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Citation

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Abstract

We investigate whether management's cognitions, values and perceptions are associated with fraud for 18 863 firm-years for Chinese listed firms from 2000 to 2014. Demographic characteristics of the chief financial officer (CFO) are used as proxies for management's cognitions, values and perceptions. We find that fraudulent financial reporting is higher when CFOs are younger, male, and have lower education backgrounds. An analysis of inflated earnings, fictitious assets, material omissions and other material misstatements provide similar results, with the exception that CFOs with higher education levels are associated with more inflated earnings.

Key words: Fraud; CFO age; CFO gender; CFO education

JEL classification: M12, M14, M41

1. Introduction

Individuals charged with the governance of a firm have the primary responsibility for fraud prevention and detection. We apply upper echelons theory and propose that fraudulent financial reporting of a firm reflects the values, perceptions and cognitive biases of its chief financial officer (CFO).

Further, a CFO's values, perceptions and cognitive biases are a function of their observable characteristics of age, gender and education background, and as a result, fraudulent financial reporting decisions are associated with these CFO observable characteristics.[1]

We contribute to the literature in several ways. First, we estimate management's cognitions, values and perceptions using the demographic characteristics of age, gender and education and test whether these are related to fraudulent financial reporting. Management's cognitions, values and perceptions can predict organisational outcomes such as strategic choices including fraudulent financial reporting (Hambrick and Mason, 1984; Carpenter et al., 2004). Demographic characteristics of top executives play a significant role in shaping organisational outcomes (Hambrick and Mason, 1984).

Second, we examine the CFO as a representative of senior management. Studies that apply upper echelons theory to examine unethical financial reporting behaviour focus on the impact of chief executive officers (CEOs) (Huang et al., 2012; Zona et al., 2013; Abdel-khalik, 2014; Ho et al., 2015; Palvia et al., 2015). However, it is arguable that CFOs have more influence and power in corporate earnings management than CEOs. Jiang et al. (2010) find that the magnitude of abnormal accruals (a proxy for financial reporting quality) and the likelihood of beating analyst forecasts are more sensitive to CFO equity incentives than to those of CEOs.[2] This is supported by survey evidence suggesting that more than 80 percent of CFOs engage in real manipulation of activities to meet or beat earnings benchmarks, even though this manipulation is detrimental to a firm's future performance (Graham et al., 2005). However, we also test the demographic characteristics of CEOs to ensure that any characteristics of CFOs and fraudulent financial reporting are not driven by CEO characteristics.

Third, we distinguish between the categories of inflated earnings, fictitious assets, material omissions and other material misstatements relating to fraudulent financial reporting. Previous Australian studies have tended to identify one category of fraudulent financial reporting or cover general financial reporting due to a lack of data. To illustrate, some researchers have focused on misappropriation of assets (Coram et al., 2008; Chapple et al., 2009; Tan et al., 2015), while another examines nonspecific fraudulent financial reporting (Sharma, 2004).

Finally, we exploit a unique large data set that allows us to distinguish fraudulent financial reporting and personal characteristics of the CFO.

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[1] The main disadvantage of this approach is that demographic characteristics are arguably limited or incomplete proxies of the CFOs' values, perceptions and cognitive biases (Bertrand and Schoar, 2003).

[2] However, Feng et al. (2011) find that CFOs are involved in material accounting manipulations because they succumb to pressure from CEOs rather than seeking immediate personal financial benefits from their own equity incentives.

Australian studies have relied on relatively small sample sizes in comparison with our current study using self-reporting data in the KPMG *Fraud Survey* (Coram *et al.*, 2008; Tan *et al.*, 2015; Capezio and Mavisakalyan, 2016) and data on companies that are subject to regulatory investigation, class actions and media releases (Sharma, 2004; Chapple *et al.*, 2014; Yuan and Zhang, 2016).

This unique data set arises because the Chinese government plays a forceful role in regulating its capital markets (Firth *et al.*, 2005; He *et al.*, 2016a). The China Securities Regulatory Commission, the Shanghai Stock Exchange and the Shenzhen Stock Exchange have the authority to investigate listed firms to determine whether financial statements are fairly reported. Government agencies issue public sanction reports to firms that are found to have fraudulent reports. Sanctioned listed firms are reprimanded for inflated earnings, fictitious assets, material omissions and other material misstatements that are violations of Chinese accounting standards and/or exchange listing rules. The sanction report provides varying degrees of detail on the nature of the misconduct, the individuals and entities involved, and the effect on the firm's financial statements. Previous studies use earnings manipulation measured by accruals quality as a proxy for fraudulent financial reporting (Barua *et al.*, 2010; Jiang *et al.*, 2010) or accounting choices (Ge *et al.*, 2011). These are indirect measures of fraudulent financial reporting and have limitations in estimating fraudulent financial reporting behaviour (DeFond and Zhang, 2014). China also has a large publicly available data set that identifies the personal characteristics of CFOs and CEOs.

This study is important because identification of demographic characteristics of CFOs associated with fraud provides another dimension to assist in fraud detection (Gepp, 2016). Consequences of fraud apply to the public, financiers, investors and employees. These stakeholders lose money from fraud, and the social and financial costs are difficult to quantify. KPMG (2013) estimates that only eight percent of fraud losses in Australian and New Zealand are fully recovered and 49 percent of cases are only partially recovered (KPMG, 2013; Gepp, 2016).

Disclosure of class action lawsuits and associated fraud reduces the firm's financing and investment. This is because perceived information asymmetry between stakeholders and managers increases leading to a reduction in firm reputation. This leads to difficulties in obtaining external funds. A reduction in external financing means that the firm cannot fund profitable investment (Yuan and Zhang, 2016).

This study is a useful addition to the literature because we provide indicators for auditors to identify fraudulent financial reporting. Auditors are required to continually question the honesty and integrity of management and consider whether fraudulent financial reporting exists (ASA 240, 2016; Kemp, 2016). Identifying demographic characteristics of CFOs and CEOs associated with

fraudulent financial reporting create a clear set of signals for auditors to investigate.

We find that CFOs' cognitions, values and perceptions estimated by age, gender and education level are significantly associated with fraudulent financial reporting. Specifically, firms with younger CFOs are more likely to issue fraudulent financial reports, which is consistent with the theory that younger people are less conservative and risk averse. Male CFOs are also more likely to engage in fraudulent financial reporting than female CFOs. CFOs with advanced degrees (Masters or higher) are less likely to engage in fraudulent financial reporting relative to those without advanced degrees. Conversely, we find that CFOs with higher education levels are associated with inflated earnings. In addition, we show that the impact of CFO demographic characteristics on fraudulent financial reporting is not driven by CEO demographic characteristics. Finally, our findings are robust after controlling for the endogeneity problem using the propensity score matching method and generalised method of moments.

The remainder of this article is organised as follows. Section 2 introduces the institutional background. Section 3 discusses prior literature and develops the hypotheses. Section 4 presents the research design, which includes a discussion of sample selection, data collection and empirical models. Section 5 presents the empirical results and robustness tests, while Section 6 concludes the article.

2. Institutional background

The establishment of the Shanghai and Shenzhen stock exchanges in the early 1990s was a sign that China had started converting its central planning economy into a market economy. Government regulators play a very important role in regulating the capital market in China. Chinese regulators were unsure whether regulatory policies were efficient and have implemented policies to check for efficiency in the capital market (Aharony *et al.*, 2000). One example of these policies is the IPO quota system and the IPO approval system, which are used by the China Securities Regulatory Commission and other market regulators to control the number of listed companies and the amount of capital raised in the market. The controlled IPO system induces listed firms to actively engage in fraudulent behaviours, even during the pre-IPO period (Chen and Yuan, 2004; Chen *et al.*, 2008; Aharony *et al.*, 2010).

Another example is the delisting policy issued by the China Securities Regulatory Commission that was established in 1998 and includes *Special Treatments* and *Particular Transfers*. A listed firm that incurs losses in two consecutive years is labelled as *Special Treatments* or *ST* before its trading symbol. A *Particular Transfers* or *PT* label is assigned to a firm if it reports more than two consecutive years of losses and these firms are subject to additional transfer trading rules. Firms thus have a strong incentive to engage

in opportunistic financial reporting to prevent or remove the detrimental *ST* or *PT* status.

The China Securities Regulatory Commission is the main regulator for listed firms in China. Issued in 1994 by the China Securities Regulatory Commission, the *Provisional Rules and Regulations on the Administration of Stock Issues and Trade* (*Provisional Rules* hereafter) stipulates the rules and regulations guaranteeing fair trading and financial reporting. The *Securities Law of People's Republic of China* of 1999 with amendments in 2005 provides the legal basis for the China Securities Regulatory Commission to supervise listed firms and market intermediaries. Article 36 in *Provisional Rules* mandates that listed firms must ensure that financial statements are reported fairly in accordance with Chinese accounting standards and that firms are held liable for damages to investors for undetected material misstatements. Article 38 stipulates that listed firms and top executives are to be sanctioned by the China Securities Regulatory Commission if the financial statement contains misleading contents or misstatements. Sanctions against listed firms and top executives include warnings, criticism, condemnation and monetary fines.

3. Literature review and hypotheses development

Research in economics, finance and accounting has mostly theorised that specific noneconomic characteristics of managers do not influence company decisions. Neoclassical economic theory assumes managers are rational optimisers and managers' specific personal characteristics do not influence company decisions (Bertrand and Schoar, 2003; Bamber *et al.*, 2010). Agency theory relaxes the perspective of neoclassical economics to assume that individual managers can idiosyncratically influence company decisions. However, the agency perspective assumes that managers react rationally to the company's economic environment, monitoring mechanisms and managers' contractual incentives (Jensen and Meckling, 1976). The noneconomic characteristics of managers are assumed to have no influence on the decisions made by the company (Bamber *et al.*, 2010).

A contrasting perspective is provided by upper echelons theory that predicts that managers are not identical and specific differences in managers' experiences are associated with differences in essential personal values and cognitive styles such as honesty and ethics. These differences in personal values and cognitive styles result in different managers making different decisions, particularly in complex situations lacking clear and quantifiable solutions (Hambrick and Mason, 1984).

Misstatement in financial reporting arises from fraud or error. The distinction between the two terms according to ASA 240 (2016) is that fraud arises from intentional misstatement while errors are unintentional. Managements are frequently in the position to commit fraud because they have the opportunity to manipulate accounting records and prepare fraudulent financial

reports. This is because they are in a unique position to override controls that otherwise appear to be operating effectively (ASA 240, 2016; Kemp, 2016). Previous research indicates that fraudulent financial reporting scandals are frequently preceded by entrenched lenient attitudes by management to fraudulent behaviour (Leung and Cooper, 2003; Tan et al., 2015).

Intentional misstatements are made by individuals because individuals (rather than firms as a whole) make decisions, and these decisions are shaped by the personalities of individuals involved in decision-making (Kachelmeier, 2010). Executives typically embody a bundle of attributes, and their decision-making processes reflect the configuration of multiple characteristics rather than individual ones in isolation (Carpenter et al., 2004).

Upper echelons theory explains that top executives' cognitions, values and perceptions predict organisational outcomes such as strategic choices and performance (Hambrick and Mason, 1984; Carpenter et al., 2004; Hambrick, 2007) including fraudulent financial reporting. Indeed, research in management, behavioural economics and psychology has documented that significant personal characteristics-based differences exist in leadership styles, communicative skills, conservatism, risk aversion and decision-making and that these differences play a significant role in shaping an organisation's behaviour. For example, Daboub et al. (1995) find that the characteristics of top executives, including work experience, age and formal business education, are associated with a firm's illegal activity. Evidence exists that CEOs and other top managers have large individual-specific heterogeneity in their management styles. These style differences explain a substantial portion of the variation in firms' capital structures, investment decisions and organisational structures (Bertrand and Schoar, 2003; Xuan, 2009).

Accounting research also documents that individual executives exert significant influence over a wide range of firms' accounting policy choices and outcomes (Bertrand and Schoar, 2003; Ge et al., 2011). Beaudoin et al. (2015) conduct an experimental study and find that CFOs' fraudulent financial reporting decisions are influenced by personal financial incentives and earnings management ethics. Wang and Fargher (2015) find that the internal auditors' assessed fraud risk is higher when senior management's attitude towards ethics and integrity is relatively poor. Dyreng et al. (2010) report that individual executives play a significant role in explaining the level of tax avoidance by companies. Bamber et al. (2010) find that individual characteristics of executives are significantly associated with management forecasts. In addition, Yang (2012) reports that manager-specific forecasting style and creditability are associated with the strength of market reactions to management earnings forecast releases.

We focus on observable demographic characteristics of managers to operationalise values, perceptions and cognitive biases of CFOs rather than psychological dimensions. Psychological dimensions are typically measured using tests and questionnaires. Senior management is reluctant to respond to

tests and questionnaires and recognised psychological tests have been developed for the general public and are not reliably applicable to senior management (Hambrick and Mason, 1984; Finkelstein and Hambrick, 1996; Hambrick, 2007).

Bamber *et al.* (2010) performed a widespread review of the literature in strategic management, career counselling, sociology, psychology and business education to identify demographic characteristics that operationalise managers' values, perceptions and cognitive biases. Their review identified age, gender and educational background as characteristics that credibly represent managers' values, perceptions and cognitive biases referred to in upper echelons theory and are selected for this study.

Older executives are more concerned about their financial and career security (Wiersema and Bantel, 1992) and have well-established social circles, spending traits and expectations about retirement income. Older executives are also more risk averse (Abdel-khalik, 2014). The age of a manager can also be viewed as a proxy for the extent of experience and as a signal of their resistance to risk-taking and change. Ruegger and King (1992) find that older participants are more ethical than younger participants in a survey of 2196 business school students. Deshpande (1997) finds similar results using 252 managers as respondents.

Herrmann and Datta (2006) find that older top executives tend to be more conservative and risk averse. Sundaran and Yermack (2007) report that CEOs become more ethical and conservative as they age. It has been found that CEO age is negatively related to financial restatements and firms' meeting, or beating, analyst earnings forecasts (Huang *et al.*, 2012).

In summary, existing studies have documented that older managers are more ethical and risk averse than younger managers. We therefore hypothesise that older CFOs are less likely to be involved in unethical fraudulent financial reporting than their younger counterparts. This leads to our first hypothesis:

H1: *Older CFOs are associated with less fraudulent financial reporting*.

The literature in cognitive psychology, behavioural economics and management has documented that significant gender differences exist in risk aversion, conservatism and ethical behaviour (Bernardi and Arnold, 1997; Sunden and Surette, 1998; Schubert, 2006; Croson and Gneezy, 2009). Evidence suggests that gender is a significant factor in the determination of ethical conduct and that females are more ethical than males (Ruegger and King, 1992; Deshpande, 1997).

Empirical evidence suggests that the behavioural differences between genders have important implications for financial reporting quality. For example, Heminway (2007) argues that women are less likely to manipulate earnings and other disclosures because they have higher ethical levels and are more trustworthy than men. Barua *et al.* (2010) provide evidence that companies

with female CFOs provide higher quality financial reports. In addition, research finds that firms with female directors have higher earnings quality and less earnings management (Srinidhi *et al.*, 2011; Gavious *et al.*, 2012). Abbott *et al.* (2012) find that having female directors on the board is associated with fewer financial restatements.

Ho *et al.* (2015) find female CEOs are more conservative than male CEOs regarding financial reporting. However, conflicting Australian evidence finds that female partners identify fewer going-concern decisions for financially distressed clients (Hossain *et al.*, 2016). Other research indicates that female CFOs are more conservative, risk averse and ethical than male CFOs. Capezio and Mavisakalyan (2016) confirm the prediction that an increase in women's representation on company boards is associated with a decreased probability of fraud for publicly listed companies in Australia. On balance, we expect that female CFOs are less likely to be associated with fraudulent financial reporting. This leads to our second hypothesis as follows:

H2: *Female CFOs are associated with less fraudulent financial reporting.*

The upper echelons literature suggests that education level reflects managers' abilities and skills (Hambrick and Mason, 1984; Chatterjee and Hambrick, 2007; Nadkarni and Herrmann, 2010; Burkert and Lueg, 2013). The general argument is that better-educated top executives have a greater cognitive complexity and ability to absorb new ideas and implement more effective strategies (Dabila and Foster, 2005, 2007; Naranjo-Gil *et al.*, 2009). Moreover, better-educated managers are more capable of discriminating among an extensive variety of alternatives to solve organisational problems and make better decisions because of their greater cognitive ability to process and analyse information (e.g. Herrmann and Datta, 2006; Chatterjee and Hambrick, 2007; Nadkarni and Herrmann, 2010). Based on this line of research, Cheng *et al.* (2010) provide evidence that Chinese firms headed by a board chairperson with a higher level of education report better financial performance.

The ethics literature documents that individuals with a higher education level are more ethical than those with a lower education level. For example, Jones and Gautschi (1988) find respondents with more education have higher ethical beliefs than those with less education, and Lane *et al.* (1988) find similar results. Deshpande (1997) finds managers with a higher education level are more ethical than their counterparts with a lower education level. This indicates that senior executives with higher education levels are less likely to be involved in fraudulent financial reporting because they are more proficient in running their business and have higher ethical beliefs.

However, some literature argues that individuals with a higher educational level can command more job opportunities and higher compensation, which could lead them to be overly optimistic or more aggressive than others. For example, Bertrand and Schoar (2003) find that managers with an MBA degree

are relatively more aggressive than others. A higher education level could also lead to top executives displaying more narcissism than others, which could induce them to be involved in fraud. In addition, some types of fraud require managers to have a higher education level because the fraud schemes are complex. For example, accrual-based earnings manipulation is achieved by changing accounting methods or estimates when presenting a given transaction in a financial statement.

Prior research indicates that higher education levels are associated with less fraudulent financial reporting. Alternatively, some financial frauds require a certain level of financial expertise likely be acquired through formal education. Therefore, we predict that fraudulent financial reporting is associated with education level without predicting a direction, leading to our third hypothesis as follows:

H3: The education level of CFOs is associated with fraudulent financial reporting.

4. Research design

4.1. Sample selection and data

Our sample of 18 863 pooled clients' firm-year observations spans 2000 to 2014. The financial data for calculating all the variables are obtained from the China Securities Markets and Accounting Research database. We begin with 27 409 firm-year observations with no missing values on total assets. After deleting firms with missing data, our sample consists of 14 578 firm-year observations not involved in fraudulent financial reporting and 4285 firm-year observations sanctioned because of fraudulent financial reporting.

The China Securities Regulatory Commission identifies companies committing fraud and imposes fines on the company and their senior management. The companies are required as far as possible to correct the fraud. Sanction reports relating to these frauds provide information on the exact nature of the fraud, associated reasons for the penalties, the originally released accounting amounts and the exact periods affected by the fraudulent financial reporting. This information is provided on the China Securities Regulatory Commission, the Shanghai Stock Exchange and the Shenzhen Stock Exchange websites. We download the sanction reports from these websites and manually collect the reasons for sanctions, the related renminbi (RMB) amounts and the fraud periods from these reports. The China Securities Regulatory Commission, the Shanghai Stock Exchange and the Shenzhen Stock Exchange issued 3453 sanction reports for fraudulent financial reporting from 2000 to 2014, which relates to 4285 firm-years. The types of fraudulent financial reporting include

inflated earnings, fictitious assets, material omissions and other material misstatements.[3] Each sanction report includes one or several types of fraudulent financial reporting.

4.2. Empirical models

We estimate the following logistic regression for the pooled sample (and also for a matched sample) to test whether CFO demographic characteristics influence fraudulent financial reporting:

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\begin{aligned}
Fraud = {} & \beta_0 + \beta_1 CFO\_DEMO + \beta_2 SIZE + \beta_3 LEV + \beta_4 BM + \beta_5 S\_GROW \\
& + \beta_6 LOSS + \beta_7 ROA + \beta_8 F\_AGE + \beta_9 BIG4 + \beta_{10} SEO \\
& + \beta_{11} G\_INDEX + \beta_{12} CFO\_TENUR + \beta_{13} CFO\_SHARE \\
& + Year\ Fixed\ Effects + Industry\ Fixed\ Effects + \varepsilon,
\end{aligned}
$$

$$(1)$$

where the dependent variable is fraudulent financial reporting denoted by *Fraud*. *Fraud* equals 1 when, due to fraudulent financial reporting, a firm is sanctioned by China Securities Regulatory Commission, the Shanghai Stock Exchange or the Shenzhen Stock Exchange, otherwise *Fraud* equals 0. CFO demographic characteristics include *CFO_AGE*, *CFO_GEN*, and *CFO_EDU* denoted by *CFO_DEMO*. *CFO_AGE* is a CFO's natural logarithm of age. *CFO_GEN* is a dummy variable, which equals 1 when a firm's CFO is female and 0 if the CFO is male. *CFO_EDU* is a CFO's education level. *CFO_EDU* equals 1 for a CFO with a high school diploma, 2 for a CFO with a college degree, 3 for a CFO with a bachelor's degree, 4 for a CFO with a master's degree and 5 for a CFO with a doctoral degree.

We control for factors identified in previous research that potentially influence firms' fraudulent financial reporting. We include *SIZE*, measured by the natural log of a firm's total assets to control for firm size. Dechow and Dichev (2002) suggest that smaller firms are more likely to be involved in earnings management. We include *LEV*, measured by the total debt divided by total assets (Subramaniam *et al.*, 2009; Oliveira *et al.*, 2011; Kent and Zunker, 2013; Tao and Hutchinson, 2013). Menon and Williams (2004) suggest that high growth firms are more likely to report low-quality financial information, so we control for book-to-market value (*BM*) and sales growth rate (*S_GROW*). Following Matsumoto (2002), we include *LOSS* because loss firms are less likely to be involved in fraudulent financial reporting. We also include return on assets (*ROA*), measured by net income divided by total assets

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[3] Delaying financial reporting is also part of some sanction reports. We do not include it in our sample because delaying financial reporting is not considered a form of fraudulent financial reporting.

to control for firm performance (Kent and Zunker, 2013; He *et al.*, 2016b). Huang *et al.* (2012) suggest that firms with higher ROA are less likely to manipulate earnings. We also include *F_AGE*, measured by the number of years a firm has been listed (Huang *et al.*, 2012; Abdel-khalik, 2014). We include *BIG4* to control for audit quality, as Big 4 audit firms are associated with higher audit quality (Fargher *et al.*, 2014; Miglani *et al.*, 2015).

Prior studies have documented that many differences exist between state-owned companies and nonstate-owned companies, so we include *SOE* as a control variable (Liu *et al.*, 2011). We also include *G_INDEX*, measured as a corporate governance index developed by Nankai University Corporate Governance Center.[4] CFO tenure is one of the factors that might affect ethical reasoning and therefore influence financial reporting decisions (Pennino, 2002), so we add *CFO_TENUR* as a control variable.

Jiang *et al.* (2010) document CFOs' equity incentive as one of the factors affecting earnings manipulation behaviour, so we include total shares held by CFO (*CFO_SHARE*) to control for CFOs' equity incentive. In addition, considering that the macroeconomic environment (Kent *et al.*, 2008) and industry conditions affect a firm's fraudulent financial reporting behaviour, we also control for the year and industry dummies in Equation (1). Table 1 defines the variables.

Table 2 describes the distribution of each type of fraudulent financial reporting by year. The number of each type of fraudulent reporting tends to grow each year suggesting that the Chinese government pays increasing attention to regulating public firms' financial reporting behaviour. This increase could also be related to increased business activity and therefore increased fraud for companies during the period of study.

Table 3, Panel A provides descriptive statistics for fraud firms and nonfraud firms. We also compare the mean and median values of the CFO demographic characteristics and firm characteristics between the two groups. More than 90 percent of CFOs are males, and no significant gender difference exists between the two groups. The average age of CFOs is around 46, and CFOs in nonfraud firms are slightly older than CFOs in fraud firms. The average CFO education level is a bachelor's degree, and no significant difference in education level exists between the two groups. Fraud firms are significantly smaller, have higher leverage, poorer performance, poorer corporate governance, longer listed years and slower growth relative to nonfraud firms. The fraud firms are less likely to hire one of the Big 4 firms as their external auditor. Nonstate-owned firms are

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[4] The corporate governance index developed by Nankai University Corporate Governance Center is a widely used index in corporate governance research in China. The Center issues a corporate governance index of listed firms in China each year. The index includes six aspects: shareholder governance, board of supervisor governance, board governance, managerial governance, information disclosure and stakeholder governance. Each aspect is assigned a score according to detailed standards. We use the average score of these six aspects as a proxy for corporate governance.

Table 1
Definition of variables

Variable	Definition
Dependent variables	
Fraud	1 if a listed firm is sanctioned by the China Securities Regulatory Commission, the Shanghai Stock Exchange or the Shenzhen Stock Exchange due to fraudulent financial reporting and 0 otherwise.
Independent variables	
CFO_AGE	The natural logarithm of CFO age in year t.
CFO_GEN	1 if a listed firm's CFO is female and 0 otherwise.
CFO_EDU	1 for CFO with a high school diploma, 2 for CFO with a college degree, 3 for CFO with a bachelor's degree, 4 for CFO with a master's degree and 5 for CFO with a doctoral degree.
Control variables	
SIZE	The natural logarithm of a listed firm's total assets at the end of year t.
LEV	A listed firm's total debt in year t scaled by total assets at the end of year t.
BM	A listed firm's book value of equity divided by total assets at the end of year t.
S_GROW	Percentage growth in a listed firm's sales from year $t-1$ to year t.
LOSS	1 if a listed firm records negative net income in year t and 0 otherwise.
ROA	A listed firm's net income in year t divided by total assets at the end of year t.
F_AGE	The number of years a listed firm has been listed since its IPO year to year t.
BIG4	1 if a listed firm hires one of the Big 4 international audit firms as its auditor and 0 otherwise.
SOE	1 if the firm is ultimately controlled by the Chinese government and 0 otherwise.
G_INDEX	The average value of a listed firm's corporate governance score constructed by The Nankai University Corporate Governance Center.
CFO_TENUR	The number of years that a CFO has worked for a listed firm.
CFO_SHARE	The number of shares held by a CFO divided by the total number of shares outstanding of a listed firm in year t.

less likely to commit fraud than state-owned firms. The results of the descriptive statistics indicate that fraud and nonfraud firms are significantly different in their underlying characteristics confirming the necessity to control for these differences.

Table 3, Panel B shows the Pearson product–moment correlations between variables.[5] Most of the correlations are between −0.20 and 0.20. The highest

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[5] The Spearman rank-order correlations are similar to the Pearson product–moment correlations.

Table 2

The distribution of different types of fraudulent financial reporting by year

Type of fraud	Inflated earnings	Fictitious assets	Material omissions	Other material misstatements	Total
2000	9	12	16	26	63
2001	30	41	82	56	209
2002	14	22	41	66	143
2003	29	39	87	73	228
2004	37	63	67	73	240
2005	26	61	65	51	203
2006	31	60	75	61	227
2007	26	42	50	44	162
2008	30	64	80	80	254
2009	14	97	89	102	302
2010	32	88	95	138	353
2011	5	95	124	113	337
2012	7	146	258	155	566
2013	26	159	262	227	674
2014	46	110	142	102	400
Total	362	1099	2133	1367	4961

Pearson correlation is between *BM* and *SIZE* at 0.361. The correlations do not indicate any serious collinearity problems.[6]

5. Results

5.1. Regression results

Table 4 presents the logistic regression results for Equation (1). Column (1) shows the association between CFO age and fraudulent financial reporting. The coefficient on *CFO_AGE* (Para = −0.014, χ^2 = 12.25) is negative and significant at the 1 percent level, which indicates that older CFOs are less likely to engage in fraudulent financial reporting, supporting Hypothesis 1. This finding is consistent with the upper echelons theory that older top executives are more ethical and risk averse (Ruegger and King, 1992; Sundaran and Yermack, 2007; Huang *et al.*, 2012).

Column (2) reports the association of CFO gender with fraudulent financial reporting. The coefficient on *CFO_GEN* (Para = −0.257, χ^2 = 15.38) is negative and significant at the 1 percent level, which indicates that female CFOs are less likely to engage in fraudulent financial reporting, supporting Hypothesis 2. This finding is consistent with the theory that females are more

[6] All of the VIF scores are below 3.96.

Table 3
Descriptive statistics

Panel A: Summary statistics

	Fraud = 1				Fraud = 0				Difference	
	Obs	Mean	Median	SD	Obs	Mean	Median	SD	Mean_diff	Median_diff
CFO_GEN	4285	0.087	0.000	0.154	14 578	0.099	0.000	0.155	−0.012	0.000
CFO_AGE	4285	46.014	46.000	4.638	14 578	46.179	46.000	4.431	−0.165*	0.000
CFO_EDU	4285	3.125	3.000	0.399	14 578	3.105	3.000	0.398	0.020	0.000
SIZE	4285	21.333	21.229	1.258	14 578	21.604	21.428	1.311	−0.271***	−0.199***
LEV	4285	0.718	0.556	1.986	14 578	0.472	0.474	0.219	0.246***	0.082***
BM	4285	0.323	0.307	0.367	14 578	0.432	0.371	0.287	−0.109***	−0.064***
S_GROW	4285	0.243	0.132	0.260	14 578	0.259	0.135	0.273	0.016***	0.003
LOSS	4285	0.245	0.000	0.430	14 578	0.101	0.000	0.301	0.144***	0.000
ROA	4285	−0.023	0.033	0.294	14 578	0.043	0.045	0.057	−0.066***	−0.012**
F_AGE	4285	9.096	8.000	5.625	14 578	7.749	7.000	5.428	1.374***	1.000**
BIG4	4285	0.046	0.000	0.201	14 578	0.053	0.000	0.192	0.007***	0.000
SOE	4285	0.384	0.000	0.486	14 578	0.541	1.000	0.498	−0.157***	−1.000***
G_INDEX	4285	61.520	60.830	6.964	14 578	62.030	61.650	7.259	0.510**	0.820**
CFO_TENUR	4285	4.046	4.000	1.854	14 578	3.655	3.000	1.675	0.391*	1.000
CFO_SHARE	4285	0.000	0.000	0.004	14 578	0.000	0.000	0.004	0.000	0.000

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)

Panel B: Pearson correlation

		(1)	(2)
CFO_GEN	(1)	1.000	
	(2)	−0.016	1.000

(continued)

Table 3 (continued)

Panel B: Pearson correlation

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
CFO_AGE															
CFO_EDU (3)	−0.006	0.044	1.000												
SIZE (4)	0.219	0.259	0.059	1.000											
LEV (5)	0.001	−0.019	0.009	−0.06	1.000										
BM (6)	0.019	0.082	0.021	0.361	−0.085	1.000									
S_GROW (7)	0.002	0.017	−0.004	0.001	0.048	−0.097	1.000								
LOSS (8)	−0.013	−0.020	0.015	−0.166	0.048	0.195	−0.237	1.000							
ROA (9)	0.002	0.017	−0.004	0.048	−0.097	0.085	0.019	−0.078	1.000						
F_AGE (10)	0.002	0.017	−0.004	0.048	−0.178	0.020	−0.017	−0.025	−0.146	1.000					
BIG4 (11)	0.004	−0.029	−0.051	0.009	0.095	−0.001	0.006	−0.029	0.032	−0.047	1.000				
SOE (12)	0.057	0.173	0.119	0.299	−0.010	0.148	0.038	−0.035	0.007	0.0065	0.010	1.000			
G_INDEX (13)	−0.003	0.032	0.010	0.046	−0.022	0.109	0.023	−0.086	0.063	0.025	0.032	0.107	1.000		
CFO_TENUR (14)	0.063	0.302	−0.028	0.173	−0.008	0.061	−0.028	−0.036	0.001	0.002	0.005	−0.041	0.056	1.000	
CFO_SHARE (15)	0.007	0.034	0.029	0.043	−0.002	0.007	0.008	−0.037	0.017	−0.012	0.008	0.006	0.007	0.090	1.000

Panel A presents the summary statistics of CFO demographic characteristics and firm characteristics for a fraud group and a nonfraud group, respectively. The last two columns of Panel A show significant mean and median differences between fraud and nonfraud groups. Panel B shows the Pearson product–moment correlations between variables. In Panel A, *, ** and *** indicate statistically significant results at the 0.10, 0.05 and 0.01 levels (two-tails), respectively. In Panel B, the bold characteristics indicate statistically significant at the 0.05 or higher level (two-tailed). Please see the definitions of the variables in Table 1.

Table 4
Logistic regression results

	(1)	(2)	(3)	(4)
CFO_AGE	−0.014***			−0.011***
	(12.25)			(9.68)
CFO_GEN		−0.257***		−0.275**
		(15.38)		(6.07)
CFO_EDU			−0.032*	−0.029*
			(3.05)	(2.97)
SIZE	0.040**	0.034**	0.044***	0.072***
	(5.83)	(4.29)	(6.85)	(17.53)
LEV	0.014	0.010	0.001	0.001
	(0.88)	(0.51)	(0.346)	(0.379)
BM	0.428***	0.452***	0.443***	0.435***
	(60.99)	(67.30)	(64.75)	(60.88)
S_GROW	0.159***	0.165***	0.162***	0.150***
	(20.95)	(22.39)	(21.77)	(18.19)
LOSS	−0.792***	−0.793***	−0.795***	−0.811***
	(93.48)	(96.05)	(97.57)	(101.85)
ROA	0.029***	0.028***	0.029***	0.030***
	(13.52)	(12.93)	(13.03)	(14.33)
F_AGE	−0.050***	−0.053***	−0.052***	−0.044***
	(68.89)	(70.86)	(69.91)	(57.46)
BIG4	−0.021**	−0.024**	−0.020**	−0.017**
	(5.12)	(5.47)	(5.01)	(4.16)
SOE	0.661***	0.647***	0.636***	0.613***
	(58.84)	(56.86)	(52.68)	(50.21)
G_INDEX	−−0.082***	−0.084***	−0.079***	−0.087***
	(23.59)	(24.55)	(21.65)	(25.60)
CFO_TENUR	−0.112***	−0.108***	−0.119***	−0.117***
	(53.96)	(52.64)	(55.94)	(53.08)
CFO_SHARE	0.015	0.017	0.013	0.015
	(1.84)	(1.98)	(1.64)	(1.79)
Year fixed effect	Yes	Yes	Yes	Yes
Industry fixed effect	Yes	Yes	Yes	Yes
Generalised pseudo-R^2	0.057	0.058	0.059	0.063
p-value	<0.001	<0.001	<0.001	<0.001
Observation	18 863	18 863	18 863	18 863

*, **, and ***Statistically significant results at the 0.10, 0.05 and 0.01 levels (two-tails), respectively. Please see the definitions of the variables in Table 1.

ethical and risk averse than males (Ruegger and King, 1992; Barua *et al.*, 2010; Ho *et al.*, 2015; Palvia *et al.*, 2015).

Column (3) reports the association of CFO education level on fraudulent financial reporting. The coefficient on *CFO_EUD* (Para = −0.032, χ^2 = 3.05) is negative and significant at the 10 percent level, which partially indicates that CFOs with a higher education level are less likely to engage in fraudulent financial reporting.

Finally, column (4) presents the joint associations between CFO age, gender and education level on fraudulent financial reporting. The coefficients on *CFO_AGE*, *CFO_GEN* and *CFO_EDU* (Para = -0.011, -0.275 and -0.029, χ^2 = 9.68, 6.07 and 3.54, respectively) are similar to those in Columns (1), (2) and (3).

5.2. *Types of fraudulent financial reporting*

We treated all types of fraudulent financial reporting similarly in the prior analysis when estimating the association between CFO demographic characteristics and fraudulent financial reporting. However, it remains unclear how CFO demographic characteristics influence different types of fraudulent financial reporting. In the following analysis, we thus divide fraudulent financial reporting into four types: inflated earnings, fictitious assets, material omissions and other material misstatements.[7] Table 4 reports the regression results of the joint associations between CFO demographic characteristics on each type of fraudulent financial reporting. We find that higher education levels are associated with inflated earnings at the five percent level, while education level is not significant in explaining other material misstatements. Otherwise, we find similar results for the associations between CFO age and gender on the other types of fraudulent financial reporting (Table 5).

5.3. *CEO demographic characteristics*

Hunton *et al.* (2011) argue that a firm's CEO primarily creates the *tone at the top* and that such a tone is associated with earnings quality. Extracting CEOs' traits of ethical leadership from corporate narrative language, Parelli and Pedrini (2015) find that this *tone at the top* is significantly associated with firms' aggressive financial reporting behaviour. Saxton (2015) affirms this finding. CFOs are agents of CEOs and CEOs have the power to replace CFOs who do not follow their orders (Mian, 2001; Fee and Hadlock, 2004). Our concern is that the findings of the associations between CFO demographic characteristics and fraudulent financial reporting are driven by CEO demographic characteristics. To rule out this concern, we follow Jiang *et al.* (2010) by estimating the following model:

$$
\begin{aligned}
Fraud = {} & \beta_0 + \beta_1 CFO\_DEMO + \beta_2 CEO\_DEMO + \beta_3 SIZE + \beta_4 LEV \\
& + \beta_5 BM + \beta_6 S\_GROW + \beta_7 LOSS + \beta_8 ROA + \beta_9 FIRM\_AGE \\
& + \beta_{10} BIG4 + \beta_{11} SEO + \beta_{12} G\_INDEX + \beta_{13} CFO\_SHARE \\
& + Year\ Fixed\ Effects + Industry\ Fixed\ Effects + \varepsilon,
\end{aligned}
$$

(2)

---

[7] Each sanction report could include one or several types of fraud. For example, a sanction report could include both inflated earnings and fictitious assets.

where CEO_DEMO represents CEO demographic characteristics, including CEO_AGE, CEO_GEN and CEO_EDU. Other variables are the same as those used in Equation (1).

Table 6 reports the logistic regression results of Equation (2) based on a propensity score matching sample[8]. The results in columns (1), (4) and (7) are the associations between CFO demographic characteristics and fraudulent financial reporting. The results in columns (2), (5) and (8) are the associations between CEO demographic characteristics on fraudulent financial reporting. Consistent with the findings in prior studies, CEO age, gender and education level are significantly associated with fraudulent financial reporting. The results in columns (3), (6) and (9) are the joint associations between CFO and CEO demographic characteristics on fraudulent financial reporting. We find that the associations between CFO demographics characteristics on fraudulent financial reporting do not disappear after adding CEO demographic characteristics into the regressions. Therefore, CEO relations do not drive the CFO results.

5.4. Endogeneity

The results in Table 4 provide preliminary evidence that CFO demographic characteristics are associated with fraudulent financial reporting. However, 'endogeneity has always been present and recognised as a problem that undermines causal inference' (Gippel *et al.*, 2015, p. 143). We are concerned that specific companies with fraudulent financial reporting attract CFOs that are younger, female, and with lower education levels.

We reduce the problem of endogeneity by ensuring that we base our predictions on strong theory. Poor theory development adds to econometric problems associated with endogeneity (Gippel *et al.*, 2015). In addition, we are careful to recognise that we have not demonstrated a causal relationship between CFO demographic characteristics and fraudulent financial reporting.

In addition, two econometric solutions are provided to ensure that we can be confident regarding the logic and direction of the relationship between CFO demographic characteristics and fraudulent financial reporting. First, we use the propensity score matching method to ensure the results are not driven by

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[8] When using PSM scores, we set the calliper at 0.05, to match each client-year involved in fraudulent financial reporting with a client-year not involved in fraudulent financial reporting. Specifically, we estimate Equation (2) after excluding CEOs' and CFOs' demographic characteristics by year and the propensity score is calculated for each client-year as the predicted value. Then, we match each client-year involved in fraudulent financial reporting with a client-year not involved in fraudulent financial reporting which has the closet propensity score in the same year. We restrict the difference in propensity scores of each pair to 0.05. In this manner, we obtain a PSM sample including 3964 client-years involved in fraudulent financial reporting and 3964 client-years not involved in fraudulent financial reporting.

Table 5
CFO characteristics and different types of corporate violations

	Inflated earnings	Fictitious assets	Material omissions	Other material misstatements
CFO_AGE	−0.026**	−0.032***	−0.045***	−0.021**
	(4.79)	(8.51)	(10.11)	(4.02)
CFO_GEN	−1.016***	−0.096***	−0.712***	−0.382**
	(22.06)	(9.28)	(15.89)	(4.40)
CFO_EDU	0.053**	−0.269**	−0.224*	0.020
	(3.86)	(6.00)	(2.92)	(1.37)
SIZE	0.553***	0.024	0.148***	0.202***
	(52.99)	(1.74)	(32.40)	(48.60)
LEV	0.106*	0.087***	0.019	0.019
	(3.01)	(7.33)	(0.93)	(0.94)
BM	0.308**	0.378***	0.076	0.165***
	(6.02)	(27.09)	(1.57)	(6.70)
S_GROW	0.148***	0.128**	0.146***	0.152***
	(17.07)	(4.45)	(7.49)	(6.84)
LOSS	−0.423***	−0.863***	−0.675***	−0.482***
	(7.04)	(84.61)	(75.63)	(42.76)
ROA	0.018	0.038**	0.012	0.017*
	(1.05)	(5.07)	(0.92)	(3.07)
F_AGE	−0.063***	−0.018***	−0.72***	−0.054***
	(25.34)	(10.43)	(71.69)	(72.85)
BIG4	−0.016**	−0.014**	−0.010**	−0.018**
	(4.25)	(3.92)	(3.69)	(4.51)
SOE	−0.196	0.523***	0.425***	0.549***
	(1.99)	(65.94)	(56.58)	(78.12)
G_INDEX	−0.068***	−0.060***	−0.065***	−0.071***
	(16.44)	(13.19)	(15.38)	(17.53)
CFO_TENUR	−0.092*	−0.099***	−0.084***	−0.080***
	(3.79)	(36.79)	(33.15)	(24.99)
CFO_SHARE	0.011	0.015	0.014	0.013
	(1.36)	(1.86)	(1.77)	(1.59)
Year fixed effect	Yes	Yes	Yes	Yes
Industry fixed effect	Yes	Yes	Yes	Yes
Generalised pseudo-R^2	0.051	0.057	0.057	0.050
p-value	<0.001	<0.001	<0.001	<0.001
Observation	14 940	15 845	16 279	15 677

*, **, and ***Statistically significant results at the 0.10, 0.05 and 0.01 levels (two-tails), respectively. Please see the definitions of the variables in Table 1.

firm-specific factors because the descriptive evidence in Table 3 shows fundamental differences between characteristics of fraud and nonfraud firms. This method means that the sample firms have similar characteristics with similar probabilities of being fraud firms.

Table 6
The joint associations of CFO and CEO demographic characteristics on fraudulent financial reporting

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
CFO_AGE	−0.017***		−0.015***						
	(15.92)		(14.83)						
CEO_AGE		−0.009***	−0.007**						
		(8.64)	(5.01)						
CFO_GEN				−0.263**		−0.232**			
				(5.94)		(5.19)			
CEO_GEN					−0.129**	−0.083*			
					(4.81)	(3.14)			
CFO_EDU							−0.035**		−0.126***
							(3.96)		(9.08)
CEO_EDU								−0.059**	−0.037**
								(5.72)	(4.29)
SIZE	0.038**	0.035**	0.037**	0.031**	0.036**	0.038**	0.042***	0.041***	0.039**
	(5.16)	(4.61)	(4.95)	(4.07)	(4.59)	(4.93)	(6.79)	(6.57)	(6.02)
LEV	0.013	0.018	0.017	0.008	0.013	0.015	0.001	0.001	0.001
	(0.81)	(1.02)	(0.97)	(0.47)	(0.79)	(0.86)	(0.332)	(0.31)	(0.33)
BM	0.407***	0.401***	0.407***	0.441***	0.432***	0.429***	0.425***	0.424***	0.420***
	(57.49)	(51.20)	(54.52)	(62.90)	(60.04)	(59.58)	(60.49)	(58.64)	(57.18)
S_GROW	0.148***	0.144***	0.147***	0.153***	0.149***	0.152***	0.157***	0.148***	0.145***
	(17.07)	(18.17)	(19.06)	(19.65)	(19.38)	(20.05)	(20.08)	(18.09)	(17.31)
LOSS	−0.776***	−0.743***	−0.750***	−0.781***	−0.745***	−0.748***	−0.783***	−0.747***	−0.746***
	(85.69)	(82.96)	(86.37)	(87.24)	(85.09)	(86.71)	(86.58)	(88.49)	(87.38)
ROA	0.025***	0.028***	0.027***	0.026***	0.027***	0.029***	0.027***	0.028***	0.030***
	(10.94)	(12.06)	(11.73)	(11.57)	(11.67)	(12.28)	(12.63)	(12.67)	(13.94)
F_AGE	−0.047***	−0.045***	−0.042***	−0.051***	−0.048***	−0.050***	−0.050***	−0.046***	−0.044***
	(62.19)	(57.29)	(53.46)	(67.95)	(67.53)	(68.92)	(68.22)	(59.68)	(57.29)
BIG4	−0.019**	−0.017**	−0.017**	−0.021**	−0.020**	−0.021**	−0.016**	−0.023**	−0.021**

(continued)

Table 6 (continued)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	(4.84)	(4.62)	(4.65)	(4.97)	(4.83)	(4.89)	(4.29)	(4.99)	(4.78)
SOO	0.649***	0.605***	0.589***	0.638***	0.618***	0.625***	0.619***	0.612***	0.607***
	(55.23)	(51.64)	(49.85)	(52.94)	(53.21)	(54.50)	(49.87)	(51.24)	(50.16)
G_INDEX	−0.077***	−0.068***	−0.065***	−0.079***	−0.069***	−0.070***	−0.073***	−0.066***	−0.068***
	(20.15)	(16.20)	(15.19)	(21.63)	(17.31)	(18.15)	(18.20)	(16.94)	(17.55)
CFO_TENUR	−0.105***	−0.097***	−0.090***	−0.107***	−0.101***	−0.094***	−0.102***	−0.098***	−0.091***
	(47.59)	(45.68)	(37.82)	(48.46)	(47.39)	(48.67)	(46.39)	(44.36)	(35.85)
CFO_SHARE	0.013	0.015	0.014	0.015	0.017	0.015	0.012	0.014	0.014
	(1.59)	(1.72)	(1.63)	(1.77)	(1.88)	(1.79)	(1.51)	(1.67)	(1.70)
Year fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Generalised pseudo-R^2	0.061	0.055	0.058	0.063	0.056	0.059	0.064	0.057	0.060
p-value	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Observation	7928	7928	7928	7928	7928	7928	7928	7928	7928

*, **, and ***Statistically significant results at the 0.10, 0.05 and 0.01 levels (two-tailed), respectively. Please see the definitions of the variables in Table 1.

We estimate Equation (1) based on the propensity score matching method to control for differences in characteristics between fraud and nonfraud firms (Armstrong *et al.*, 2010). Specifically, we estimate the following model by year:

$$
\begin{aligned}
Probit(Fraud) = a_0 &+ a_1 SIZE + a_2 LEV + a_3 BM + a_4 S\_GROW \\
&+ a_5 LOSS + a_6 ROA + a_7 F_A GE + a_8 BIG4 + a_9 SEO \\
&+ a_{10} G\_INDEX \\
&+ a_{10} CFO\_TENUR + a_{12} CFO\_SHARE + \varepsilon_{j,t}.
\end{aligned}
$$

(3)

First, we identify 4285 firm-year observations sanctioned by government agents, and 14 578 firm-year observations not sanctioned by government agents. Second, we use propensity score matching to match each sanctioned observation with each nonsanctioned observation. Specifically, we estimate Equation (3) by year and the propensity score is calculated for each firm-year as the predicted value. We then match each fraud observation to a nonfraud observation with the closest propensity score in the same year. We restrict the difference in propensity scores of each pair to 0.05. In this manner, we obtain a propensity score matching sample of 3964 fraud observations[9] and 3964 nonfraud observations. We estimate Equation (1) using this matched sample. Table 7 shows the regression results based on the propensity score matching sample, which are similar to those based on the pooled sample. In particular, the estimated coefficient on CFO_EDU is negative at the 5 percent significance level. The results based on the propensity score matching sample rule out the alternative explanation that the association between CFO demographic characteristics and fraudulent financial reporting is driven by firm-specific characteristics.

Second, we use generalised method of moments (GMM) to assess the endogeneity problem. This method uses the lagged values of dependent variables as instruments and is considered more appropriate than two-stage least squares (2SLS) for our study. The validity of 2SLS regressions largely depends on the choice of instrumental variables in the first stage. At least one instrumental variable is required when completing the 2SLS test and this instrumental variable should have an impact on CFO characteristics but not on the probability of financial statement fraud. The problem is that it is difficult to find a good instrumental variable in our analysis. The lagged values used in most research may not be good instrumental variables because these variables can be correlated. It is more appropriate to apply GMM using lagged CFO characteristics when appropriate exogenous variables are not available and when the endogenous variable is highly serially correlated (for our example,

---

[9] Three hundred and twenty-one sanctioned observations were eliminated from the sample because they did not match.

Table 7
Logistic regression results based on the propensity score matching method

	(1)	(2)	(3)	(4)
CFO_AGE	−0.017***			−0.011***
	(15.92)			(9.68)
CFO_GEN		−0.263**		−0.278**
		(5.94)		(6.22)
CFO_EDU			−0.035**	−0.033**
			(3.96)	(3.89)
SIZE	0.038**	0.031**	0.042***	0.068***
	(5.16)	(4.07)	(6.79)	(15.42)
LEV	0.013	0.008	0.001	0.001
	(0.81)	(0.47)	(0.332)	(0.357)
BM	0.407***	0.441***	0.425***	0.419***
	(57.49)	(62.90)	(60.49)	(58.93)
S_GROW	0.148***	0.153***	0.157***	0.139***
	(17.07)	(19.65)	(20.08)	(14.12)
LOSS	−0.776***	−0.781***	−0.783***	−0.793***
	(85.69)	(87.24)	(86.58)	(92.55)
ROA	0.025***	0.026***	0.027***	0.030***
	(10.94)	(11.57)	(12.63)	(14.54)
F_AGE	−0.047***	−0.051***	−0.050***	−0.040***
	(62.19)	(67.95)	(68.22)	(51.07)
BIG4	−0.019**	−0.021**	−0.016**	−0.015**
	(4.84)	(4.97)	(4.29)	(4.08)
SOE	0.649***	0.638***	0.619***	0.595***
	(55.23)	(52.94)	(49.87)	(43.39)
G_INDEX	−0.077***	−0.079***	−0.073***	−0.075***
	(20.15)	(21.63)	(18.20)	(19.54)
CFO_TENUR	−0.105***	−0.107***	−0.102***	−0.101***
	(47.59)	(48.46)	(46.39)	(45.28)
CFO_SHARE	0.013	0.015	0.012	0.013
	(1.59)	(1.77)	(1.51)	(1.62)
Year fixed effect	Yes	Yes	Yes	Yes
Industry fixed effect	Yes	Yes	Yes	Yes
Generalised pseudo-R^2	0.061	0.063	0.064	0.067
p-value	<0.001	<0.001	<0.001	<0.001
Observation	7928	7928	7928	7928

*, **, and ***Statistically significant results at the 0.10, 0.05 and 0.01 levels (two-tailed), respectively. Please see the definitions of the variables in Table 1.

they are the same for gender and education level and highly correlated for age (Areliano and Bover, 1995; Blundell and Bond, 1998).

The results of the GMM regression are presented in Table 8. Overall, the GMM regression reports confirm our earlier findings suggesting that fraud companies do not select CFOs that are younger, male, and with lower education. Unreported results of a 2SLS test confirm these results.

Table 8
Logistic regression results based on the generalised method of moments (GMM)

	(1)	(2)	(3)	(4)
CFO_AGE_{t-1}	−0.010***			−0.009***
	(8.48)			(8.01)
CFO_GEN_{t-1}		−0.237**		−0.226**
		(5.02)		(4.83)
CFO_EDU_{t-1}			−0.033**	−0.030**
			(4.54)	(3.96)
SIZE	0.035**	0.031**	0.040***	0.064***
	(5.07)	(3.96)	(6.59)	(14.73)
LEV	0.011	0.007	0.001	0.001
	(0.78)	(0.46)	(0.330)	(0.355)
BM	0.403***	0.435***	0.420***	0.412***
	(56.24)	(61.28)	(59.65)	(56.81)
S_GROW	0.146***	0.150***	0.154***	0.137***
	(16.59)	(18.23)	(19.84)	(14.06)
LOSS	−0.762***	−0.767***	−0.770***	−0.785***
	(80.18)	(82.51)	(83.06)	(87.22)
ROA	0.021***	0.023***	0.025***	0.027***
	(9.15)	(9.84)	(11.29)	(12.34)
F_AGE	−0.041***	−0.045***	−0.044***	−0.037***
	(53.75)	(57.83)	(58.67)	(46.37)
BIG4	−0.020**	−0.023**	−0.018**	−0.016**
	(4.97)	(5.21)	(4.67)	(4.43)
SOE	0.602***	0.609***	0.594***	0.583***
	(47.39)	(50.32)	(45.16)	(40.28)
G_INDEX	−0.070***	−0.075***	−0.068***	−0.071***
	(18.25)	(20.09)	(17.30)	(19.02)
CFO_TENUR	−0.095***	−0.098***	−0.093***	−0.091***
	(41.03)	(44.57)	(40.12)	(39.83)
CFO_SHARE	0.011	0.013	0.010	0.010
	(1.50)	(1.62)	(1.44)	(1.48)
Year fixed effect	Yes	Yes	Yes	Yes
Industry fixed effect	Yes	Yes	Yes	Yes
Generalised pseudo-R^2	0.062	0.067	0.069	0.072
p-value	<0.001	<0.001	<0.001	<0.001
Observation	18 863	18 863	18 863	18 863

*, **, and ***Statistically significant at the 0.10, 0.05 and 0.01 levels (two-tailed), respectively.
Please see the definitions of the variables in Table 1.

6. Conclusions

We examine whether CFO demographic characteristics influence a firm's fraudulent financial reporting in a sample of Chinese publicly listed firms. According to the upper echelons theory, top executives' demographic characteristics can be used as reasonable proxies for underlying differences in cognitions, values and perceptions, which can influence strategic choices and

performance. As CFOs are the primary executives involved in the financial reporting process, CFO demographic characteristics should affect a firm's fraudulent financial reporting activities. Consistent with this expectation, we find that CFO age, gender and education level are significantly associated with fraudulent financial reporting in China. The results are not driven by the differences in characteristics between fraud and nonfraud firms and remain robust when we divide the fraudulent financial reporting into four different types with the exception of inflated earnings. Finally, we rule out the alternative explanation that the associations between CEO demographic characteristics are driving the findings.

It is widely understood that a company's CEO exerts major influence on the firm's strategic choices and performance. The majority of prior studies have focused on the association between a CEO's personal traits and the quality of financial reporting. Our findings of the significant association between CFO demographic characteristics and a firm's fraudulent financial reporting suggest that although CFOs report to CEOs, they can impose their own influence on financial reporting. The findings of this study provide some insight into the antecedents of managerial fraud, that is CFO demographic characteristics.

Our results imply that regulators in Australia require a mechanism for identifying fraudulent financial reporting in a similar way to the Chinese government. The finding that female CFOs are associated with less fraudulent financial reporting provides support for legislative or regulatory efforts in many countries to increase the proportion of women on boards.[10] Furthermore, the findings of a significant association between CFO demographic characteristics and fraudulent financial reporting helps external auditors better assess the risk of material misstatement when planning an audit by considering demographic information of their audit client's CFO.

The current article acknowledges several limitations. First, fraudulent financial reporting is affected by many factors, such as top executives' external and internal incentives, corporate governance, firm characteristics and the legal environment. Although we have controlled for as many factors as we can, our findings could still be driven by omitted variables. Second, the significant association between CFO demographic characteristics and fraudulent financial reporting is not a causal relationship. Our results do not indicate that male, younger, or less educated CFOs specifically cause fraudulent financial reporting. Rather, our findings merely indicate that male, younger, or less educated CFOs are more likely to engage in fraudulent financial reporting relative to their female, older, or higher-educated counterparts. Last, these demographic characteristics are arguably limited or incomplete proxies of

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[10] For example, Norway has passed legislation mandating a minimum of 40 percent female board representation with penalties for noncompliance. Also, Spain and Sweden require female board representation of at least 40 percent and 25 percent, respectively.

CFOs' cognitions, values and perceptions. Future research may try to identify more reliable measures to examine this issue.

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