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RESEARCH ARTICLE

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CFO accounting education on the choice of earnings management

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Abstract

This paper investigates whether CFO's educational background could influence his/her firm's level of earnings management because CFO plays a direct role in overseeing financial reporting. Based on agency theory and upper echelons theory, we discuss whether a CFO with/without an accounting degree could incentivize him/her to choose one over another among the three types of earnings management. Using a US sample between 1999 and 2016, we empirically find that CFOs with an accounting degree are associated with a higher degree of accrual earnings management and a higher degree of real earnings management through overproduction while CFOs without any accounting degree are associated with a higher degree of classification shifting. Our results hold robust when we implement a difference-in-difference test on the executive turnover from a CFO without any accounting degree to a CFO with an accounting degree. Finally, we find that CFOs with CPA certification behave more ethically in all three types of earnings management. Our study enriches the management demographic factor influence literature, unveils the role of CFO in choices of earnings management, supports ethics requirements in business education, and provides implications to executive hiring as well to audit practices.

KEYWORDS

CFO's education, financial reporting, accrual earnings management, real earnings management, classification shifting

1 | INTRODUCTION

In April 2020, after 1 month into the pandemic shutdown, SEC chairman Jay Clayton expressed the concerns over the significant implications of financial reporting caused by COVID-19, with revenue recognition among one of the most affected areas (Teotia, 2020). In the United States, about 40% of all detected financial frauds were related to revenue recognition (Alali & Wang, 2017). Improper revenue recognition serves as one of the main earnings management techniques. Prior research has focused on factors affecting a firm's earnings management choices both on the firm level (Huang et al., 2008; Liu et al., 2017; El Diri et al., 2020) and on the executive level (Healy, 1985; Krishnan & Parsons, 2008; Harris et al., 2019; Zalata & Abdelfattah, 2021). However, little attention has been given to the CFOs' education background. Sarbanes-Oxley Act of 2002 requires both CEO and CFO to certify their periodic reports while prior studies pay more attention to the effect of CEO on the quality of financial reporting (Bergstresser & Philippon, 2006; Ali & Zhang, 2015).

This study investigates the impact of CFOs' accounting related education and certification on their choices of earnings management types. Specifically, we examine whether

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CFOs with an accounting education background behave more ethically in financial reporting compared with CFOs without any accounting education background. Upper echelons theory suggests that managers' demographic factors may be used to capture their cognitive values, and have impact on corporate strategies and outcomes (Hambrick & Mason, 1984). We focus on CFOs' accounting education background because overseeing financial reporting is one of CFOs' primary responsibilities and they can exercise discretion over financial reporting (Jiang et al., 2010) and it is important to learn whether trainings in accounting skills and business ethics at early ages distinguish them from colleagues with different trainings when deciding the choice of earnings management.

Moreover, we are interested in how different education backgrounds influence CFOs' choices among accrual-based earnings management, real activity earnings management, and classification shifting, which are the three main forms of earnings management that companies engage to achieve their financial goals. Historically, researchers focused mainly on accrual-based earnings management (Healy, 1985; Jones, 1991; Dechow et al., 1995; Kothari et al., 2005). However, recent studies show that firms also largely engage in real earnings management,[1] where the management alters real activities, such as boosting sales by accelerating revenue recognition (Gunny, 2005; Roychowdhury, 2006). Besides these two methods, companies also engage in classification shifting to inflate their continuing income (McVay, 2006; Malikov et al., 2018). Prior research suggests that managers trade off among accrual earnings management, real earnings management, and classification shifting based on the constraints of different earnings manipulation methods (Zang, 2012; Abernathy et al., 2014). This introduces tension in our study whether the CFO's accounting versus non-accounting education background leads to skill and judgment differentials and thus has an impact on the choices of earnings management types, especially when earnings management is widespread (Bertomeu et al., 2021).

We manually collect the educational background data of S&P 1500 CFOs between 1994 and 2016. Using alternative measures of various types of earnings management, we find first, that CFOs with an accounting degree are associated with a higher degree of accrual earnings management and a higher degree of real earnings management through overproduction compared with CFOs without any accounting degree. This suggests formal accounting education offers CFOs with necessary accounting knowledge and skills to use discretionary accruals more aggressively within the flexibility of accounting standards and calculate product costs more accurately to implement overproduction. Second, consistent with prior studies which suggest that real earnings management is mainly constrained by internal and external monitoring, we do not find a significant relation between CFOs' educational background and the degree of real earnings management through lowering discretionary expenditures and accelerating revenues recognition. This suggests budget reduction in R&D, advertising, and SG&A expenditures are commonly implemented in the real business world regardless of CFOs' individual educational background. Finally, non-accounting majored CFOs are associated with a higher degree of shifting operating expenses to special items to manipulate their core earnings upward, while accounting majored CFOs may not prefer classification shifting.

Moreover, we find that the effect of education on earnings management weakens when CFOs become older. Our main results hold when we test the effect of change from nonaccounting majored CFOs to accounting majored CFOs on the three types of earnings management. Additionally, we find mixed results for CFOs with a business degree in their earnings management practice while CFOs with CPA certification are associated with a lower degree of all the three types of earnings management.

This paper contributes to the current literature of accounting and business research in several ways. First, we enrich the management demographic factor influence literature by identifying a new executive-level factor, educational background, related to a firm's earnings management choice. Second, to the best of our knowledge, this paper is the first empirical study that comprehensively investigates CFO's choice among accrual based, classification shifting, and real activities earnings management, while most prior research focuses on the CEO's effect on firms' strategies of earnings management (Bergstresser & Philippon, 2006; Ali & Zhang, 2015). Our paper suggests that CFO individual characteristics have the direct effect on firms' financial reporting strategies and provides additional evidence for the CFO certification required by Sarbanes-Oxley Act. Third, collaborating with the complete updates of the international ethics code by International Ethics Standards Board for Accountants (IESBA) in 2018, our findings call for more ethics trainings and ethics awareness in accounting and business education. Our result that CFOs with CPA certification are more ethical in financial reporting also supports recently increased requirements of ethic credits in the CPA exam and continuing professional education (AICPA, 2001; CalCPA, 2017). Finally, through empirically unveiling that executive's education results in decision-making differentials, our study

[1] In this paper, we follow Roychowdhury (2006) and refer to real earnings management activities as the actions that management takes that deviate from normal business practices with the primary objective of meeting certain earnings thresholds.

provides implications to executive hiring as well to audit practices.

The rest of this paper proceeds as follows. Sections 2 and 3 review the relevant literature and develop the hypotheses. Section 4 describes the methodology design. Section 5 summarizes the sample data. Sections 6 and 7 present the main empirical results and additional analyses. Section 8 concludes the article.

2 | LITERATURE REVIEW

2.1 | Executive's education background and business outcomes

Prior studies have documented the potential effect of education on business outcomes since 1970s (Spence, 1973; Hambrick & Mason, 1984; Tuo et al., 2019). One stream of research examines the signaling effect of education in the job market and provides mixed results. Due to information asymmetry in the job market, education background has been used by recruiters to distinguish the quality among candidates and researchers document a positive signaling effect of education (Vafeas, 2009; Gomulya & Boeker, 2014). However, some other researchers could not find evidence to support that education is an effective proxy for capability (Spence, 1973; Bhagat et al., 2010).

The other stream of research is built on the consensus that education represents an individual's knowledge and skill base to some extent (Hambrick & Mason, 1984; Becker 2009). As Becker (2009) asserts in his book Human Capital: "Education and training are the most important investments in human capital." Upper echelons theory agrees with Becker's claim and believes that managers' educational background may influence their interpretations of firm situations, and, in turn, affect corporate strategies and outcomes (Hambrick & Mason, 1984). Hambrick and Mason (1984) posit that since education is a costly investment and is widely considered as one of the most important decisions made during an individual's lifetime, education choices can partially characterize individuals' values and cognitive preferences. Moreover, Miller et al. (2015) and King et al. (2016) find that different educational backgrounds lead to differences in executives' skill-sets and result in performance differentials. Following this theory, accounting and finance scholars employ alternative indicators to measure managers' formal and professional education history and study the impacts of education on firms' corporate behaviors. For example, Aier et al. (2005) find that CFOs with an MBA degree and a CPA certification are associated with a lower likelihood of restatements. Bamber et al. (2010) find that managers holding an MBA degree have disclosure styles that tend to deliver more good news with a higher forecast accuracy in management earnings forecast. Troy et al. (2011) suggest that CEOs with a business education background are less likely to conduct accounting frauds, while Beber and Fabbri's (2012) study shows that CEOs holding an MBA degree are more aggressive in speculating behaviors. Hu et al. (2017) find that firms with CEOs having an accounting degree are less conservative in financial reporting but do not observe higher levels of income-increasing discretional accruals in those firms' annual reports. Although prior studies shed light on the effect of managers' education on business outcomes, current literature is silent on the relation between managers' education backgrounds and their choices of earnings management behaviors.

2.2 | Earnings management

Three earnings management tools have been documented by literature, accrual management, real activity management, and classification shifting and prior studies empirically find that managers make trade-offs among the three types of earnings management based on relative costs and constraints (Zang, 2012; Abernathy et al., 2014). Among the three earning management methods, accrual earnings management offers managers opportunities to choose and change accounting methods and estimates within the flexibility of accounting standards. Prior studies introduce discretionary accruals to measure managers' discretion to opportunistically "borrow" earnings from future periods in order to beat performance targets and satisfy personal interests (Healy, 1985; McNichols & Wilson, 1988; Jones, 1991; Dechow et al., 1995; Dechow & Dichev, 2002; Kothari et al., 2005; Hribar & Craig Nichols, 2007; Demerjian et al., 2013). Nonetheless, the implementation of accrual earnings management is affected by several factors, including auditing quality, external reporting environment, and a firm's own accounting flexibility (Zang, 2012).

Different from accrual earnings management, real earnings management is to deviate from the optimal business operations to achieve short-term financial performance under the expenses of long-term firm value. Prior studies have examined managerial earnings management by focusing on operational activities, including cutting or postponing discretionary expenses, overproducing to reduce cost of goods sold in the current period, and accelerating revenue recognition (Healy & Wahlen, 1999; Dechow & Skinner, 2000; Roychowdhury, 2006; Cohen & Zarowin, 2010). Graham et al. (2005) provide evidence suggesting that managers actually prefer real earnings management over accrual-based earnings management, because real earning management activities potentially have less likelihood of being detected.

McVay (2006) investigates a third method of earnings management, classification shifting, and concludes that managers move certain expenses out of core operating section and classify them as income-decreasing special items to overstate current core earnings. Later, Barua, Davidson (2010), Fan et al. (2010), and Malikov et al. (2018) provide similar findings and examine the method and timing of classification shifting. Zalata et al. (2019) report that classification shifting by female CEOs declined significantly after the passage of SOX. Although classification shifting does not affect bottom line net income, it misleads investors' perception of the future performance and therefore the true value of the firms by altering the permanent line income numbers (Lipe, 1986; Abernathy et al., 2014).

In conclusion, existing literature has documented that both firm and executive characteristics may impact companies' earnings management behaviors. Prior research also shows that education background may affect an individual's business decisions. Nonetheless, most prior studies pay more attention to the effect of CEO on earnings management while CFO directly oversees accounting system and also certifies the quality of financial statements after the passage of Sarbanes-Oxley Act in 2002.

3 | HYPOTHESES DEVELOPMENT

Existing literature has documented that top executives' personal characteristics may influence their decisions in accounting and business practices according to upper echelons theory (Aier et al., 2005; Bamber et al., 2010; Troy et al., 2011; Beber & Fabbri, 2012; Hu et al., 2017; Tuo et al., 2019). Education shapes thinking and represents an individual's knowledge and skill base (Hambrick & Mason, 1984; Becker 2009). Prior studies find that educational attainment of executives influences firm investments and decision makings and thus results in performance differentials (Miller et al., 2015; King et al., 2016). Therefore, we are interested in the effect of CFOs' accounting education on their choices of earnings management because overseeing financial reporting is one of CFOs' primary responsibilities and they could exercise discretion over financial reporting (Jiang et al., 2010; Feng et al., 2011). On the one hand, accounting education provides CFOs with professional business and accounting knowledge as well as business ethics, which are equally important to CFOs in charge of company's finance and accounting operation. Compared with CFOs without any accounting degree, after receiving formal accounting education at college CFOs with an accounting degree have a clear awareness of the severe consequences of incompliance or non-integrity in financial reporting. On the other hand, there is no conclusive evidence that CFOs with an accounting degree are more ethical in financial reporting than CFOs without any accounting degree, although integrating ethics into accounting curriculum has been widely discussed as early as in 1980s. Moreover, Miller and Xu (2019) find that compared with non-MBA CEOs, MBA CEOs are more likely to engage in short-term myopic behaviors, such as earnings management and cutting R&D expenditures. Taken together, we develop our first hypothesis as follow:

H1. *Other things being equal, CFOs with an accounting degree are not more ethical in financial reporting compared with CFOs without any accounting degree.*

Prior studies provide robust evidence that managers make trade-offs among different types of earnings management because managers need to evaluate the costs and consequences of real earnings management, accrual earnings management, and classification shifting (Zang, 2012; Abernathy et al., 2014). Since we expect that CFOs with an accounting degree do not generate more ethical financial reporting in H1, we also predict that according to agency theory, self-interested CFOs with different degrees tend to implement different skill sets and have different cognitive judgments in deciding their methods to manipulate earnings after considering relative constraints of each type of earnings management.

When managers perform accrual-based earnings management, it requires them of sophisticated accounting knowledge and professional judgment to justify their accounting method changes and estimation changes to the auditors. Generally, CFOs with an accounting degree are systematically trained with accounting knowledge so that they understand the whole accounting framework and know how to justify their accrual earnings management under the flexibility of GAAP without hitting the auditors' redline. In contrast, CFOs without any accounting degree either pick up accounting knowledge unsystematically from previous accounting-related work experience or largely rely on accounting managers' assistance if they were not exposed too much accounting experience in the past. Without sophisticated accounting and professional judgment skills, either they are less likely to perform credible accrual-based earnings management, or their accrual-based earnings management will be more likely to be scrutinized and rejected by auditors. Taken together, considering that accrual earnings management requires sophisticated accounting knowledge to "play games" under the flexibility of accounting system, we conjecture that:

H2a. *Other things being equal, CFOs with an accounting degree are associated with a higher level of accrual earnings*

management compared with CFOs without any accounting degree.

As mentioned previously, compared with accrual earnings management, real earnings management is more difficult to be detected by auditors (Graham et al., 2005). Prior research suggest that institutional owners and other monitoring mechanisms could effectively reduce managers' certain real earnings management behaviors, such as cutting current-period expenditures, freezing hiring, and shutting down new research projects (Zang, 2012). Moreover, real earnings management, in general, requires executives to cooperate with other departments and thus the individual education background could have a lower level of effect on it. Therefore, because internal and external monitoring play a more important role in overseeing firms' real earnings management behaviors, we develop the following hypothesis:

H2b. *Other things being equal, CFOs with an accounting degree and CFOs without nay accounting degree do not behave differently in real earnings management.*

Prior research suggests that managers could also opportunistically shift expenses from core expenses (cost of goods sold and selling, general, and administrative expenses) to special items to overstate core earnings (McVay, 2006). Different from accrual earnings management, manipulating earnings via classification shifting does not require professional skills of financial reporting and the understanding of accounting system. Different from real earnings management, classification shifting may not attract attention from intuitional owners, financial analysts, and even internal control because classification shifting does not change the bottom-line GAAP earnings while most financial statement users focus on GAAP earnings (McVay, 2006). According to Abernathy et al. (2014), classification shifting is one of the last earnings management strategies if accrual earnings management and real earnings management are not available. Therefore, we expect that CFOs without any accounting degree are more likely to choose classification shifting because they face higher constraints of accrual earnings management due to the lack of accounting skills and face the similar pressure from corporate governance of monitoring real earnings management. We develop our hypothesis as follow:

H2c. *Other things being equal, CFOs without any accounting degree are associated with a higher level of classification shifting compared with CFOs with an accounting degree.*

4 | RESEARCH DESIGN

4.1 | CFO's personal educational background

To obtain the information of CFO's personal traits, we manually collect the related demographical data from various sources, such as Marquis Who's Who, Zoominfo.com, Capital IQ, company official website, executive introduction section in annual financial reports, and other social media news, based on the list of S&P 1500 CFOs from EXECUCOMP database. We carefully identify the major(s) of degree(s) hold by each CFO and construct dummy variables to proxy his/her educational background. The dummy variable, *CFOACCT*, equals 1, if a CFO has at least one bachelor's, master's, or doctor's degree in accounting or a master's degree in taxation, and zero otherwise.[2]

4.2 | Accrual earnings management

The main proxy of accrual earnings quality used in this paper is based on the following Equation (1) developed by Kothari et al. (2005).[3]

$$TAC_{j,t} = \beta_0 + \beta_1 \frac{1}{Asset_{j,\,t-1}} + \beta_2 \frac{\Delta Rev_{j,\,t} - \Delta AR_{j,\,t}}{Asset_{j,\,t-1}} + \beta_3 \frac{PPE_{j,t}}{Asset_{j,t-1}} + \beta_3 \frac{NI_{j,t}}{Asset_{j,t-1}} + \varepsilon_{j,t} \quad (1)$$

The absolute value of the difference between actual accruals and normal accruals estimated from Kothari et al. (2005) model (*ABSDA*) inversely captures the accrual earnings quality. The higher value of *ABSDA* indicates a lower level of accrual earnings quality and thus a higher degree of accrual earnings management.

[2] To further investigate the difference between business and non-business education, we also construct the dummy variable, CFO Business, which equals 1 if a CFO has at least one bachelor's, master's, or doctor's degree in business or related field. The examples of business majors include but not limit to accounting, finance, management, marketing, management information system, international business, and general business. We also construct the dummy variable, CFOCPA, which equals 1 if a CFO has the CPA and 0 otherwise.

[3] Where $TA_{j,t}$ is firm *j*'s total accruals in year *t*, calculated as (firm's change in current assets – firm's change in current liabilities – change in cash + change in short-term debts – depreciation and amortization expenses). $Asset_{j,\,t-1}$ is firm *j*'s total assets at the beginning of year *t*. $\Delta Rev_{j,\,t}$ is firm *j*'s change in sales revenues between year *t*–1 and year *t*. $PPE_{j,t}$ is firm *j*'s gross value of property, plant, and equipment in year *t*. $\Delta AR_{j,\,t}$ refers to change in net accounts receivable. $NI_{j,t}$ (net income scaled by beginning total assets) is also controlled. Then we calculate the predicted value of normal accruals again using estimated parameters from running Equation (1) of industry-year observations.

After constructing the measures of accrual earnings management, we follow Demerjian et al. (2013) to test our first hypothesis using the model presented below:

$$\begin{aligned} ABSDA = {} & \gamma_0 + \gamma_1\, CFOACCT + \gamma_2\, CFOTAge \\ & + \gamma_3\, CFOTenure + \gamma_4\, CFOComp \\ & + \gamma_5\, CFOGender + \gamma_6\, SIZE \\ & + \gamma_7\, SalesVolatility + \gamma_8\, CashFLowVolatility \\ & + \gamma_9\, AveOpercycle + \gamma_{10}\, LossFreq + \gamma_{11}\, BigN \\ & + \gamma_{12}\, \Delta SalesGrowth + \gamma_{13}\, RetVolatility \\ & + \gamma_{14}\, Industry + \gamma_{15}\, Year \end{aligned} \quad (2)$$

where *ABSDA* inversely measures accrual earnings quality and *CFOACCT* refers to whether CFO holds an accounting degree or not. We also include other variables to control for CFO's individual characteristics and company's financial condition and operations. First, we control for CFO's age (*CFOAge*) and gender (*CFOGender*) since previous studies suggest that executives' individual characteristics, including age and gender, could influence firm's financial reporting quality (Barua, Lin, et al., 2010; Huang et al., 2012). Specifically, *CFOAge* is the natural logarithm of the current CFO's age by the year end and *CFOGender* equals 1 if the current CFO is male and 0 for female. We also control for CFO's tenure measured as the natural logarithm of years that CFO stays at the firm (*CFOTenure*), because Ali and Zhang (2015) suggest that CEOs' incentive to manage earnings is higher in earlier than in later years of CEOs' service. Second, to capture the agency costs faced by CFOs, we include CFOs' total compensations (*CFOComp*) into the model since prior research suggest that CEO's compensation is associated with his/her opportunistic use of discretionary accruals in reported earnings (Bergstresser & Philippon, 2006; Harris et al., 2019). Following prior research, including Dechow and Dichev (2002), Hribar and Nichols (2007), and Demerjian et al. (2013), we also include other measures of firm-specific characteristics as control variables which influence firm's accrual earnings quality, including *SIZE*, *SalesVolatility*, *CashFlowVolatility*, *AveOpercycle*, *LossFreq*, *BigN*, $\Delta SalesGrowth$, and *RetVolatility*. *SIZE* represents firm size, measured as the natural logarithm of total assets at the year end. *SalesVolatility* and *CashFlowVolatility* are volatility of sales revenues and operating cash flow, respectively, scaled by average total assets during the previous five years. *AveOpercycle* is the average firm's operating cycle during the previous 5 years, calculated as the natural logarithm of days in sales plus days in inventory. *LossFreq* is the frequency of net income incurred during the previous 5 years. *BigN* is a dummy variable which represents whether the firm's auditor is one of the Big Five firms before 2002 or one of the Big Four firms since 2002. $\Delta SalesGrowth$ refers to change in sales growth, defined as the difference between current year sales growth and prior year sales growth. We also control for the information asymmetry faced by each firm measured as the standard deviation of monthly return in the prior year (*RetVolatility*). Finally, we conduct two-way clustering of standard errors at the firm level and control for both industry using Fama-French 48 industry classifications and year fixed effects in our regressions.

4.3 | Real earnings management

Following prior research (Gunny, 2005; Roychowdhury, 2006; Cohen & Zarowin, 2010; Zang, 2012), we implement three alternative measures to capture firms' behaviors of real earnings management. First, firms may accelerate their timing to recognize sales revenues through providing more discounts or credit terms which results in the lower level of operating cash flow. Following Roychowdhury (2006), we use abnormal operating cash flow, the difference between actual operating cash flow and the normal level of operating cash flow, to capture firms' manipulation of sales revenues. The normal level of operating cash flow is estimated from the model below for each industry and year[4]:

$$\begin{aligned} \frac{CFO_{j,t}}{Assets_{j,t-1}} = {} & \mu_0 + \mu_1 \frac{1}{Assets_{j,\,t-1}} + \mu_2 \frac{Sales_{j,t}}{Assets_{j,\,t-1}} \\ & + \mu_3 \frac{\Delta Sales_{j,t}}{Assets_{j,\,t-1}} + \varepsilon_{j,t} \end{aligned} \quad (3)$$

where $CFO_{j,t}$ is the operating cash flow for firm j during year t, $Sales_{j,t}$ refers to sales revenues, and $\Delta Sales_{j,t}$ captures changes in sales revenues from the last year. The lower level of abnormal operating cash flow (*Ab_OCF*) indicates the higher level of real earnings manipulation through accelerating the recognition of sales revenues.

The second method of real earnings management is that firms may increase cost of inventories but reduce cost of goods sold to increase gross margins. Therefore, we measure abnormal production costs as the difference between actual production costs and the normal level of production costs because real earnings management through overproduction tends to experience higher production costs. The normal level of production costs is estimated from the model below for each industry and year following Cohen

[4] We run regressions of Equations (3), (4), and (5) for each industry-year if there are at least 10 observations in each industry-year.

and Zarowin (2010):

$$\frac{Prod_{j,t}}{Assets_{j,t-1}} = \mu_0 + \mu_1 \frac{1}{Assets_{j,\,t-1}} + \mu_2 \frac{Sales_{j,t}}{Assets_{j,\,t-1}} + \mu_3 \frac{\Delta Sales_{j,t}}{Assets_{j,\,t-1}} + \mu_4 \frac{\Delta Sales_{j,t-1}}{Assets_{j,\,t-1}} + \varepsilon_{j,t} \quad (4)$$

where $Prod_{j,t}$ refers to production costs of firm j in year t which is the sum of cost of goods sold and change in inventory from the last year. The higher level of abnormal production costs (Ab_Prod) represents the higher level of real earnings manipulation through overproduction.

The third measure of real earnings management is abnormal discretionary expenditures because firms may intentionally increase the current period reported earnings through cutting or putting of SG&A expenditures, research and development expenditures, and/or advertising expenditures. Following Cohen and Zarowin (2010), we calculate abnormal discretionary expenditures as the difference between actual discretionary expenditures and the normal level of discretionary expenditures. We run regressions for each industry and year to estimate the normal level of discretionary expenditures using the model below:

$$\frac{DiscExp_{j,t}}{Assets_{j,t-1}} = \mu_0 + \mu_1 \frac{1}{Assets_{j,\,t-1}} + \mu_3 \frac{Sales_{j,t-1}}{Assets_{j,\,t-1}} + \varepsilon_{j,t} \quad (5)$$

where $DiscExp_{j,t}$ refers to the sum of advertising expenditures, R&D expenditures, and SG&A expenditures.[5] We include $Sales_{j,t-1}$ instead of $Sales_{j,t}$ in our Equation (5) because the residuals from the model with current sales will be very small if firms deliberately manipulate sales upwards. The lower level of abnormal discretionary expenditures captures the higher level of real earnings management through reducing these discretionary expenditures.

After constructing the three proxies of real earnings management, we test our second hypothesis using the model below:

$$\begin{aligned} REQ = {} & \varphi_0 + \varphi_1\, CFOACCT + \varphi_2\, CFOAge \\ & + \varphi_3\, CFOTenure + \varphi_4\, CFOComp \\ & + \varphi_5\, CFOGender + \varphi_6\, SIZE + \varphi_7\, LossFreq \\ & + \varphi_8\, ROA + \varphi_9\, Quick + \varphi_{10}\, Leverage \\ & + \varphi_{11}\, InstOwner + \varphi_{12}\, Analyst + \varphi_{13}\, Litigation \\ & + \varphi_{14}\, BigN + \varphi_{15}\, \Delta SalesGrowth \\ & + \varphi_{16}\, RetVolatility + \varphi_{17}\, Industry + \varphi_{18}\, Year \end{aligned} \quad (6)$$

where REQ alternatively refers to the three measures of real earnings management, including *Ab_OCF*, *Ab_Prod*, and *Ab_DiscExp*. *Quick* is the quick ratio which is quick assets scaled by current liabilities. *Leverage* is the long-term debt ratio which is long-term liabilities scaled by total assets. *InstOwner* and *Analyst* represent the percentage of institutional ownership and the number of financial analysts following respectively to capture firms' inside and outside oversight. *Litigation* is a dummy variable which equals one if the sample firm is in an industry with high litigation risk.[6] Other control variables have been introduced in Section 4.2.

4.4 | Classification shifting

Following McVay (2006) and Abernathy et al. (2014), we estimate the core earnings for each industry-year using the model below:

$$\begin{aligned} CE_t = {} & \gamma_0 + \gamma_1\, CE_{t-1} + \gamma_2\, ATO_t + \gamma_3\, WCA_{t-1} \\ & + \gamma_4\, WCA_t + \gamma_5\, \Delta Sales_t + \gamma_0\, NEG_\Delta Sales_t + \varepsilon_t \end{aligned} \quad (7)$$

The unexpected core earnings, *UCE*, is the difference between actual CE reported and predicted CE estimated from Equation (7).[7] The higher value of UCE suggests the higher level of earnings manipulation using classification shifting. Then we test our third hypothesis using the model of Abernathy et al. (2014) below:

$$\begin{aligned} UCE = {} & \delta_0 + \delta_1 CFOACCT + \delta_2 CFOAge + \delta_3 CFOTenure \\ & + \delta_4 CFOComp + \delta_5 CFOGender + \delta_6 HighNOA \\ & + \delta_7 MarketSahre + \delta_8 SIZE + \delta_9 ROA + \delta_{10} MTB \\ & + \delta_{11} InstOwner + \delta_{12} Analyst + \delta_{13} OperCycle \\ & + \delta_{14} Zscore + \delta_{15} TaxRate + \delta_{16} SOX \end{aligned}$$

[5] Following Cohen and Zarowin (2010), we set advertising expenditure and R&D expenditure with missing value as zero, if SG&A expenditure is available.

[6] The industries with high litigation risk include 2833<=sic<=2836, 3570<=sic<=3577, 7370<=sic<=7374, 3600<=sic <=3674, and 5200<=sic<=5961.

[7] Where *CE* refers core earnings (sales revenues minus both COGS and SG&A expenses) scaled by sales, *ATO* is asset turnover ratio, *WCA* measures working capital accruals scaled by total assets, and *NEG_ΔSales* refers the percentage change in sales when sales decrease from the last year.

$$+\delta_{17}Litigation+\delta_{18}BigN+\delta_{19}Industry+\delta_{20}Year \quad (8)$$

where *UCE* refers to earnings management via classification shifting. *HighNOA* is a dummy variable which equals 1 if beginning net operating assets are greater than the industry median. *MarketShare* is firm's sales scaled by the industry total sales (three-digit SIC code). Zscore is the Altman's Z-Score to measure firm's bankruptcy risk. *TaxRate* is the total taxes paid divided by pre-tax net income, and *SOX* refers to post Sarbanes-Oxley period. Other control variables have been introduced in previous sections.

4.5 | The moderating effect of age

Prior research suggests that executives are less likely to take risk or engage in aggressive financial reporting when they become old (Huang et al., 2012; Yim, 2013; Serfling, 2014). Moreover, the effect of college education CFOs received in their late teens and early twenties may wane over time. Therefore, age could have a moderating effect on the relation between college education and CFOs behaviors, and we include the interaction terms, *CFOACCT*× *CFOAge*, into our tests of all the three types of earnings management.

5 | SAMPLE SELECTION

Our sample of CFO's educational background is based on the list of S&P 1500 CFOs downloaded from EXECUCOMP database. Then we manually search and collect each individual CFOs' educational information from various resources, including Marquis Who's Who, Zoominfo.com, Capital IQ, company's office website, and 10-Ks. Fundamental financial data and market data are respectively obtained from COMPUSTAT and CRSP database. Our sample period spans from 1999 to 2016, and sample sizes vary when dependent variable is accrual earnings management, real earnings management, or classification shifting and using different proxies to measure real earnings management.

In Table 1, Panel A–C, respectively, illustrates the descriptive statistics and Pearson correlations of variables in Equation (2), (6), and (8). Specifically, our univariate tests suggest that *CFOACCT* is significantly positively correlated with accrual earnings management measured by Kothari et al. (2005) model (ABSDA), positively correlated with real earnings management via abnormal production level, and negatively correlated with classification shifting (significant at the 10% level). The medians and distributions of *CFOACCT* and control variables in the three samples are similar, suggesting the validity of our measures. Approximately, there are 36% of CFOs in our samples with an accounting degree at the level of undergraduate, graduate, or both.

6 | EMPIRICAL RESULTS

6.1 | CFOs' educational background and accrual earnings management

Table 2 presents the results of Equation (2) to test any relation between CFOs' educational background and their companies' behaviors of accrual earnings management. Consistent with H2a, we find that CFOs with at least one accounting degree at the level of either undergraduate or graduate are associated with a higher level of discretionary accruals measured by Kothari et al. (2005) model (coefficient = .0023, *p*-value = .0258). This suggests that CFOs with accounting higher education tend to engage in a higher degree of accrual earnings management, because these CFOs with accounting major have both the professional knowledge and the authority to influence their companies' accounting policies and/or methods under the flexibility of accounting system. Moreover, we find that the positive relation between accounting higher education and accrual earnings management tends to be weaker when a CFO becomes older (*CFOACCT*×*CFOAge*: coefficient = −.0188, *p*-value = .0414), suggesting the effect of higher education will gradually weaken once a CFO becomes senior. Finally, consistent with prior research, we also find that female CFOs, CFOs with longer tenure, and larger firms are associated with a lower level of accrual earnings management while CFOs with higher compensations are more incentivized to engage in accrual earnings management. Untabulated results from additional tests suggest that our conclusions hold before and post Sarbanes–Oxley Act.

6.2 | CFOs' educational background and real earnings management

Table 3 illustrates the relation between CFOs with an accounting degree and their companies' real earnings management measured by three different proxies. Consistent with H2b, we don't find a significant relation between CFO's accounting education and firm-level real earnings management through accelerating timing of recognizing revenues in Panel A and cutting discretionary accruals in Panel C. There are two plausible explanations to rationalize the insignificant relation between *CFOACCT*

TABLE 1 Descriptive statistics and Pearson correlation.

Panel A: The sample of accrual earnings quality								
	Descriptive statistics						Pearson corr.	
Variable	*N*	Mean	Median	Std. Dev.	25th Pctl.	75th Pctl.	Coeff.	*p*-value
ABSDA	8312	.0519	.0347	.0604	.0153	.0667	1.0000	
CFOACCT	8312	.3597	0	.4799	0	1	.0226	.0398
CFOTenure	8312	1.3810	2	.7689	1	2	−.0785	<.0001
CFOComp	8312	.5053	.2401	.9041	.0953	.5466	.1888	<.0001
CFOAge	8312	3.9355	3.9512	.1300	3.8501	4.0254	−.0711	<.0001
CFOGender	8312	.9098	1	.2865	1	1	.0169	.1229
Size	8312	7.6583	7.5718	1.6007	6.5157	8.6956	−.1897	<.0001
SalesVolatility	8312	.1323	.0950	.1322	.0548	.1635	.1600	<.0001
CashFlowVolatility	8312	.0434	.0334	.0409	.0202	.0532	.2920	<.0001
AveOpercycle	8312	−2.8467	−3.1635	.9541	−3.4961	−2.4183	−.0145	.1868
LossFreq	8312	.7720	0	1.2192	0	1	.2219	<.0001
BigN	8312	.9182	1	.2741	1	1	−.0652	<.0001
Change_SalesGrowth	8312	−.0140	−.0127	.3074	−.1107	.0783	.0267	.0149
RetVolatility	8312	.1057	.0909	.0619	.0651	.1291	.1976	<.0001

Panel B: The sample of real earnings management												
	Descriptive statistics						Pearson corr.					
Variable	*N*	Mean	Median	Std. Dev.	25th Pctl.	75th Pctl.	Coeff.	*p*-value	Coeff.	*p*-value	Coeff.	*p*-value
Ab_OCF	9646	.1072	.0598	.3846	−.0124	.1708	1					
Ab_Prod	9635	−.0005	−.0025	.2038	−.0977	.0891	−.0950	<.0001	1			
Ab_DiscExp	8834	−.1849	−.0739	1.4002	−.3084	.0725	−.5017	<.0001	−.0902	<.0001	1	
CFOACCT	9646	.3692	0	.4826	0	1	−.0041	.6852	.0378	.0002	−.0091	.3907
CFOTenure	9646	1.3848	2	.7716	1	2	.0742	<.0001	.0163	.1101	−.0456	<.0001
CFOComp	9646	.5579	.2548	1.0252	.1024	.5919	.0200	.0493	−.0168	.0998	−.0008	.9410
CFOAge	9646	3.9336	3.9512	.1305	3.8501	4.0254	.0198	.0520	−.0034	.7393	−.0149	.1611
CFOGender	9646	.9066	1	.2910	1	1	−.0080	.4341	−.0116	.2559	−.0062	.5635
Size	9646	7.5922	7.5021	1.6083	6.4502	8.6378	.0472	<.0001	.0672	<.0001	−.0289	.0066
LossFreq	9646	.7670	0	1.2356	0	1	−.0479	<.0001	.0844	<.0001	.0056	.5989
ROA	9646	.0433	.0533	.1161	.0210	.0912	.1058	<.0001	−.2076	<.0001	−.0178	.0935
Quick	9646	1.8482	1.4022	1.6982	.9316	2.1295	.0901	<.0001	−.0975	<.0001	−.0428	<.0001

(Continues)

TABLE 1 (Continued)

Panel B: The sample of real earnings management												
	Descriptive statistics						Pearson corr.					
Variable	***N***	**Mean**	**Median**	**Std. Dev.**	**25th Pctl.**	**75th Pctl.**	**Coeff.**	***p*-value**	**Coeff.**	***p*-value**	**Coeff.**	***p*-value**
Leverage	9646	.1924	.1736	.1773	.0186	.2946	−.0234	.0216	.0593	<.0001	−.0027	.8011
InstOwner	9646	.6175	.7480	.4273	0	.9117	.0452	<.0001	.0102	.3189	−.0031	.7715
Analyst	9646	1.9861	2.3979	1.9396	0	3.9318	.0455	<.0001	−.0675	<.0001	.0165	.1206
Litigation	9646	.3215	0	.4671	0	1	.1047	<.0001	−.1217	<.0001	−.0735	<.0001
BigN	9646	.9171	1	.2758	1	1	−.0152	.1356	.0286	.0050	.0122	.2512
ChangeSalesGrowth	9646	−.0151	−.0131	.3301	−.1070	.0745	.0570	<.0001	−.0255	.0125	−.0218	.0405
RetVolatility	9646	.1053	.0907	.0622	.0648	.1284	−.0591	<.0001	.0239	.0190	.0300	.0049

Panel C: The sample of classification shifting								
	Descriptive statistics						Pearson corr.	
Variable	***N***	**Mean**	**Median**	**Std. Dev.**	**25th Pctl.**	**75th Pctl.**	**Coeff.**	***p*-value**
UCE	7103	.1220	.0136	.9623	−.0356	.1749	1	
CFOACCT	7103	.3586	0	.4796	0	1	−.0134	.0767
CFOTenure	7103	1.4365	1.6094	.7609	1.0986	2.0794	.0451	.0001
CFOComp	7103	.5311	.2525	.9419	.1033	.5864	−.0036	.7600
CFOAge	7103	3.9404	3.9512	.1300	3.8501	4.0254	.0164	.1658
CFOGender	7103	.9000	1.0000	.3000	1.0000	1.0000	.0027	.8183
HighNOA	7103	.5382	1	.4986	0	1	.0275	.0205
MarketShare	7103	.0739	.0215	.1167	.0043	.0862	−.0372	.0017
Size	7103	7.5685	7.4675	1.5909	6.4507	8.5965	.0730	<.0001
ROA	7103	.0444	.0553	.1144	.0186	.0920	−.0829	<.0001
MTB	7103	.8388	.7993	.7399	.3684	1.2547	.0030	.8025
InstOwner	7103	.5420	.7006	.4530	0	.8931	.0146	.2202
Analyst	7103	1.8745	1.3863	1.9376	0	3.8712	−.0476	<.0001
OperCycle	7103	−2.9037	−3.2139	.9401	−3.5380	−2.4973	−.0398	.0008
Zscore	7103	2.7881	2.1386	4.2322	1.2901	3.3824	−.0034	.7740
TaxRate	7103	.2351	.3030	.3591	.1716	.3658	−.0058	.6263
SOX	7103	.9977	1	.0474	1	1	.0010	.9312
Litigationn	7103	.3325	0	.4712	0	1	−.0310	.0089
BigN	7103	.9045	1	.2939	1	1	.0093	.4335

Note: This table illustrates descriptive statistics and Pearson correlations of variables included in our main tests. In Panel A–C, we respectively present descriptive statistics and Pearson correlations of variables to test the effect of CFO accounting education on accrual earnings management, real earnings management, and classification shifting. All variables are winsorized at top and bottom 1 percentile, except for dummy variables. Please see Appendix for variable definitions.

TABLE 2 The relation between CFOs' accounting educational background and accrual earnings management.

	Dependent = ABSDA			
Variable	**Coefficient**	***t*-stat**	**Coefficient**	***t*-stat**
Intercept	.0808	3.14***	.0571	1.98**
CFOACCT	.0023	2.23**	.0764	1.99**
CFOACCT × *CFOAge*			−.0188	−2.04**
CFOAge	−.0037	−.69	.0024	.38
CFOTenure	−.0019	−1.6	−.0020	−1.65*
CFOComp	.0018	1.97**	.0018	1.97**
CFOGender	.0042	1.91*	.0044	1.98**
Size	−.0019	−3.4***	−.0019	−3.37***
SalesVolatility	.0279	5.15***	.0276	5.1***
CashFlowVolatility	.2706	14.82***	.2698	14.78***
AveOpercycle	−.0008	−.82	−.0008	−.79
LossFreq	.0050	8.2***	.0050	8.21***
BigN	.0056	2.23**	.0056	2.22**
Δ*SalesGrowth*	.0066	3.11***	.0065	3.09***
RetVolatility	.0572	4.24***	.0575	4.27***
Industry & Year Fixed Effect	Yes		Yes	
Adj R^2	.1428		.143	
Observations	8312		8312	

This table illustrates the relation between a CFO with an accounting education and his/her firm's level of accrual earnings management.
*, **, *** represent significant at the level of 10%, 5%, and 1% levels, respectively.

and *Ab_OCF* or *Ab_DiscExp*. First, CFOs are not associated with earnings manipulation through accelerating the timing of revenue recognitions or opportunistically cutting/delaying R&D, advertising, or SG&A expenditures. Second, under internal and external monitoring which are the constraints of real earnings management commonly recognized in previous studies, the individual educational background plays a less important role in choices of real earnings management. Therefore, CFOs with an accounting degree are not distinguished from CFOs with non-accounting degree in the engagement of real earnings management through these two methods. We suggest the second explanation could better justify the insignificant relations, since prior research finds extensive evidence of real earnings management through myopically lowering discretionary expenditures and strategically recognize revenues in the real business world (Roychowdhury, 2006; Cohen & Zarowin, 2010; Chi et al., 2011; Cheng et al., 2016) and these two types of real earnings management are straightforward ways to increase short-term earnings without any requirements to understand accounting methods or policies.

In Panel B, inconsistent with H2b we find a positive relation between CFOs with an accounting degree and their companies' abnormal production costs (coefficient = .0125, *p*-value = .0024), suggesting CFOs graduated from accounting programs are associated with the higher level of real earnings management through overproduction. Moreover, we find the positive relation between CFO's accounting education and overproduction is less pronounced when a CFO becomes older (*CFOACCT* × *CFOAge*: coefficient = −.1024, *p*-value = .0013). This suggests compared with accelerating revenue recognition and cutting discretionary expenditures, overproduction to reduce the current-period cost of goods sold requires managers to calculate product costs and inventory balance more accurately based on managerial accounting knowledge. Compared with CFOs without any accounting degree, CFOs with an accounting degree have the available skill sets and thus are associated with a higher degree of real earnings management through overproduction.

6.3 | CFOs' educational background and classification shifting

Table 4 presents the relation between CFOs' educational background and their firms' earnings management through classification shifting. The relation between *CFOACCT* and unexpected core earnings is insignificant when the moderating effect of CFO age is not considered. However, when we consider the moderating effect of CFO age, we find that CFO with an accounting degree is associated with a lower level of unexpected core earnings

TABLE 3 The relation between CFOs' accounting educational background and real earnings management.

Panel A: abnormal operating cash flow to measure real earnings management				
	Dependent = Ab_OCF			
Variable	**Coefficient**	***t*-stat**	**Coefficient**	***t*-stat**
Intercept	.2918	2.03**	.3243	1.98**
CFOACCT	−.0048	−.62	−.1008	−.43
*CFOACCT*CFOAge*			.0244	.41
CFOAge	−.0896	−2.86***	−.0977	−2.63***
CFOTenure	.0118	1.71*	.0119	1.72*
CFOComp	.0034	.66	.0034	.67
CFOGender	.0068	.54	.0066	.52
Size	.0142	4.32***	.0142	4.31***
LossFreq	−.0115	−3.03***	−.0115	−3.03***
ROA	.3057	8***	.3057	8***
Quick	.0089	3.34***	.0089	3.34***
Leverage	.0046	.19	.0045	.19
InstOwner	.0234	2.18**	.0232	2.16**
Analyst	.0069	3.41***	.0070	3.41***
Litigation	.0525	3.2***	.0522	3.18***
BigN	−.0009	−.06	−.0009	−.06
Δ*SalesGrowth*	.0649	5.69***	.0649	5.69***
RetVolatility	.1757	2.24**	.1755	2.24**
Industry & Year Fixed Effect	Yes		Yes	
Adj R^2	.1573		.1573	
Observations	9646		9646	
Panel B: Abnormal production cost to measure real earnings management				
	Dependent = Ab_Prod			
Variable	**Coefficient**	***t*-stat**	**Coefficient**	***t*-stat**
Intercept	−.1499	−1.95*	−.2864	−3.26***
CFOACCT	.0125	3.03***	.4149	3.31***
*CFOACCT*CFOAge*			−.1024	−3.21***
CFOAge	−.0168	−1	.0174	.88
CFOTenure	.0145	3.92***	.0142	3.84***
CFOComp	.0005	.19	.0005	.18
CFOGender	−.0135	−1.99**	−.0127	−1.87*
Size	.0176	9.99***	.0177	10.05***
LossFreq	.0055	2.73***	.0055	2.7***
ROA	−.3876	−18.93***	−.3877	−18.94***
Quick	−.0029	−2**	−.0029	−2.05**
Leverage	−.0334	−2.56**	−.0330	−2.53**
InstOwner	.0014	.25	.0022	.38
Analyst	−.0063	−5.8***	−.0064	−5.86***
Litigation	−.1115	−12.69***	−.1104	−12.56***
BigN	−.0050	−.65	−.0053	−.68
Δ*SalesGrowth*	−.0107	−1.75*	−.0106	−1.74*
RetVolatility	.0481	1.14	.0489	1.16

(Continues)

TABLE 3 (Continued)

Panel B: Abnormal production cost to measure real earnings management				
	Dependent = Ab_Prod			
Variable	**Coefficient**	***t*-stat**	**Coefficient**	***t*-stat**
Industry & year fixed effect	Yes		Yes	
Adj R^2	.1394		.1403	
Observations	9635		9635	
Panel C: Abnormal discretionary expenses to measure real earnings management				
	Dependent = Ab_DiscExp			
Variable	**Coefficient**	***t*-stat**	**Coefficient**	***t*-stat**
Intercept	.3608	.64	.8087	1.26
CFOACCT	−.0081	−.27	−1.3394	−1.45
*CFOACCT*CFOAge*			.3387	1.45
CFOAge	.1394	1.13	.0270	.18
CFOTenure	−.0564	−2.07**	−.0559	−2.05**
CFOComp	−.0024	−.11	−.0017	−.08
CFOGender	−.0291	−.59	−.0314	−.63
Size	−.0500	−3.77***	−.0501	−3.78***
LossFreq	.0167	1.13	.0167	1.12
ROA	−.0076	−.05	−.0089	−.06
Quick	−.0165	−1.56	−.0164	−1.55
Leverage	−.1216	−1.25	−.1224	−1.25
InstOwner	.0103	.25	.0079	.19
Analyst	.0143	1.76*	.0144	1.77*
Litigation	−.1025	−1.61	−.1066	−1.67*
BigN	.0384	.69	.0393	.7
ΔSalesGrowth	−.0678	−1.4	−.0679	−1.4
RetVolatility	−.3698	−1.2	−.3695	−1.2
Industry & year fixed effect	Yes		Yes	
Adj R^2	.0872		.0873	
Observations	8834		8834	

Notes: This table illustrates the relation between a CFO with an accounting degree and his/her firm's level of real earnings management. In Panels A–C, we respectively use abnormal operating cash flow, abnormal production, and abnormal discretionary expenditures to measure real earnings management.
*, **, *** represent significant at the level of 10%, 5%, and 1% levels, respectively.

(coefficient = −1.4467, *p*-value = .0394) and this negative relation becomes weaker when a CFO becomes aged (*CFOACCT* × *CFOAge*: coefficient = .3659, *p*-value = .0404). Consistent with H2c, our results suggest that non-accounting majored CFOs may tend to shift operating expenses to special items to manipulate their core earnings upward while accounting majored CFOs may not prefer this approach.

In conclusion, our results regarding the relation between CFOs' educational background and their firms' preferred types of earnings management are consistent with most of our hypotheses. First, we find that both CFOs with an accounting degree and CFOs without any accounting degree engage in earnings management using different methods to various extents. Specifically, using their professional knowledge CFOs with an accounting degree tend to manage earnings more aggressively through manipulating discretionary accruals below the auditing red line and through overproduction given the sales level. In contrast, CFOs with a non-accounting degree are associated with more aggressive earnings management through classification shifting because they face more constraints from using accrual and real earnings management. Finally, internal and external monitoring, instead of individual educational background, play a more important role in determining the level of real earnings management through lowering discretionary expenditures and accelerating revenue recognition. Our findings are also consistent with prior research that real earnings management, accrual earnings management,

TABLE 4 The relation between CFO's educational background and classification shifting.

	Dependent = UCE			
Variable	**Coefficient**	***t*-stat**	**Coefficient**	***t*-stat**
Intercept	.5096	1.11	.9939	1.92*
CFOACCT	−.0053	−.23	−1.4457	−2.06**
*CFOACCT*CFOAge*			.3659	2.05**
CFOAge	−.1720	−1.87*	−.2910	−2.67***
CFOTenure	.0336	1.59	.0349	1.65*
CFOComp	.0220	1.45	.0215	1.41
CFOGender	.0229	.62	.0204	.56
HighNOA	.0006	.03	.0015	.06
MarketShare	−.2747	−2.33**	−.2842	−2.41**
Size	.0490	4.6***	.0488	4.59***
ROA	−.9702	−8.67***	−.9723	−8.69***
MTB	−.0089	−.52	−.0086	−.51
InstOwner	−.0076	−.28	−.0107	−.39
Analyst	.0075	.43	.0067	.38
OperCycle	.0017	.59	.0021	.72
Zscore	−.0018	−.06	−.0034	−.11
TaxRate	.0034	.56	.0035	.57
SOX	−.1589	−.61	−.1734	−.67
Litigationn	−.1871	−3.52***	−.1908	−3.59***
BigN	−.0086	−.21	−.0097	−.24
Industry & Year Fixed Effect	Yes		Yes	
R^2	.1285		.1289	
Observations	7103		7103	

Note: This table illustrates the relation between a CFO with an accounting degree and his/her firm's level of earnings management using classification shifting. *, **, *** represent significant at the level of 10%, 5%, and 1% levels, respectively.

and classification shifting are substitutive based on their relative costs (Huang et al., 2012; Zang, 2012; Abernathy et al., 2014), because CFOs with different educational backgrounds have their different preferences in determining the type and degree of earnings management based on their personal professional judgment and cognitive attitude learned from their previous education and career experience. Moreover, the methods and degrees to implement earnings management vary among CFOs with different educational backgrounds, suggesting the difficulty of monitoring and detecting companies' numbers game.

6.4 | Controlling for endogeneity

Our findings could be attributable to firms' institutional environment instead of CFO's education. In other words, there could be a reverse explanation that firms with a higher level of accrual earnings management and a higher level of real earnings management via overproduction are more likely to hire accounting majored CFOs and firms with a higher level of classification shifting are more likely to hire non-accounting majored CFOs. In this section, we analyze whether a turnover from a non-accounting majored CFO to an accounting majored CFO leads to any change in a firm's earnings management. We find, respectively, 29, 22, and 17 times of nonaccounting-to-accounting CFO changes in our analyses of accrual earnings management, real earnings management, and classification shifting in our sample.

Following Francis et al. (2008) and Barua, Davidson, et al. (2010), we consider 3 years before and after the change but exclude the year of change. We also construct a new dummy variable, *PostChange*, which equals 1 after the nonaccounting-to-accounting change and 0 before the nonaccounting-to-accounting change. Results presented in Table 5 are consistent with our main conclusions. We find that after changing from a nonaccounting majored CFO to an accounting CFO, a firm's accrual earnings management significantly increases, real earnings management through overproduction increases but classification shifting decreases, and these effects become weaker if the newly hired CFO is older.

TABLE 5 The effect of switching non-accounting CFO to accounting CFO on different types of earnings management.

Panel A: The effect of switch on accrual earnings management				
	Dependent = ABS_DA			
Variable	**Coeff.**	***t*-stat**	**Coeff.**	***t*-stat**
Intercept	.0740	.23	−.0470	−.12
PostChange	.0525	2.51**	.4731	2.03**
PostChange*CFOAge			−.1056	−2.06**
Intercept & Control Variables	Yes		Yes	
Industry & Year Fixed Effect	Yes		Yes	
Adj R–square	.4632		.4671	
Observations	100		100	
Panel B: The effect of switch on real earnings management				
	Dependent = Ab_Prod			
Variable	**Coeff.**	***t*-stat**	**Coeff.**	***t*-stat**
PostChange	.0541	1.22	4.1130	3.15***
PostChange*CFOAge			−1.0246	−3.11***
CFOAge	.0073	.27	−.0073	−.28
Intercept & Control Variables	Yes		Yes	
Industry & Year Fixed Effect	Yes		Yes	
Adj R^2	.6939		.7232	
Observations	129		129	
Panel C: The effect of switch on classification shifting				
	Dependent = UCE			
Variable	**Coeff.**	***t*-stat**	**Coeff.**	***t*-stat**
PostChange	−.2911	−.93	−1.7561	−1.79*
PostChange*CFOAge			.7428	1.82*
CFOAge	−1.8472	−2.05**	−1.3351	−1.92*
Intercept & Control Variables	Yes		Yes	
Industry & Year Fixed Effect	Yes		Yes	
R^2	.5373		.5376	
Observations	81		81	

Notes: This table illustrates how the change from a CFO with a non-accounting degree to a CFO with an accounting degree could influence the firm level of earnings management. In Panels A–C, we respectively test the effect of CFO switch on accrual earnings management, real earnings management using abnormal production, and classification shifting.

*, **, *** represent significant at the level of 10%, 5%, and 1% levels, respectively. We omitted control variables for brevity.

7 | ADDITIONAL TESTS

Because business students are also required to take some fundamental accounting classes, in this section we are interested in how business majored CFOs versus non-business majored CFOs behave in the three types of earnings management. Moreover, because CPA requires professional accounting experience and continuing informal education beyond undergraduate and/or graduate accounting studies and has continuously updated ethics requirements, we additionally investigate whether CPA licensed CFOs could behave more ethically in financial reporting. Untabulated results suggest that in our sample of accrual earnings management, real earnings management, and classification shifting, respectively 16.08%, 16.35%, and 14.59% of accounting majored CFOs have the CPA certification. Additional untabulated results suggest that in our three samples, averagely 55% of CPA licensed CFOs has an accounting degree, 78.57% of CPA licensed CFOs has a business degree, and 21.43% of CPA licensed CFOs has no business degree. Taken together, the group of CFOs with an accounting degree/a business degree and the group of CFOs with the CPA certification are not highly overlapped. Therefore, our further tests of CFOs with the CPA certification/CFOs with a business degree on earnings management could provide additional meaningful insights.

In Table 6, we respectively regress CFOs with CPA certification and CFOs with a business degree on the three types of earnings management. First, we find CFOs with a business degree are associated with a higher level of accrual earnings management and a lower level of real

TABLE 6 The relation between CFOs' CPA/business educational background and three types of earnings management.

Panel A: The relation between CFOs' CPA/business educational background and accrual earnings management				
	Dependent = ABSDA			
Variable	**Coeff.**	***t*-stat**	**Coeff.**	***t*-stat**
CFOCPA	.0010	.48		
CFOBusiness			.0028	1.87*
Intercept & Control Variables	Yes		Yes	
Industry & Year Fixed Effect	Yes		Yes	
Adj R^2	.1352		.1355	
Observations	8312		8312	

Panel B: The relation between CFOs' CPA/business educational background and real earnings management												
	Dependent = Ab_Prod				**Dependent = Ab_DiscExp**				**Dependent = Ab_OCF**			
Variable	**Coeff.**	***t*-stat**	**Coeff.**	***t*-stat**	**Coeff.**	***t*-stat**	**Coeff.**	***t*-stat**	**Coeff.**	***t*-stat**	**Coeff.**	***t*-stat**
CFOCPA	−.0071	−1.09			.0879	1.72*			−.0030	−.24		
CFOBusiness			−.0081	−1.74*			.0365	1.04			−.0122	−1.38
Intercept & Control Variables	Yes		Yes		Yes		Yes		Yes		Yes	
Industry & Year Fixed Effect	Yes		Yes		Yes		Yes		Yes		Yes	
Adj R^2	.1335		.1337		.0882		.0884		.1550		.1551	
Observations	9635		9635		8834		8834		9635		9635	

Panel C: The relation between CFOs' CPA/business educational background and classification shifting				
	Dependent = UCE			
Variable	**Coeff.**	***t*-stat**	**Coeff.**	***t*-stat**
CFOCPA	−.0873	−2.31**		
CFOBusiness			.0283	1.09
Intercept & Control Variables	Yes		Yes	
Industry & Year Fixed Effect	Yes		Yes	
R^2	.132		.1315	
Observations	7103		7103	

Notes: This table illustrates the relation between a CFO with a CPA license/a business degree and his/her firm's level of earnings management. In Panels A–C, we respectively use accrual earnings management, real earnings management, and classification shifting to measure a firm's financial reporting quality.
*, **, *** represent significant at the level of 10%, 5%, and 1% levels, respectively. We omitted control variables for brevity.

earnings management through overproduction, although both relations are significant at 10% level only. Moreover, we find CFOs with CPA certification are associated with the lower level of real earnings management through cutting discretionary expenditures and the lower level of classification shifting.

In conclusion, we find mixed results for CFOs with a business degree in earnings management. In contrast, our results suggest CFOs with CPA certification behave more ethically in all the three types of earnings management compared with CFOs with an accounting degree, CFOs with a business degree, or CFOs without any business degree. Our results provide evidence for the recent trend of including more ethics trainings in CPA initial licensing requirements. For example, in California starting on January 1, 2017, all CPA candidates will have to have at least 10 credits hours in ethics, with a standalone 3-credit course solely devoted to accounting ethics, before they can apply for a CPA license (CalCPA, 2017). Our findings also collaborate with the requirement of ethics credits in lifetime learning of CPA continuing professional education program (AICPA, 2001; California Board of Accountancy, 2017).

8 | CONCLUSIONS

This paper investigates whether CFOs' individual education background influences their choices in different types of earnings management. We empirically find that CFOs with an accounting degree are associated with a higher degree of accrual earnings management and a higher degree of real earnings management through overproduction because they have a better understanding of professional knowledge to change accounting methods and estimates within the system flexibility and calculate product costs and inventory balances more accurately. In contrast, we find that CFOs without any accounting degree are associated with a higher degree of classification shifting, suggesting CFOs may prefer arbitrarily to

shift operating expenses to special items if their knowledge base cannot support them to solve the constraints of other types of earnings management. Our results hold robust when we implement a difference-in-difference test on the executive turnover from a CFO without any accounting degree to a CFO with an accounting degree. Finally, we find that CFOs with CPA certification are associated with a lower degree of all three types of earnings management, suggesting CPAs are generally more ethical in financial reporting.

This paper contributes to the literature of both earnings management and executive study. Besides the effect of CEO, we document that CFO also has a direct effect on a firm's financial reporting and support the necessity of CFO certification on financial statements required by Sarbanes–Oxley Act. Moreover, through providing additional evidence that education influences individual judgment and leads to performance differentials, our results have implications for executive hiring and auditing practice. Finally, we encourage accounting education to integrate more ethics topics and collaborate with increased ethics requirements in the CPA exam and continuing professional education.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from COMPUSTAT and CRSP. Restrictions apply to the availability of these data, which were used under license for this study.

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APPENDIX

Definitions of variables

Earnings management measures:

ABSDA = absolute value of discretionary accruals based on Kothari et al. (2005).

Ab_OCF = abnormal operating cash flow based on Roychowdhury (2006).

Ab_Prod = abnormal production costs based on Roychowdhury (2006).

Ab_DiscExp = abnormal discretionary expenditures based on Roychowdhury (2006).

UCE = unexpected core earnings which is the difference between actual core earnings reported and predicted core earnings estimated from Mcway (2006) and Abernathy et al. (2014).

CFO individual factors:

CFOACCT = 1 if a CFO has an accounting degree and 0 otherwise.

CFOTenure = the natural logarithm of years that a CFO stays at a firm.

CFOComp = the natural logarithm of a CFO's total compensation.

CFOAge = the natural logarithm of a CFO's age

CFOGender = 1 if a CFO is a male and 0 if a CFO is a female.

Other control variables:

Size = the natural logarithm of total assets

SalesVolatility = volatility of sales revenues scaled by average total assets during the previous five years.

CashFlowVolatility = volatility of operating cash flow scaled by average total assets during the previous five years.

AveOpercycle = the average firm's operating cycle during the previous five years, calculated as the natural logarithm of days in sales plus days in inventory.

LossFreq = the frequency of net income incurred during the previous five years.

BigN = 1 if the firm's auditor is one of the Big Five firms before 2002 or one of the Big Four firms since 2002; 0 otherwise.

$\Delta SalesGrowth$ = change in sales growth, defined as the difference between current year sales growth and prior year sales growth.

RetVolatility = the standard deviation of monthly return in the prior year.

ROA = return on assets

Quick = quick assets scaled by current liabilities

Leverage = long-term liabilities scaled by total assets

InstOwner = the percentage of institutional ownership

Analyst = the number of financial analysts following

Litigation = 1 if the firm is in an industry with high litigation risk (2833< = sic< = 2836, 3570< = sic< = 3577, 7370< = sic< = 7374, 3600< = sic < = 3674, and 5200< = sic< = 5961); 0 otherwise.

HighNOA = 1 if beginning net operating assets are greater than the industry median; 0 otherwise.

MarketShare = firm's sales scaled by the industry total sales (three-digit SIC code).

Zscore = Altman's Z-Score

TaxRate = the total taxes paid divided by pre-tax net income

SOX = 1 if it's the post Sarbanes–Oxley period; 0 otherwise.

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