788 observations into two subsamples: the SOEs subsample where the controlling shareholder is a SOE or government agency, and the private subsample where the controlling shareholder is a private firm. We include all the other

[10] We also use the proportion of female independent directors on the board as an alternative measure for *Gender diversity*; the results are similar to the results reported in Table 4.

independent variables in Table 4 in the subsample regression analysis except the state control dummy (*State*).

The results reported in Table 7 show that the negative relationship between the presence of female CFOs and *Fraud* is only significant in the private subsample (see Panel B), but we fail to find a significant relationship between female CFOs and accounting fraud in SOEs, where the political concerns are strong. This result indicates that the relationship between female CFOs and accounting fraud becomes less significant when the political concerns are pronounced. The result is in line with the argument that government shareholdings are associated with political objectives, which may lead to inefficiency and value destruction (for example, Chen, El Ghoul, Guedhami and Wang, 2017).

Insert Table 7 here

4.3 Additional tests

We perform additional tests to examine whether the relationship between female CFOs and accounting fraud is subject to the composition of the board. Specifically, we examine in turn the impact of board gender discrimination, powerful CEOs, and CFO-director duality by splitting our data into subsamples based on previously defined variables, namely, *Gender diversity*, *Political CEO* and *CEO duality*, and *CFO duality*.

4.3.1 Female CFO and accounting fraud: does board gender discrimination matter

Studies have explored whether there is discrimination with respect to the hiring of women in the first instance, and whether such discrimination subsequently influences the relationship between gender and its monitoring role. Bilimoria and Piderit (1994) find a bias in favour of men when it comes to making appointments to various board committees. Farrel and Hersch (2005) show that when there are a number of women currently on the board, it is less likely that the firm will appoint another woman. It is argued that the effects of gender cannot be properly estimated without controlling for discrimination bias in the nomination process (De

Cabo, Gimeno and Escot, 2011). Lara et al. (2017) use a sample of UK firms to examine the association between gender diversity on boards and the quality of earnings management. While they find that a higher percentage of female independent directors is associated with better earnings management practices, they also report that these monitoring effects disappear in firms that do not discriminate against women in access to directorships. Thus in this section, we examine whether gender discrimination in the boardroom influences the relationship between female CFOs and accounting fraud.

We construct the board gender discrimination measures by using the board gender diversity measure (*Gender diversity*), which is controlled for in Tables 4 to 7. Following Lara et al. (2017), we use two approaches to proxy whether the firm discriminates against women in access to directorships. The first approach is to identify board gender discrimination at the firm level. Non-discriminating firms are identified as firms that have at least one female director during the sample period, while discriminating firms are those which never have female directors during the sample period. The second approach is to apply the discrimination criterion at the firm-year level instead of at the firm level. That is, a single firm would be recognized as discriminating in some years (when the firm has a male-only board) but as non-discriminating in other years (when the firm has a gender-mixed board).

We divide the propensity score matched sample of 5,788 firm-year observations into two subsamples: firms with and without gender discrimination according to the two approaches discussed above. We include all the other independent variables of Table 4 in the subsample analysis and remove the board gender diversity measure (*Gender diversity*). Panel A of Table 8 reports the results of the subsample with non-discriminating board, while Panel B reports the results of the subsample with discriminating board. We find the CFO gender effect is only significant in the subsample with boards that do not discriminate against women in the access to directorships (the coefficients of *Female CFO* are only significant in Panel A). These results

indicate that the female gender effect is shaped by gender discrimination in the boardroom. When the overall environment in the boardroom is gender-friendly, the negative relationship between female CFOs and accounting fraud becomes more pronounced. This result is opposite to Lara et al. (2007) who find female independent directors cannot improve earnings management practices when firms do not discriminate against women in access to directorships. We argue that in China, gender discrimination is more serious than that of most developed economies, and therefore a gender-friendly board enhances the female CFO's mitigating effect on accounting fraud.

Insert Table 8 here

4.3.2 Female CFO and accounting fraud: does a powerful CEO matter?

In this section, we examine the CFO gender effect under a setting of CEO power. A key reason that boards may not provide sufficient monitoring of management is due to a powerful CEO, who often has significant say over the board composition (Baldenius, Melumad and Meng, 2014). It is possible that CEOs will set the tone for decisions from the top, which would potentially dominate CFOs' accounting choices (Ge et al., 2011). A proportion of CEOs in Chinese listed firms are politically connected and have strong connections with government sectors due to their previous working experience. Politically connected CEOs appear to be more powerful than those who do not have previous experience in government sectors. We argue that the impact of female CFOs on accounting fraud is subject to the CEO power effect. As discussed, there is evidence that the quality of earnings reported by politically connected firms is significantly poorer than that of non-connected firms (Chaney, Faccio and Parsley, 2011; Bona-Sánchez et al., 2014). Therefore we expect the female CFO effect should be more pronounced in firms without politically connected CEOs. We also use the conventional CEO duality as a second CEO power measure.

Using the propensity score matched sample of 5,788 firm-year observations, we divide the

observations into subsamples with and without politically connected CEOs. We include all the independent variables of Table 4 in the subsample regression analysis and remove the variable *Political CEO* from the regressions in Models 1 and 2 of Table 9. The results are in line with our expectation that the CFO gender effect is more pronounced in subsamples without a politically connected CEO. The coefficients of *Female CFO* is significant at the 5% level in the subsample without politically connected CEOs (see Models 1 and 2 in Panel B), while in firms with politically connected CEOs, the CFO gender effect becomes less pronounced (Models 1 and 2 in Panel A). Models 3 and 4 report the results when using *CEO duality* as an alternative proxy for CEO power. Again, we remove the variable *CEO duality* from the subsample analysis in Models 3 and 4. The results show that the CFO gender effect is only significant in firms without *CEO duality* (Models 3 and 4 in Panel B). We thus provide empirical evidence for the argument that the monitoring mechanism is less effective when the CEO is powerful (Baldenius et al., 2014).

Insert Table 9 here

4.3.3 Female CFO and accounting fraud: does CFO's directorship matter

On average, 24.7% of CFOs in our sample hold a directorship simultaneously. It is interesting to examine whether CFO-director duality matters in relation to accounting fraud. Using the same propensity score matched sample, we divide the observations into subsamples with, and without, CFO-director duality. We include all the other independent variables of Table 4 and remove *CFO duality* from the subsample analysis. Panel A of Table 10 reports the results of the subsample of firms with CFO-director duality, while Panel B reports the results of the subsample of firms without CFO-director duality. The results show that the CFO gender effect is only significant in the subsample with CFO-director duality (the coefficients of *Female CFO* are only significant in Panel A). In firms where CFOs do not simultaneously hold a directorship, the CFO gender effect becomes insignificant. This result indicates that the

directorship held by a CFO enhances their power in firm decision-making processes.

Insert Table 10 here

5. Conclusion

We find a negative relationship between the presence of female CFOs and conducting accounting fraud. We argue that these results are mainly due to the following reasons. First, women in Chinese firms have to meet a higher standard of effectiveness than men to attain executive positions and to retain them over time. Hence, female CFOs have strong incentives to avoid accounting violations. Second, Chinese female CFOs are expected to be more cautious and risk averse than men in making financial decisions and have to perform their managerial roles and basically conservative gender roles simultaneously. Third, according to Chinese culture, females are expected to be particularly introverted in their conduct. A conservative approach by female CFOs with respect to accounting fraud is consistent with such a cultural influence. Overall, our results highlight that female CFOs are able to provide effective oversight of accounting related decision-making in Chinese firms, and that the presence of female CFOs can reduce the likelihood of conducting accounting fraud. In addition, we find the negative relationship between female CFOs and accounting fraud is significant in private firms, but not in SOEs where political concerns are more pronounced.

However, establishing a causal relationship between CFO gender and corporate fraud is challenging because it is possible that firms wanting to follow a more conservative accounting approach are more likely to hire a female CFO. Our results show that the likelihood of having a female CFO is significantly higher in firms with a higher proportion of female directors on the board. In addition, the CFO gender effect is significant in firms with gender-mixed boards, but not in firms with male-only boards. Gender discrimination in China is more prevalent than in most developed economies, therefore a board with better gender parity enhances the female CFO's ability to reduce accounting fraud. Our results add to the literature by providing further

evidence that when the overall lack of gender parity is prevalent, such as in the Chinese setting, female executives are more likely to play a role in more conservative areas, such as accounting. In addition, other governance mechanisms, such as CEO power and CFO-director duality, shape the beneficial effect of having a female CFO. The negative relationship between female CFOs and accounting fraud is more pronounced when the firm has a less powerful CEO and when the CFO simultaneously holds a directorship in the same firm.

Appendix A: Variable definitions

This appendix reports the variables and definitions used in this study.

Variables	Definition
Fraud	A dummy variable that equals one if there is an accounting enforcement action in a given year and zero otherwise
Serious Fraud	A dummy variable that equals one if the accounting enforcement action affects multiple financial years and zero otherwise
Female CFO	A dummy variable that equals one if the CFO of the firm is female and zero otherwise
CFO age	The age of the CFO
LnCFO age	The natural logarithm of the age of the CFO
CFO duality	A dummy variable that equals one if the CFO of the firm also holds a directorship in the same firm and zero otherwise
Political CEO	A dummy variable that equals one if the CEO is politically related and zero otherwise
CEO duality	A dummy that equals one if the CEO is also the firm's Chairman of the Board and zero otherwise
Female CEO	A dummy variable that equals one if the CEO of the firm is female and zero otherwise
CEO age	The age of the CEO
LnCEO age	The natural logarithm of the age of the CEO
Gender diversity	The proportion of female directors to total number of directors on the board
Female independence	The proportion of female independent directors to total number of directors on the board
Board size	The total number of directors on the board
InBoard size	The natural logarithm of total number of directors on the board
Board independence	The proportion of independent directors to total number of directors on the board
Firm Size	The natural logarithm of the total assets
Leverage	Total debts to total assets
ROA	Net profits to total assets
State	A dummy that equals one if the ultimate controller is a SOE or government agency and zero otherwise

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Table 1: Descriptive statistics

This table reports the summary statistics of the variables included in the analysis. The description of the variables is summarized in Appendix A.

Variable	Obs	Mean	Std. Dev.	Min	Max
Fraud	10073	0.100	0.300	0	1
Serious Fraud	10073	0.041	0.199	0	1
Female CFO	10073	0.287	0.453	0	1
CFO age	10073	43	6.763	27	67
CFO duality	10073	0.247	0.432	0	1
Political CEO	10073	0.186	0.389	0	1
CEO duality	10073	0.223	0.416	0	1
Female CEO	10073	0.047	0.212	0	1
CEO age	10073	51	7.330	29	74
Gender diversity	10073	0.121	0.117	0.000	0.833
Board size	10073	9	1.815	4	19
Board independence	10073	0.363	0.051	0.083	0.714
Female independence	10073	0.051	0.073	0.000	0.500
Firm size	10073	21.466	1.162	15.468	28.004
Leverage	10073	0.448	0.223	0.014	1.591
ROA	10073	0.042	0.076	-1.454	1.756
State	10073	0.413	0.492	0	1

Table 2: Time trend of CFO/CEO characteristics and board composition variables

This table reports the time trend of CFO/CEO characteristics and board composition variables included in the analysis. The description of the variables is summarized in Appendix A.

Year	*Female CFO*	*CFO age*	*CFO director dual*	*Political CEO*	*CEO Duality*	*Female CEO*	*CEO age*	*Gender Diversity*	*Board size*	*Board Independence*	*Female independence*
2003	0.253	41.6	0.233	0.267	0.081	0.049	48.0	0.096	9.802	0.334	0.033
2004	0.249	41.9	0.237	0.225	0.105	0.045	48.6	0.092	9.658	0.343	0.034
2005	0.251	41.9	0.253	0.211	0.112	0.045	49.2	0.098	9.425	0.349	0.041
2006	0.262	42.1	0.247	0.212	0.120	0.046	49.6	0.103	9.296	0.352	0.042
2007	0.256	42.5	0.235	0.207	0.148	0.045	49.9	0.105	9.245	0.358	0.046
2008	0.248	42.8	0.241	0.178	0.173	0.040	50.1	0.111	9.109	0.360	0.046
2009	0.286	43.1	0.254	0.180	0.220	0.046	50.3	0.119	8.899	0.363	0.052
2010	0.295	43.3	0.245	0.169	0.268	0.043	50.8	0.124	8.892	0.365	0.054
2011	0.306	43.6	0.240	0.165	0.279	0.050	51.1	0.133	8.759	0.369	0.057
2012	0.320	44.1	0.253	0.169	0.311	0.054	51.7	0.131	8.728	0.370	0.055
2013	0.305	44.9	0.250	0.170	0.287	0.053	52.4	0.133	8.651	0.372	0.057
2014	0.314	44.9	0.245	0.168	0.300	0.048	52.6	0.141	8.332	0.376	0.062
2015	0.347	45.8	0.279	0.173	0.320	0.045	53.7	0.155	8.296	0.376	0.068

Table 3: Determinants of presence of a female CFO

This table reports the estimates of the probit regression model, controlling for year dummies and clustering standard errors by firm. The estimations use the full sample that consists of 10,073 firm-year observations.

$$Female\ CFO = \alpha + \beta_1 PCEO + \beta_2 CEO\ Duality + \beta_3 Female\ CEO + \beta_4 LnCEO\ age + \beta_5 Gender\ diversity/Female\ independence + \beta_6 LnBoard\ Size + \beta_7 Board\ independence + \beta_8 Firm\ Size + \beta_9 Leverage + \beta_{10} ROA + \beta_{11} State + \varepsilon$$

The variable descriptions are summarized in Appendix A. The superscripts *, **, and *** indicate significance at the 90%, 95%, and 99% confidence levels, respectively.

	Model 1 *Female CFO*	Model 2 *Female CFO*
Political CEO	0.113*	0.107
	(1.73)	(1.64)
CEO duality	0.089	0.104*
	(1.53)	(1.80)
Female CEO	0.047	0.268**
	(0.39)	(2.34)
LnCEO age	-0.083	-0.050
	(-0.47)	(-0.28)
Gender diversity	1.899***	
	(9.22)	
Female Independence		0.847***
		(2.70)
LnBoard size	-0.13	-0.145
	(-0.86)	(-0.97)
Board independence	-0.545	-0.582
	(-1.07)	(-1.14)
Firm size	-0.009	-0.022
	(-0.36)	(-0.88)
Leverage	-0.274**	-0.265**
	(-2.25)	(-2.17)
ROA	-0.073	-0.037
	(-0.29)	(-0.15)
State	-0.032	-0.064
	(-0.54)	(-1.07)
Year effects	Yes	Yes
Firm effects	Yes	Yes
No. of Obs.	10073	10073
Pseudo R^2	0.0332	0.0173

Table 4: Female CFOs and accounting fraud, PSM approach

This table reports the estimates of the probit regression model, using the sample of 5,788 propensity score matched observations. Year dummies are controlled for and standard errors are clustered by CFO.

$$Fraud/Serious\ Fraud = \alpha + \beta_1 Female\ CFO + \beta_2 LnCFO\ age + \beta_3 CFO\ duality + \beta_4 PCEO + \beta_5 CEO\ duality + \beta_6 Female\ CEO + \beta_7 LnCEO\ age + \beta_8 Gender\ diversity/Female\ independence + \beta_9 LnBoard\ Size + \beta_{10} Board\ independence + \beta_{11} Firm\ Size + \beta_{12} Leverage + \beta_{13} ROA + \beta_{14} State + \varepsilon$$

The variable descriptions are summarized in Appendix A. The superscripts *, **, and *** indicate significance at the 90%, 95%, and 99% confidence levels, respectively.

	Model 1	Model 2	Model 3	Model 4
	Fraud	*Serious Fraud*	*Fraud*	*Serious Fraud*
Female CFO	-0.137***	-0.135**	-0.133***	-0.132**
	(-2.83)	(-2.06)	(-2.75)	(-2.03)
InCFO age	-0.155	0.150	-0.166	0.144
	(-0.92)	(0.67)	(-0.98)	(0.65)
CFO duality	0.006	0.037	0.012	0.043
	(0.11)	(0.47)	(0.20)	(0.54)
Political CEO	-0.152**	-0.120	-0.153**	-0.121
	(-2.44)	(-1.42)	(-2.45)	(-1.44)
CEO duality	0.037	-0.005	0.038	-0.005
	(0.65)	(-0.07)	(0.67)	(-0.06)
Female CEO	0.085	0.183	0.101	0.202
	(0.85)	(1.36)	(1.04)	(1.57)
LnCEO age	-0.108	-0.293	-0.107	-0.288
	(-0.60)	(-1.19)	(-0.60)	(-1.16)
Gender diversity	0.151	0.176		
	(0.75)	(0.61)		
Female independence			0.311	0.212
			(1.10)	(0.49)
LnBoard size	0.021	-0.117	0.024	-0.119
	(0.15)	(-0.59)	(0.17)	(-0.59)
Board independence	0.329	0.527	0.290	0.499
	(0.63)	(0.78)	(0.55)	(0.74)
Firm size	-0.044*	-0.073**	-0.044*	-0.074**
	(-1.88)	(-2.37)	(-1.89)	(-2.39)
Leverage	0.350***	0.386**	0.351***	0.386**
	(2.89)	(2.30)	(2.90)	(2.30)
ROA	-1.060***	-0.748**	-1.061***	-0.749**
	(-3.46)	(-2.56)	(-3.47)	(-2.57)
State	-0.147**	-0.070	-0.149**	-0.073
	(-2.35)	(-0.88)	(-2.39)	(-0.91)
Year effects	Yes	Yes	Yes	Yes
CFO effects	Yes	Yes	Yes	Yes
No. of Obs.	5788	5788	5788	5788
Pseudo R^2	0.0364	0.0421	0.0365	0.0420

Table 5: Female CFOs and accounting fraud, Heckman two-stage analysis

This table presents the results of a Heckman two-stage procedure to further address endogeneity issues. The estimations use the full sample that consists of 10,073 firm-year observations. Year dummies are controlled for and standard errors are clustered by CFO. The first-stage regression is the same as those shown in Table 3.

$$\textit{Fraud/Serious Fraud} = \alpha + \beta_1 \textit{Female CFO} + \beta_2 \textit{LnCFO age} + \beta_3 \textit{CFO duality} + \beta_4 \textit{PCEO} + \beta_5 \textit{CEO duality} + \beta_6 \textit{Female CEO} + \beta_7 \textit{LnCEO age} + \beta_8 \textit{Gender diversity/Female independence} + \beta_9 \textit{Mills} + \beta_{10} \textit{LnBoard Size} + \beta_{11} \textit{Board independence} + \beta_{12} \textit{Firm Size} + \beta_{13} \textit{Leverage} + \beta_{14} \textit{ROA} + \beta_{15} \textit{State} + \varepsilon$$

The variable descriptions are summarized in Appendix A. The superscripts *, **, and *** indicate significance at the 90%, 95%, and 99% confidence levels, respectively.

	Model 1	Model 2	Model 3	Model 4
	Fraud	*Serious Fraud*	*Fraud*	*Serious Fraud*
Female CFO	-0.120***	-0.126**	-0.119***	-0.130**
	(-2.78)	(-2.19)	(-2.76)	(-2.26)
InCFO age	-0.054	0.095	-0.039	0.088
	(-0.41)	(0.56)	(-0.29)	-0.52
CFO duality	-0.026	-0.002	-0.025	-0.004
	(-0.60)	(-0.03)	(-0.57)	(-0.07)
Political CEO	-0.093	0.140	-0.044	0.014
	(-0.55)	(0.66)	(-0.85)	-0.21
CEO duality	0.019	0.119	0.062	0.013
	-0.14	(0.69)	-1.28	-0.2
Female CEO	0.065	0.232	0.084	0.171
	(0.59)	(1.62)	(0.85)	(1.30)
LnCEO age	-0.021	-0.256	-0.03	-0.199
	(-0.12)	(-1.12)	(-0.23)	(-1.09)
Gender diversity	-0.825	2.039		
	(-0.31)	(0.61)		
Female independence			0.088	-0.29
			-0.26	(-0.63)
Mills	-2.386	5.417	-0.288	-0.007
	(-0.35)	(0.64)	(-0.49)	(-0.01)
Other controls	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes
CFO effects	Yes	Yes	Yes	Yes
No. of Obs.	10073	10073	10073	10073
Pseudo R^2	0.0359	0.0337	0.0351	0.0326

Table 6: Losing female CFOs and accounting fraud, difference-in-difference approach

This table reports the estimates of the probit regression model. The sample for the regression includes the firms that have mixed CFO gender over the sample period, which consists of 3,066 firm-year observations. Year dummies are controlled for and standard errors are clustered by CFO.

$$Fraud/Serious\ Fraud = \alpha + \beta_1 Loss + \beta_2 State + \beta_3 Loss \times State + \beta_4 LnCFO\ age + \beta_5 PCEO + \beta_6 CEO\ Duality + \beta_7\ Female\ CEO + \beta_8 LnCEO\ age + \beta_9 Gender\ diversity + \beta_{10} LnBoard\ Size + \beta_{11} Board\ independence + \beta_{12} Firm\ Size + \beta_{13} Leverage + \beta_{14} ROA + \varepsilon$$

Loss is a dummy variable equal to one if the gender of the CFO changes from female to male in the given year, and zero otherwise. The other variable descriptions are summarized in Appendix A. The superscripts *, **, and *** indicate significance at the 90%, 95%, and 99% confidence levels, respectively.

	Model 1	Model 2	Model 3	Model 4
	Fraud	*Fraud*	*Serious Fraud*	*Serious Fraud*
Loss	0.245**	0.337***	0.151	0.295*
	(2.46)	(2.84)	(1.16)	(1.90)
State	-0.268***	-0.237***	-0.017	0.023
	(-3.39)	(-2.86)	(-0.17)	-0.23
Loss×State		-0.313		-0.457
		(-1.38)		(-1.49)
LnCFO age	-0.497**	-0.492**	-0.109	-0.103
	(-2.29)	(-2.27)	(-0.43)	(-0.40)
CFO duality	-0.076	-0.075	0.045	0.047
	(-0.78)	(-0.77)	(0.40)	(0.42)
Political CEO	0.000	0.002	-0.006	-0.003
	(-0.00)	(0.02)	(-0.06)	(-0.03)
CEO duality	0.155*	0.152*	0.132	0.126
	(1.71)	(1.68)	(1.18)	(1.13)
Female CEO	0.152	0.159	0.025	0.026
	(0.60)	(0.62)	(0.08)	(0.08)
LnCEO age	-0.177	-0.175	-0.039	-0.032
	(-1.03)	(-1.02)	(-0.15)	(-0.13)
Gender diversity	0.232	0.222	-0.011	-0.033
	(0.84)	(0.80)	(-0.03)	(-0.08)
LnBoard size	0.103	0.106	-0.1	-0.092
	-0.59	(0.61)	(-0.44)	(-0.40)
Board independence	1.594**	1.608**	1.894**	1.929**
	(2.44)	(2.47)	(2.44)	(2.49)
Firm size	-0.067**	-0.068**	-0.084**	-0.086**
	(-2.25)	(-2.29)	(-2.39)	(-2.44)
Leverage	0.479***	0.484***	0.571***	0.580***
	(2.68)	(2.70)	(2.76)	(2.78)
ROA	-0.695*	-0.687*	-0.847**	-0.831**
	(-1.72)	(-1.70)	(-1.98)	(-1.97)
Year effects	Yes	Yes	Yes	Yes
CFO effects	Yes	Yes	Yes	Yes
No. of Obs.	3066	3066	3066	3066
Pseudo R^2	0.0606	0.0616	0.0431	0.0452

Table 7: Female CFOs and accounting fraud, does state control matter

This table presents regression results for the impact of state control on the relationship between female CFOs and accounting fraud, using the sample of 5,788 propensity score matched observations. Year dummies are controlled for and standard errors are clustered by CFO. We divide the sample into the SOE subsample and private firm subsample. We remove the variable *State* and include all the controls in Table 4 for the subsample analysis.

$$Fraud/Serious\ Fraud = \alpha + \beta_1 Female\ CFO + \beta_2 LnCFO\ age + \beta_3 CFO\ duality + \beta_4 CEO\ duality + \beta_5 Female\ CEO + \beta_6 LnCEO\ age + \beta_7 LnBoard\ Size + \beta_8 Board\ independence + \beta_9 Firm\ Size + \beta_{10} Leverage + \beta_{11} ROA + \varepsilon$$

The variable descriptions are summarized in Appendix A. The superscripts *, **, and *** indicate significance at the 90%, 95%, and 99% confidence levels, respectively.

Panel A reports the results of the subsample of SOEs

	Model 1	Model 2
	Fraud	*Serious Fraud*
Female CFO	-0.145	-0.161
	(-1.61)	(-1.44)
InCFO age	-0.361	-0.092
	(-1.10)	(-0.22)
CFO duality	0.112	0.061
	(0.97)	(0.45)
Other controls	Yes	Yes
Year effects	Yes	Yes
CFO effects	Yes	Yes
No. of Obs.	2091	2091
Pseudo R^2	0.0625	0.0402

Panel B reports the results of the subsample of private firms

	Model 1	Model 2
	Fraud	*Serious Fraud*
Female CFO	-0.125**	-0.124
	(-2.18)	(-1.58)
InCFO age	-0.083	0.255
	(-0.42)	(0.97)
CFO duality	-0.013	0.036
	(-0.20)	(0.39)
Other controls	Yes	Yes
Year effects	Yes	Yes
CFO effects	Yes	Yes
No. of Obs.	3697	3697
Pseudo R^2	0.0303	0.0562

Table 8: Female CFOs and accounting fraud, does board gender discrimination matter

This table presents regression results for the impact of board gender discrimination on the relationship between female CFOs and accounting fraud, using the sample of 5,788 propensity score matched observations. Year dummies are controlled for and standard errors are clustered by CFO. We divide the sample into subsamples with non-discriminating and discriminating board, respectively. We include all the controls in the subsample regression analyses and remove the board gender diversity measure (*Gender diversity*).

$$Fraud/Serious\ Fraud = \alpha + \beta_1 Female\ CFO + \beta_2 LnCFO\ age + \beta_3 CFO\ duality + \beta_4 CEO\ duality + \beta_5 Female\ CEO + \beta_6 LnCEO\ age + \beta_7 LnBoard\ Size + \beta_8 Board\ independence + \beta_9 Firm\ Size + \beta_{10} Leverage + \beta_{11} ROA + \beta_{12} State + \varepsilon$$

The variable descriptions are summarized in Appendix A. The superscripts *, **, and *** indicate significance at the 90%, 95%, and 99% confidence levels, respectively.

Panel A reports the results of the subsample with non-discriminating board

	Approach I		Approach II	
	Model 1	Model 2	Model 3	Model 4
	Fraud	*Serious Fraud*	*Fraud*	*Serious Fraud*
Female CFO	-0.114**	-0.150**	-0.131**	-0.152*
	(-2.10)	(-2.18)	(-2.28)	(-1.79)
InCFO age	-0.210	0.198	-0.191	0.15
	(-1.09)	(0.84)	(-0.95)	(-0.53)
CFO duality	-0.029	0.008	-0.030	-0.042
	(-0.42)	(0.10)	(-0.40)	(-0.39)
Other controls	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes
CFO effects	Yes	Yes	Yes	Yes
No. of Obs.	5162	5162	4447	4447
Pseudo R^2	0.0333	0.0421	0.0325	0.0614

Panel B reports the results of the subsample with discriminating board

	Approach I		Approach II	
	Model 1	Model 2	Model 3	Model 4
	Fraud	*Serious Fraud*	*Fraud*	*Serious Fraud*
Female CFO	-0.153	0.152	-0.007	0.133
	(-0.78)	(0.67)	(-0.05)	(0.90)
InCFO age	-0.269	-0.181	-0.639	-0.471
	(-0.43)	(-0.27)	(-1.49)	(-1.02)
CFO duality	0.311	0.480*	0.249	0.393**
	(1.39)	(-1.75)	(1.51)	(2.06)
Other controls	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes
CFO effects	Yes	Yes	Yes	Yes
No. of Obs.	626	626	1341	1341
Pseudo R^2	0.1163	0.1470	0.0870	0.0877

Table 9: Female CFOs and accounting fraud, does a powerful CEO matter

This table presents regression results for the impact of CEO power on the relationship between female CFOs and accounting fraud, using the sample of 5,788 propensity score matched observations. Year dummies are controlled for and standard errors are clustered by CFO. We divide the sample into the subsamples with and without politically connected CEO/CEO duality, respectively. We include all the controls in the subsample analysis and remove the CEO power measures (*Political CEO* or *CEO Duality*). The variable descriptions are summarized in Appendix A. The superscripts *, **, and *** indicate significance at the 90%, 95%, and 99% confidence levels, respectively.

Panel A reports the results of the subsample with politically connected CEO or CEO duality

	Political CEO subsample		CEO-duality subsample	
	Model 1	Model 2	Model 3	Model 4
	Fraud	Serious Fraud	Fraud	Serious Fraud
Female CFO	-0.204*	-0.111	-0.0718	-0.0427
	(-1.79)	(-0.77)	(-0.74)	(-0.36)
InCFO age	-0.820**	-0.644	-0.0006	0.2541
	(-2.08)	(-1.23)	(-0.00)	(0.64)
CFO duality	0.131	0.069	0.0243	0.4258
	(0.88)	(0.37)	(0.19)	(0.31)
Other controls	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes
CFO effects	Yes	Yes	Yes	Yes
No. of Obs.	1142	1142	1534	1534
Pseudo R^2	0.0829	0.0606	0.0563	0.0614

Panel B reports the results of the subsample without politically connected CEO or CEO duality

	Non- Political CEO subsample		Non-CEO-duality subsample	
	Model 1	Model 2	Model 3	Model 4
	Fraud	*Serious Fraud*	Fraud	Serious Fraud
Female CFO	-0.127**	-0.147**	-0.1330**	-0.1639**
	(-2.40)	(-2.04)	(-2.14)	(-2.15)
InCFO age	-0.008	0.333	-0.4297*	0.1246
	(-0.04)	(1.35)	(-1.93)	(0.47)
CFO duality	-0.025	0.024	-0.0109	0.0263
	(-0.39)	(0.28)	(-0.14)	(0.28)
Other controls	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes
CFO effects	Yes	Yes	Yes	Yes
No. of Obs.	4646	4646	4254	4254
Pseudo R^2	0.0375	0.0477	0.0425	0.0457

Table 10: Female CFO and accounting fraud, does CFOs' directorship matter

This table presents regression results for the impact of CFO-director duality on the relationship between female CFOs and accounting fraud, using the sample of 5,788 propensity score matched observations. Year dummies are controlled for and standard errors are clustered by CFO. We divide the sample into the subsamples with and without CFO-director duality, respectively. We include all the controls in the subsample analysis and remove the CFO-director duality measure (*CFO duality*).

$$\textit{Fraud/Serious Fraud} = \alpha + \beta_1 \textit{Female CFO} + \beta_2 \textit{LnCFO age} + \beta_3 \textit{CEO duality} + \beta_4 \textit{Female CEO} + \beta_5 \textit{LnCEO age} + \beta_6 \textit{Gender diversity} + \beta_7 \textit{Board Size} + \beta_8 \textit{Board independence} + \beta_9 \textit{Firm Size} + \beta_{10} \textit{Leverage} + \beta_{11} \textit{ROA} + \beta_{12} \textit{State} + \varepsilon$$

The variable descriptions are summarized in Appendix A. The superscripts *, **, and *** indicate significance at the 90%, 95%, and 99% confidence levels, respectively.

Panel A reports the results of the subsample of firms with CFO-director duality

	Model 1	Model 2
	Fraud	*Serious Fraud*
Female CFO	-0.233**	-0.250*
	(-2.28)	(-1.80)
InCFO age	0.293	0.795
	(0.79)	(-1.81)
Other controls	Yes	Yes
Year effects	Yes	Yes
CFO effects	Yes	Yes
No. of Obs.	1372	1372
Pseudo R^2	0.0522	0.0880

Panel B reports the results of the subsample of firms without CFO-director duality

	Model 1	Model 2
	Fraud	*Serious Fraud*
Female CFO	-0.0917	-0.073
	(-1.65)	(-0.97)
InCFO age	-0.270	-0.031
	(-1.39)	(-0.12)
Other controls	Yes	Yes
Year effects	Yes	Yes
CFO effects	Yes	Yes
No. of Obs.	4416	4416
Pseudo R^2	0.0414	0.0459