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Top management team expertise and corporate real earnings management activities☆

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ABSTRACT

This study investigates the effects of top management team (TMT) expertise on real earnings management (REM) activities by examining a hand-collected data set that contains 4,690 firm-year observations from Taiwanese listed firms during 2006 to 2010. The results of this study show that the percentages of TMT members possessing master's degrees (PMS) and managing core functional areas (CORE) negatively relate to REM activities, whereas the percentage of TMT members possessing a CPA certificate (PCPA) has the opposite effect. We also find that the PMS and CORE effects are mainly demonstrated through the channel of raising firm performance and thereby reduce managers' incentives to manage earnings. In addition, the effect of TMT expertise on REM activities becomes weaker with increasing firm age. Finally, the outcomes of several robustness tests, such as suspect firm analyses, endogeneity analyses, employing other TMT expertise variables, and additionally controlling for accrual-based earnings management also support our results.

1. Introduction

Over the past several decades, researchers have examined the role of top management team (TMT) characteristics and argued that TMT characteristics are associated with organizational outcomes. Specifically, previous studies document that TMT characteristics such as education background (Hambrick & Mason, 1984; Switzer & Bourdon, 2011)[1] and work experience (Aier, Comprix, Gunlock, & Lee, 2005; Bamber, Jiang, & Wang, 2010; Hambrick & D'Aveni, 1992; Matsunaga, Wang, & Yeung, 2013; Switzer & Bourdon, 2011)[2] are related to firm performance and earnings quality. Most related studies focus on the relationship between TMT characteristics and earnings quality from the perspective of financial statement restatements or accrual-based earnings management (AEM).[3] However, how TMT characteristics affect real earnings management (REM) activities is rarely discussed. Therefore, this study aims to determine how TMT expertise impacts a firm's earnings quality from an REM perspective.

When managers have incentives to communicate with or mislead the users of financial statements, they can use AEM as well as REM to smooth or manage earnings for private purposes (Cohen, Mashruwala, & Zach, 2010; Roychowdhury, 2006; Wongsunwai, 2013). In addition, Graham, Harvey, and Rajgopal (2005) suggest that managers are more likely to manage earnings through REM than AEM, despite REM costs possibly being higher for the firms. Moreover, after the passage of the Sarbanes–Oxley Act (SOX) of 2002, managers have preferred to engage in REM activities rather than false AEM because REM activities attract less scrutiny from auditors and regulators (Cohen, Dey, & Lys, 2008; Cohen & Zarowin, 2010; Francis, Hasan, & Li, 2016). In Taiwan, a series of noteworthy financial scandals broke out in 2004. For example, after Procomp Informatics Co. using falsified sales with fake foreign companies to boost its earnings, the authorities amended and promulgated relevant legislation to strengthen the quality of financial statements and

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[1] Hambrick and Mason (1984) indicate that education level is positively associated with innovation, whereas the type of educational curriculum (administration vs. non-administration) is not a significant factor. Aier et al. (2005) and Chevalier and Ellison (1999) find that firms with managers who attended undergraduate programs requiring higher SAT scores or who had an MBA degree exhibit higher performance or earnings quality. However, Switzer and Bourdon (2011) indicate that firms with TMTs that have members with MBAs exhibit lower performance.

[2] Related studies demonstrate that work experience also plays a critical role in firm outcomes and operations. Managers of a firm could learn better techniques for using work experience to create firm value for stockholders. Consequently, managers who have managerial experience regarding core functions, competitors, another industry, or law and finance jobs can substantially influence a firm's performance and earnings quality (Aier et al., 2005; Bamber et al., 2010; Hambrick & D'Aveni, 1992; Matsunaga et al., 2013; Michel & Hambrick, 1992).

[3] Previous studies also use the extent of information asymmetry (Chemmanur et al., 2009), the content of voluntary disclosure (Bamber et al., 2010), information content of earnings (Warfield, Wild, & Wild, 1995), management earnings forecasts (Baik et al., 2011), and asymmetric timeliness of loss recognition (Ahmed & Duellman, 2013) as indicators of earnings quality.

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reporting. Since the Procomp scandal, Taiwan listed firms have less discretionary accruals (Shih, 2005), tend to engage in REM (Chou, 2010), and auditors reduce their acceptable level of clients' financial risk (Liu, Wang, & Lai, 2009). Consequently, REM activities have generated increased interest and gained importance. Numerous recent studies focus on investigating the causes and consequences of REM activities.[4] However, studies that empirically document the link between the characteristics of TMT and REM activities are scant. The current study, therefore, fills this gap in the literature by investigating how TMT expertise affects firms' REM activities.

TMT expertise refers to a management team's knowledge and experiences and may exert both positive and negative effects on a firm's operating performance. Several related studies find that TMTs with more expertise are associated with higher firm operating performance (e.g., Chemmanur & Paeglis, 2005; Haleblian & Finkelstein, 1993; Hambrick & D'Aveni, 1992; Hambrick & Mason, 1984). For example, Chemmanur and Paeglis (2005) suggest that firms with more TMT expertise, such as higher education levels and superior core functional knowledge, are likely to select higher-quality projects, implement them more effectively, and, therefore, have higher operating performance. In addition, superior firm operating performance also lessens managers' incentives to manage earnings (Balsam, Haw, & Lilien, 1995; DeFond & Park, 1997; Doyle, Ge, & McVay, 2007; Keating & Zimmerman, 1999).[5] Hence, based on incentive-reduction concerns, TMT expertise is reasonably conjectured to be negatively associated with a firm's REM level (called the *incentive-reduction effect*).

However, some other studies report that managerial expertise also augments the incentives of managerial entrenchment (Finkelstein, 1992) and has a negative effect on firm value (Dane, 2010; Schwenk, 1993). In such circumstances, the motives for managers to engage in earnings management would increase. Finkelstein (1992) demonstrates that managerial expertise is a critical factor that leads to a powerful or an entrenched TMT, thus suggesting that TMT members with greater expertise are more likely to engage in entrenchment activities and subsequently to manage earnings in order to prevent information leaks about their entrenched behaviors (Ding, Zhang, & Zhang, 2007). Therefore, based on managerial entrenchment concerns, TMT expertise is expected to be positively associated with a firm's REM activity level (called the *managerial entrenchment effect*). According to these discussions, TMT expertise is expected to affect the level of REM activities through the incentive-reduction effect and the managerial entrenchment effect. The effects of TMT expertise on REM levels are unclear. It is, however, apparent that how TMT expertise affects REM activity levels is an empirical question warranting further examination.

Following Chemmanur and Paeglis (2005), this study hand-collects the percentage of TMT members who have a master's degree (*PMS*), manage core functional areas (*CORE*), and possess a certified public accountant (CPA) certificate (*PCPA*) to measure TMT expertise. The variable *PMS* represents the education level of TMT members, whereas *PCPA* and *CORE* refer to the TMT members' level of expertise in accounting and core functions, respectively. To capture firms' REM levels, this study follows Cohen and Zarowin (2010) and estimates abnormal operating cash flows (*R_CFO*), overproduction (*R_PROD*), and abnormal discretionary expenses (*R_DISX*). In addition, three comprehensive metrics are developed according to Cohen et al. (2008), Cohen and Zarowin (2010) and Zang (2012) to capture the total effects of REM. After considering relevant control variables, industry and year fixed effects, and one-way clustering by firm (Petersen, 2009), this study regresses the indications of REM on *PMS*, *CORE*, and *PCPA* to examine the association between TMT expertise and REM.

Using a sample of 4,690 firm-year observations in Taiwan from 2006 to 2010, the current study presents the following results. First, the percentage of TMT members who have master's degrees (*PMS*) and manage core functional areas (*CORE*) are both negatively associated with REM activity levels, indicating that TMTs with higher education levels and greater core functional knowledge improve firm performance and reduce the incentives to engage in REM activities. The results also imply that the incentive-reduction effect dominates the managerial entrenchment effect, which leads to negative associations between REM and TMT education levels as well as TMT core functional expertise. Second, this study finds that the percentage of TMT members who possess a certified public accountant certificate (*PCPA*) is positively associated with REM activity levels, which suggests that the managerial entrenchment effect dominates the incentive-reduction effect for TMTs with greater accounting expertise. When managers with expertise in accounting choose to hide their entrenched behavior through earnings management, they tend to engage in REM activities to avoid the ligation risk of AEM behaviors. Third, the discussed results are attenuated by firm age, possibly indicating that older and more established firms have stronger corporate cultures (Van den Steen, 2005) and lower information asymmetry (Zhang, 2006). These conditions weaken managers' influence on firm operational and reporting strategies, thereby reducing the impact of TMT expertise on REM activity levels. Finally, as a robustness check, this study restricts the analysis to sample firms with incentives to meet earnings benchmarks (suspect-firm analysis), controls omitted variable biases (the endogeneity problem), uses other variables, such as CEO/CFO expertise and MBA degree, to proxy TMT expertise, and controls for the effect of discretionary accruals on REM. The results of the additional tests are consistent with our main findings.

This study contributes to TMT characteristics and REM research in several respects. First, it contributes to the literature by demonstrating that TMT characteristics are associated with REM activities from a managerial expertise perspective. Prior studies have explored the relationship between TMT features and earnings quality by employing discretionary accruals (Geiger & North, 2006), financial statement restatement (Aier et al., 2005; Demerjian, Lev, Lewis, & McVay, 2013), the content of voluntary disclosure (Bamber et al., 2010), forecast accuracy (Baik, Farber, & Lee, 2011), and information asymmetry (Chemmanur, Paeglis, & Simonyan, 2009). We demonstrate the effect of TMT expertise on REM and advance the growing literature on the determinants of REM.

Our second contribution takes the form of a response to Hambrick's (2007) call for more research on upper echelons theory. Jiang, Zhu, and Huang (2013) and Matsunaga et al. (2013) suggest that the experience of CEOs plays a role in improving earnings quality. Aier et al. (2005) indicate that CFOs with prior work experience as CFOs or CPAs are less likely to restate their earnings. In contrast to the work of Jiang et al. (2013), Matsunaga et al. (2013), and Aier et al. (2005), this study echoes Hambrick's (2007) argument by suggesting that considering the characteristics of the entire management team rather than an individual manager, such as the CEO or CFO, and thus creates a fuller picture of the effect of TMT characteristics on earnings quality.

Third, the examination of TMT's fields of expertise helps explain the effect of TMT characteristics on earnings quality. Cao, Myers, and Omer (2012) and Demerjian et al. (2013) employ a composite measure of managerial ability and propose that managers that are more able are less likely to restate their financial statements.[6] This study both differs

[4] For example, CEOs' position protection, internal governance, independent directors and high-quality venture capitalists diminish firms' REM (Chen et al., 2015; Cheng et al., 2016; Ge & Kim, 2014; Osma, 2008; Wongsunwai, 2013; Zhao et al., 2012), whereas firms have more REM because of longer auditor tenure (Chi et al., 2011) or stricter debt covenant slack (Kim et al., 2011). Bereskin et al. (2015) find that cutting R&D expenditures to manage earnings can lead to firms being less influential and less productive in patent performance and exhibiting further diminished market valuations, whereas the aggregate REM measure generated by Cohen et al. (2010) is positively related to firms' future crash risk (Francis et al., 2016) and negatively affects firms' future performance (Huang & Sun, 2014).

[5] In addition, managers with more core functional expertise have a more complete understanding of the negative effect of REM. It also reduces their incentives to engage in REM.

[6] The composite measure of managerial ability describes a firm's excess output performance given the fixed resource inputs. The managerial ability measure cannot indicate any specific talent or experience possessed by managers.

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from and complements studies on the impact of managers' characteristics on earnings quality by examining the effects of TMT's education level, core functional expertise, and accounting proficiency on REM. The results of this study illustrate that TMT's educational level and core functional expertise are negatively associated with REM whereas the percentage of TMT members with a CPA certificate is positively related to REM. It suggests that managers with different areas of expertise make particular impacts on earnings quality.

The remainder of this study is divided into four sections. Section 2 is a review of the literature on TMT characteristics and REM activities and introduces the hypothesis development. The third section defines the variables and provides the model specifications. Section 4 presents the empirical results while Section 5 presents the study's conclusions and makes suggestions for further research.

2. Literature review and hypothesis development

2.1. Effect of TMT characteristics

In the accounting- and finance-related literature, many studies use firm-, industry-, or market-level characteristics to explain a firm's operational behavior and performance. They implicitly assume that a firm's TMT makes its decisions only according to the utility function of explicit costs and benefits (Hölmstrom, 1979; Hölmstrom & Milgrom, 1991). In other words, the assumption is that managers' personal characteristics do not influence a firm's operations.

However, Bertrand and Schoar (2003) argued that managers play a critical role in a firm's investment policies, financial policies, organizational strategies, and operating performance. After considering firm fixed effects and time-varying firm characteristics, they find that manager fixed effects are associated with a firm's acquisition or diversification decisions, dividend policies, interest coverage, and cost-cutting policies. Their study further finds that manager fixed effects have an impact on firm performance. Bertrand and Schoar's (2003) results echo Hambrick and Mason's (1984) argument regarding firms' operations and performance by synthesizing the impacts of the characteristics of top managers, such as their education level, functional track, career experience, and financial position.

Since the appeal of Hambrick and Mason (1984) to empirically test the effect of TMT characteristics on firms' operations and performance, extensive research has been undertaken to investigate whether TMT features such as education level, work experience, and accounting expertise are associated with firm performance and earnings quality. Specifically, managers with an MBA degree have more business management knowledge and financial expertise and are more efficient (Baruch & Peiperl, 2006; Hambrick & Mason, 1984). Firms whose top managers have higher education levels exhibit superior performance (Chevalier & Ellison, 1999) and demonstrate a lower likelihood of restating their financial statements (Aier et al., 2005). Managers who have worked longer in the same (or similar) industry or in finance or accounting contribute to firm performance (Hambrick & D'Aveni, 1992; Hambrick & Mason, 1984; Michel & Hambrick, 1992), produce disclosures that are more precise (Bamber et al., 2010), and involve a decrease in discretionary accruals (AEM) (Matsunaga et al., 2013) and REM (Jiang et al., 2013).

In addition to specific top managers' characteristics, the overall measure of a firm's management team, the company's reputation, is associated with a firm's AEM level. Cao et al. (2012) find that firms in *Fortune*'s *America's Most Admired Companies* list have lower absolute discretionary accruals, whereas Demerjian et al. (2013) suggest that management teams that are more able are associated with higher accrual quality. In summary, numerous studies have been conducted to determine the impact of management on firm performance and earnings quality, which is measured by the AEM level, the likelihood of a financial statement restatement, and firms' disclosure policy.

2.2. Real earnings management

Among the various dimensions of earnings quality, discretionary accruals are a key indicator of earnings quality and management reporting strategies (Dechow, Ge, & Schrand, 2010; Francis, Huang, Rajgopal, & Zang, 2008; Ge, Matsumoto, & Zhang, 2011; Geiger & North, 2006). However, recent studies have begun to address the problems related to REM activities. Roychowdhury (2006) develops three REM measures and finds that managers manage earnings through real activities to avoid reporting losses. Although managers have an incentive to perform REM activities because of achieving earnings targets, longer auditor tenure, and tighter debt covenant slack (Chi, Lisic, & Pevzner, 2011; Gupta, Pevzner, & Seethamraju, 2010; Kim, Lisic, & Pevzner, 2011), several studies suggest that a corporate governance mechanism could mitigate the extent of REM (Chen, Cheng, Lo, & Wang, 2015; Cheng, Lee, & Shevlin, 2016; Ge & Kim, 2014; Osma, 2008; Zhao, Chen, Zhang, & Davis, 2012).

Cheng et al. (2016), Ge and Kim (2014) and Zhao et al. (2012) uncover some evidence to suggest that CEOs' contractual and takeover protection could mitigate their firms' REM because the threats of losing their positions create the incentive to engage in REM while Osma (2008) suggests that independent boards are negatively associated with REM. In addition to the CEOs' position protections and boards of directors, key subordinate executives also have a significant effect on REM. Cheng et al. (2016) suggest that the extent of REM decreases with key subordinate managers' horizon incentive and influence and that this relationship is stronger in firms with more complex operations. However, some studies find that corporate governance has unintended effects on REM. Chan, Chen, Chen, and Yu (2015) suggest that the compensation clawback provision that reduces instances of financial statement restatement and constrains the flexibility of AEM results in more REM substituting for AEM. Ge and Kim (2014) find that a tougher board monitoring stimulates a higher level of REM, and the substituting effect between REM and AEM is more pronounced in firms with stronger board governance.

In addition to corporate governance, prior studies also provide several potential factors that are associated with REM. Cohen et al. (2008) indicate that stricter financial reporting standards mitigate AEM, causing managers to engage in REM as a substitute for AEM. Ho, Liao, and Taylor (2015) find similar results in the Chinese capital market and suggest that the adoption of IFRS-convergent accounting standards mitigates the magnitude of discretionary accruals but that firms tend to use REM as a substitute when faced with earnings pressure. Irani and Oesch (2016) demonstrate that a reduction of analyst coverage leads managers to employ less REM whereas Chi et al. (2011) suggest that firms audited by higher quality auditors resort to more REM. As this review of the literature shows, while a number of studies have been performed to investigate the various factors affecting real earnings management activities, an analysis of TMT characteristics is still lacking.

Furthermore, the SOX Act of 2002 imposes higher litigation costs on managers engaging in AEM. Managers could trade off the benefits and costs of AEM and REM (Matsuura, 2008; Zang, 2012), suggesting that managers would prefer REM rather than AEM activities when they have the incentive to engage in earnings management (Cohen et al., 2008; Cohen & Zarowin, 2010). Graham et al. (2005) also provide evidence that managers are more likely to use REM than AEM.

Although managers are gradually moving away from AEM to REM activities (post-SOX), this trend may be costly for firms. In contrast to AEM, which shifts earnings between different periods, REM alters a firm's cash flow and diminishes its performance and value (Bereskin, Hsu, & Rotenberg, 2015; Francis et al., 2016; Gupta et al., 2010; Huang & Sun, 2014; Zang, 2012). Therefore, because of the prevalence of REM

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activity and the potential value implications, this study improves on the current understanding regarding the determinants of firms' REM levels from the perspective of TMT expertise.

2.3. Hypothesis development

According to the foregoing discussions, TMT expertise is a weighty contributor to firm performance and reporting policies. This study investigates how TMT expertise affects the level of REM in various ways. The following subsections detail the related arguments.

2.3.1. Incentive-reduction effect: TMT expertise as an indication of management capabilities

A firm with considerably high TMT expertise is regarded as having superior management capacity or quality (Chemmanur & Paeglis, 2005; Chemmanur et al., 2009). Consequently, competent managers are more likely to meet earnings targets without engaging in REM activities. Therefore, this study employs the education level of a TMT, its competence in core functions and accounting to describe TMT expertise and to investigate their associations with REM levels.

2.3.1.1. Education level. The education-signaling model developed by Spence (1973) suggests that education level can signal productivity or ability. This study adopts the viewpoint of Spence (1973) and employs education level (master's degree) to capture a firm's TMT capability. Managers with master's degrees are expected to have higher ability, greater knowledge, and more training in logical thinking. It is expected that TMTs with higher education levels possess greater ability, which in turn increases firm performance (Hambrick & D'Aveni, 1992; Michel & Hambrick, 1992) and therefore lessens their incentive to manage earnings (Balsam et al., 1995; DeFond & Park, 1997; Doyle et al., 2007; Keating & Zimmerman, 1999).

2.3.1.2. Core functional expertise. A firm's top managers possess specific hands-on knowledge of the firm's technologies, customers, and suppliers. Top managers can understand and assess not only the administrative implications of their decisions (Michel & Hambrick, 1992), but also the substantive implications. Moreover, Chemmanur and Paeglis (2005) suggest that core functional expertise (i.e., marketing, operations, and research and development [R&D]) can enhance a firm's management resource capabilities. The studies discussed reveal that acquiring core functional knowledge is crucial for managers to implement organizational strategies effectively. Consequently, TMTs with a greater level of core functional expertise possess higher management capacity and can implement business strategies more efficiently, thereby enhancing firm performance and reducing incentives to manage earnings. In addition, Chemmanur et al. (2009) provide evidence that firms with a higher percentage of managers in core functional areas have greater levels of investment. For example, as the number of workers in a firm's core function (e.g., R&D) increases, budget expenditure control over the core function is given greater importance (Barker & Mueller, 2002; Rockness & Shields, 1988), which may reduce managers' incentives to cut investment expenditures in situations when they experience earnings pressure. Therefore, firms with more managers in core functional areas are less likely to reduce valuable expenditures (i.e., REM) to boost short-term earnings.

In addition to cutting discretionary expenses, firms can temporarily increase earnings by offering aggressive price discounts or by producing more goods than expected demand to downsize the fixed costs per unit (Roychowdhury, 2006). The activities to artificially inflate earnings discussed above would poison the firm's value (Cohen & Zarowin, 2010) and damage the career prospects for the subordinate executives that are future CEO candidates (Cheng et al., 2016). When TMT members are in charge of core functional areas such as marketing and operations, it is expected that they are less likely to offer aggressive price discounts or produce more goods than expected demand because doing so would harm their career prospects. Thus, this study proposes that the percentage of TMT members in charge of core functional areas is negatively associated with REM.

2.3.1.3. Accounting proficiency. The findings of several corporate governance studies suggest that managers with accounting proficiency could enhance communication efficiency between management and an audit committee regarding significant judgments, estimates and assumptions (Abernathy, Beyer, Masli, & Stefaniak, 2014), their understanding of financial reporting and disclosure requirements, accounting and reporting, and auditing and professional responsibilities (Aier et al., 2005; Li, Sun, & Ettredge, 2010). Furthermore, Chemmanur et al. (2009) propose that managers with more accounting proficiency may be able to certify firm information to outsiders, thereby diminishing information asymmetry. Because capital markets are imperfect, information asymmetry has a positive relationship with a firm's cost of capital (Armstrong, Core, Taylor, & Verrecchia, 2011). Collectively, a TMT possessing more accounting proficiency has lower information asymmetry (to the financial markets) and a lower cost of capital, which leads to superior operating performance because of a larger number of positive NPV projects available. Consequently, the firms would be less likely to engage in REM activities to achieve their earnings targets.

2.3.2. Managerial entrenchment effect: TMT expertise as an indication of management power

An advantage of TMT expertise is the ability to deal with environmental contingencies and contribute to organizational performance, but TMT expertise may also represent a disadvantage. Managers with relevant expertise are frequently sought for their advice, implying that they may considerably influence a firm's operational strategies (Finkelstein, 1992). Managers with greater power over their firms are more likely to become entrenched and thus more likely to influence the firms in order to increase their private income (Combs & Skill, 2003). To conceal their entrenched behavior, managers may engage in further earnings management (Ding et al., 2007). Moreover, capable managers could mitigate the adverse effects of REM on future firm performance more easily and the costs of REM seem to be less for these managers (Huang & Sun, 2014). Consequently, this increases their incentive to manage earnings under pressure in order to meet their earnings benchmark.

In particular, managers with accounting expertise have a better understanding of accounting and reporting responsibilities, and litigation risk (Aier et al., 2005; Krishnan & Visvanathan, 2008). Since the passing of the SOX Act, the risk associated with AEM is higher than REM (Cohen et al., 2008; Cohen & Zarowin, 2010; Zang, 2012). When accounting discretion is restricted, managers with accounting expertise may resort to operational earnings management techniques, which could be harmful to their firm's long-term growth (Tan & Jamal, 2006). Overall, this study conjectures that TMT expertise has a positive association with REM activity levels.

Because of the ambiguous effect of TMT expertise on REM activity levels, we propose the following nondirectional hypothesis:

H1. A firm's TMT expertise relates to its REM activity level.

This study uses the percentages of TMT members who have a master's degree, manage core functional areas, and have CPA certificates as proxies for TMT expertise (Chemmanur & Paeglis, 2005; Chemmanur et al., 2009; Switzer & Bourdon, 2011). The following sub-hypotheses are stated according to the measures of TMT expertise.

H1a. The percentage of TMT members with a master's degree is associated with REM activity levels.

H1b. The percentage of TMT members managing core functional areas is associated with REM activity levels.

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H1c. The percentage of TMT members with CPA certificates is associated with REM activity levels.

3. Sample and research design

In this section, we define the variables and describe the models used to test our hypotheses, the sample selection process, and summary statistics.

3.1. Measures of TMT expertise

Following Chemmanur et al. (2009), this study defines a firm's TMT as the primary group of executive officers with the rank of vice president or higher[7] and then employs three proxies to measure TMT expertise. The first proxy of TMT expertise is *PMS*, which stands for the percentage of TMT members with a master's degree. The second proxy is *CORE*, which is the percentage of TMT members managing core functional areas. The core functional areas include operations, production, R&D, marketing and sales, and finance. The final proxy is *PCPA*, which is the percentage of TMT members with CPA certificates.[8] In this study, *PMS* captures the level of TMT education, whereas *CORE* and *PCPA* measure the TMT levels of core functional expertise and accounting expertise, respectively. The higher the levels of *PMS*, *CORE*, and *PCPA*, the greater the expertise possessed by the TMT. Based on our hypothesis, we do not predict the sign of the coefficients of *PMS*, *CORE*, and *PCPA*.

3.2. Measures of REM activities

Following Roychowdhury (2006), this study uses three models to capture REM activity levels. The first model measures abnormal cash flows from operations resulting from increased sales through lenient credit terms or sales discounts. To obtain abnormal cash flows, "normal" cash flows are estimated using the following model:

$$CFO_t/A_{t-1} = \alpha_0 + \alpha_1(1/A_{t-1}) + \alpha_2(S_t/A_{t-1}) + \alpha_3(\Delta S_t/A_{t-1}) + \varepsilon_t{}^{CFO},$$

where CFO_t is cash flows from operations, S_t is sales, ΔS_t is the change in sales, and A_{t-1} is lagged total assets. The predicted value of CFO_t is normal cash flows, and the estimated residual is the abnormal cash flows (*R_CFO*). A negative *R_CFO* implies that firms may offer lenient credit terms to boost earnings.

The second model estimates the level of overproduction, which can lower the cost of goods sold and then manipulate earnings upward. The following model is used to assess normal and abnormal production costs:

$$PROD_t/A_{t-1} = \alpha_0 + \alpha_1(1/A_{t-1}) + \alpha_2(S_t/A_{t-1}) + \alpha_3(\Delta S_t/A_{t-1}) + \alpha_4(\Delta S_{t-1}/A_{t-1}) + \varepsilon_t{}^{PROD},$$

where $PROD_t$ is the sum of the cost of goods sold and the change in inventory. The estimated residual of the model is abnormal production costs (*R_PROD*). A positive *R_PROD* implies that firms may produce more goods than necessary, which spreads the fixed overhead costs over more units to lower the cost of the goods sold per unit.

The third model assesses the abnormal reduction of discretionary expenses:

$$DISX_t/A_{t-1} = \alpha_0 + \alpha_1(1/A_{t-1}) + \alpha_2(S_{t-1}/A_{t-1}) + \varepsilon_t{}^{DISX},$$

where $DISX_t$ is the sum of selling, general and administrative, and R&D expenses. Roychowdhury (2006) uses lagged sales (S_{t-1}/A_{t-1})to estimate normal discretionary expenses. A negative estimated residual (*R_DISX*) in this model implies that firms may reduce discretionary expenses intentionally to manage earnings upward.

Overall, higher *R_PROD* values and lower *R_CFO* and *R_DISX* values suggest that firms are more likely to engage in REM activities.[9] In addition, following Cohen et al. (2008), Cohen and Zarowin (2010) and Zang (2012), this study also develops three comprehensive measures (*RM*, *RM1*, and *RM2*). The first measure, *RM*, is calculated by abnormal production minus abnormal cash flows from operations and abnormal discretionary expenses (*R_PROD-R_CFO-R_DISX*). The second measure, *RM1*, equals abnormal production costs minus abnormal discretionary expenses (*R_PROD-R_DISX*). The last measure, *RM2*, equals negative abnormal cash flows from operations minus abnormal discretionary expenses (*−R_CFO-R_DISX*). The higher the amount of these aggregate measures (*RM*, *RM1*, and *RM2*), the more likely it is that the firm engages in REM activities.

3.3. Model specification

This study examines the relationship between TMT expertise and REM activity levels by employing a panel regression model with industry and year fixed effects, as shown in Eq. (1). The dependent variables are the proxies for REM: *R_CFO*, *R_PROD*, *R_DISX*, *RM*, *RM1*, and *RM2*. The independent variables are the TMT expertise proxies (*PMS*, *CORE*, *PCPA*) and the control variables.

$$\begin{aligned} R\_RM = {} & \beta_0 + \beta_1\, PMS + \beta_2\, CORE + \beta_3\, PCPA + \beta_4\, OPCY + \beta_5\, A\_DNI \\ & + \beta_6\, N\_NI + \beta_7\, SG\_F + \beta_8\, SIZE + \beta_9\, LEV + \beta_{10}\, CR + \beta_{11}\, BM \\ & + \beta_{12}\, BIG4 + \beta_{13}\, INST + \varepsilon \end{aligned} \quad (1)$$

where *R_RM* equals REM variables (*R_CFO*, *R_PROD*, *R_DISX*, *RM*, *RM1*, *RM2*). *PMS*, *CORE*, and *PCPA* are the TMT expertise variables. The other variables in Eq. (1) are the control variables: *OPCY* is the length of a firm's operating cycle, defined as the sum of days with inventory outstanding and days with sales outstanding minus days payables outstanding; *A_DNI* equals the absolute value of changes in net income from the previous year; the dummy variable *N_NI* is equal to 1 if the firm had two or more consecutive years of negative income and 0 otherwise; *SIZE* refers to the natural log of the book value of a firm's assets; *SG_F* is the percentage change in sales from the previous year and is positively related to earnings management; *BM* refers to the book value of the assets divided by the market value and is predicted to have a negative coefficient; *LEV* refers to long-term debt plus debt in current liabilities divided by the average total assets; *CR* equals

[7] According to the reporting requirements of Taiwanese listed companies, companies must provide their consolidated annual reports and disclose the names and principal work experience of their main managers, including the general manager, assistant general managers, deputy assistant general managers and the chiefs of all the company's divisions and branch units. We consider these main managers to be the members of the top management team.

[8] This study examines the association between TMT expertise and REM and focuses on accounting knowledge because managers with CPA certificates have better understanding financial reporting requirements and know the risks of failure in financial statements. We do not use CFA qualification as the measure of TMT expertise for the following reasons. First, the number of CFA charterholders among primary managers in Taiwanese listed companies is relatively low. Second, people with CFA qualifications usually work in the financial industry, but the sample used in this study excludes financial firms because the supervision and regulations are different when financial firms and non-financial firms are compared. Therefore, this study restricts its focus to managers with accounting proficiency.

[9] In contrast to AEM, which can manage earnings upward or downward, we only focus on the effect of REM on managing earnings upward because the opposite effects cost a pocket. For example, if firms manage earnings downward by selling fewer products, offering fewer services to their customers, delaying shipping, producing fewer goods than necessary, or spending more than is necessary on SG&A and R&D, these activities cost firms a lot without providing any benefit. However, managing earnings through AEM is a cheaper and more flexible method for shifting current earnings into subsequent years because it can fill the "cookie jar," thus allowing firms to enjoy the "cookies" when they encounter earnings pressure in the future. Moreover, many studies in the REM literature only focus on earnings-increasing REM (Cohen & Zarowin, 2010; Gunny, 2010; Roychowdhury, 2006; Wongsunwai, 2013) and Chi et al. (2011), Cohen et al. (2008) and Ge and Kim (2014) propose that high level of REM indicates a high level of real earnings management. Therefore, this study focuses only on the effect of REM on managing earnings upward and measures the level of real earnings management according to the level of REM.

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current assets divided by the current liability; and *BIG4* equals 1 if a firm hires Big 4 auditors and 0 otherwise. This study includes the length of the operating cycle in year (*OPCY*) to control for flexibility in managing earnings through accruals (Zang, 2012); the absolute value of change in annual earnings (*A_DNI*) to control for its association with earnings management (Klein, 2002)[10]; sales growth (*SG_F*) to control for firm growth (Demers & Wang, 2010; Matsuura, 2008); the dummy variable of negative earnings last year (*N_NI*) to control for the managers' incentive to refresh their company; the nature log of total assets (*SIZE*) to control for firm size (Siriviriyakul, 2013); the leverage ratio (*LEV*) to control for debt covenant restrictiveness (Kim et al., 2011); the current ratio (*CR*) to control for the short-term soundness of firms (Bartov, 1993); the book-to-market ratio (*BM*) to control for firms' growth opportunities (Zang, 2012); the indicator variable of observations audited by a Big 4 auditor (*BIG4*) to control for audit quality (Cohen & Zarowin, 2010; Zang, 2012) and the institutional ownership (*INST*) to control for corporate governance[11] (Zang, 2012).

3.4. Data and sample selection

The data on TMT expertise (*PMS*, *CORE*, and *PCPA*) are hand-collected from annual reports and proxy statements on the Taiwan Stock Exchange website. The necessary financial data used to estimate REM variables (*R_CFO*, *R_PROD*, *R_DISX*, *RM*, *RM1*, and *RM2*) is obtained from the *Taiwan Economic Journal* database. This study uses the following sample selection process: First, our sample is restricted to Taiwanese listed companies from 2006 to 2010. Second, we rule out firms in the financial industry from the sample. Third, firms whose TMT-related data are not available in their annual reports and proxy statements are also excluded. Fourth, the current study excludes sample observations with invalid and missing data. Applying these screening criteria yielded 4,690 firm-year observations for the sample period (2006–2010).

Table 1 presents the distribution of the sample by year and industry. Most observations belong to the electronics industry (57.61%) since this is Taiwan's largest industry. This study also controls for industry and year fixed effects and the estimated standard errors are clustered by firm (Petersen, 2009). In addition, the sample observations exhibit a gradual yearly increase, from 855 observations in 2006 to 1,014 observations in 2010.

Table 1
Sample distribution.
The sample period of this study is from 2006 to 2010. This table reports the number of observations sorted by industry classification code and sample year. The sample includes 4,690 firm-year observations.

Industry (industry classification code)	Year					Total
	2006	2007	2008	2009	2010	
Cement (11)	6	7	5	7	7	32
Food (12)	18	21	20	20	20	99
Plastic (13)	25	25	24	23	24	121
Textile (14)	41	41	39	39	40	200
Electrical machinery (15)	46	47	52	48	53	246
Electrical cable (16)	9	11	11	11	12	54
Chemical and biotechnology (17)	48	54	56	56	60	274
Glass and ceramic (18)	4	4	4	4	4	20
Paper (19)	4	5	6	6	6	27
Iron and steel (20)	28	29	29	27	28	141
Rubber (21)	10	10	9	10	11	50
Automobile (22)	5	5	4	4	5	23
Electronics (23)	475	504	551	572	600	2,702
Construction (25)	40	43	41	40	45	209
Shipping (26)	16	19	18	18	16	87
Tourism (27)	6	7	7	7	8	35
Trade and department store (29)	15	15	13	15	14	72
Petroleum (97)	11	8	9	9	9	46
Others (99)	48	50	48	54	52	252
Total	855	905	946	970	1,014	4,690

4. Empirical analyses

In this section, we provide the descriptive statistics, present the testing of the main hypotheses, and discuss the moderating effect of firm age on the relationship between TMT expertise and REM activity levels. As a robustness check, we also apply several additional analyses, such as suspect-firm analysis, endogeneity tests, controlling for the effects of AEM on REM, and using other TMT expertise measures, such as CEO/CFO expertise and MBA degree.

4.1. Descriptive statistics

The empirical analysis begins by providing descriptive statistics relating to TMT expertise (*PMS*, *CORE*, and *PCPA*), the REM variables (*R_CFO*, *R_PROD*, *R_DISX*, *RM*, *RM1*, *RM2*), and the other control variables. The average values of *R_CFO*, *R_PROD*, *R_DISX*, *RM*, *RM1*, and *RM2* are 0.0226, −0.0264, 0.0221, −0.0701, −0.0488, and −0.0443, respectively. We employ all of the Taiwan listed firms that belong to the same industry and year to estimate REM variables, and then limit our sample firms according to available financial and TMT expertise data when testing our hypotheses. Consequently, the means of the REM variable residuals for the firms shown in Table 2 may not equal zero. Regarding the variables of TMT expertise, approximately 13.1% of the TMT members have master's degrees, 16.1% of the TMT members manage core functions,[12] and 8.7% of the TMT members possess a CPA certificate. These results suggest that managers who have a master's degree, manage core functions, or have accounting expertise are scarce human resources in the TMTs of Taiwanese companies. On average, the length of the operating cycle (*OPCY*) is 0.6010 years. The mean of the absolute value of change in earnings (*A_DNI*) is 0.7243. Approximately 1% of the observations have negative earnings (*N_NI*) in the previous year. The average value of firm size (*SIZE*) and firm sales growth (*SG_F*) are 15.3687 and 0.1932, respectively. The average leverage ratio (*LEV*) is 0.4278. The average values of the current ratio (*CR*) and the book-to- market ratio are 2.304 and 0.9953,[13] respectively. Approximately 73% of the observations are audited by one of the Big 4 auditors (*BIG4*), thus implying that most Taiwan listed firms are audited by the Big 4. The average value of institutional ownership (*INST*) is 1.9028.

[10] In addition, we substitute the variable of changes in net income (*DNI*) for *A_DNI* variable in Eq. (1) and get the similar results.

[11] Prior studies utilize many different variables to measure corporate governance and have provided mixed evidence explaining the effect of corporate governance on REM. In addition to institutional ownership, this study also considers the ratio of shares pledged by board directors and supervisors and the ratio of independent directors to the whole board as alternative measures of corporate governance. The results are robust when institutional ownership (the corporate governance proxy) is replaced by pledge ratio or board independence.

[12] We collate the management team information from firms' consolidated annual reports so that the management team includes managers of subsidiaries. In addition, this study uses a sample of Taiwanese firms whose average firm size tends to be smaller than that found in the sample used by Chemmanur et al. (2009). Therefore, managers in Taiwanese firms are often in charge of multiple fields but the annual reports sometimes disclose only the managers' general job titles, rather than the areas for which they are responsible. This somewhat limits our ability to identify the core function expertise for every manager, so the mean of *CORE* is smaller than that in Chemmanur et al. (2009) due to the data limitations.

[13] Capital market in Taiwan is an emerging market classified by MSCI, FTSE, and S&P and has a higher risk than other developed capital markets, such as North American or Europe. As a result, investors demand higher expected returns from securities in Taiwan. It turns out the average market value is lower and the average BM ratio is larger in Taiwan stock market than those in the developed capital market, and it might limit the generalizability of our research. To mitigate this problem, we have included the BM ratio in our regressions to control for different risks inherent to the stock market. Moreover, our empirical results could apply for other emerging markets such as stock market in Eastern Europe, Latin America, Middle East, Russia and some countries in Southeast Asia. In addition to prior studies that provide management practice in the western world, this study also provides how top managers' behave in the eastern world.

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Table 2
Summary statistics.
This table presents descriptive statistics of all of the variables. *R_CFO*, *R_PROD*, *R_DISX*, *RM*, *RM1*, and *RM2* are proxies for real earnings management. *R_CFO* is abnormal cash flows. *R_PROD* is abnormal production costs. *R_DISX* is abnormal discretionary expenditures. *PMS* is the percentage of a firm's management team with master's degrees. *CORE* is the percentage of management team members in core functional areas: operations and production, research and development, marketing and sales, and finance. *PCPA* is the percentage of a firm's management team who possess public accountant certificate. The control variables include the length of the operating cycle (*OPCY*) in years, firm sales growth (*SG_F*), the absolute value of changes in earnings (*A_DNI*) in trillions, the dummy variable of past negative earnings (*N_NI*), the natural log of firm assets (*SIZE*), the book-to-market ratio (*BM*), the leverage ratio (*LEV*), the current ratio (*CR*), audit quality (*BIG4*), and institutional ownership (*INST*).

	Mean	Standard deviation	Q1	Median	Q3
R_CFO	0.0226	0.1543	−0.0359	0.0227	0.0870
R_PROD	−0.0264	0.1642	−0.0948	−0.0185	0.0436
R_DISX	0.0221	0.0979	−0.0223	0.0114	0.0566
RM	−0.0701	0.3374	−0.2201	−0.0612	0.0685
RM1	−0.0488	0.2380	−0.1466	−0.0358	0.0571
RM2	−0.0443	0.2015	−0.1313	−0.0455	0.0333
PMS	0.1314	0.1897	0.0000	0.0000	0.2000
CORE	0.1610	0.1488	0.0000	0.1430	0.2500
PCPA	0.0870	0.1107	0.0000	0.0530	0.1430
OPCY	0.6010	1.8640	0.2907	0.3966	0.5253
SG_F	0.1932	4.1670	−0.0937	0.0572	0.2298
A_DNI	0.7243	3.2290	0.0419	0.1194	0.3372
N_NI	0.1126	0.3161	0.0000	0.0000	0.0000
SIZE	15.3687	1.4257	14.3682	15.1994	16.1200
LEV	0.4278	0.1779	0.2949	0.4270	0.5502
CR	2.3036	2.2637	1.3229	1.7578	2.5789
BM	0.9953	0.7794	0.5078	0.7964	1.2457
BIG4	0.7299	0.4440	0.0000	1.0000	1.0000
INST	1.9028	3.7219	0.0000	0.0500	2.3200

Table 3 shows the Pearson correlation matrix for the variables used in the study. The *PMS* and *CORE* are both positively correlated with *R_CFO* and *R_DISX* and negatively correlated with *R_PROD* and it suggests that *PMS* and *CORE* are negatively associated with REM, which is consistent with the incentive-reduction effect. The *PCPA* is negatively correlated with *R_CFO* and *R_DISX* and positively correlated with *R_PROD* and it implies that *PCPA* is positively related to REM, which is consistent with the managerial entrenchment effect. However, these correlations are univariate associations and we have to rely on multiple regression analyses for our inferences. Since all the correlations between the control variables are less than 0.21, except for the correlation between *SIZE* and *A_DNI* (0.4175), they are not high enough to cause a multicollinearity problem.

4.2. Effects of TMT expertise on REM

To investigate how TMT expertise affects a firm's REM level, this study adopts panel regressions controlling for industry and year fixed effects, as shown in Eq. (1). Table 4 presents the results of the comprehensive REM measures (*RM*, *RM1*, and *RM2*), whereas the results of the individual REM measures (*R_CFO*, *R_PROD*, *R_DISX*) are presented in Table 5.

Table 4 shows that TMT expertise is significantly associated with REM activity levels. The findings from columns (1) to (3) demonstrate that both *PMS* and *CORE* are negatively related to *RM*, whereas *PCPA* is positively related to *RM*. The coefficients (−0.2432, −0.1358, and 0.2199) show that *RM* decreases by 0.0461 units (0.2432 × 0.1897), decreases by 0.0202 units (−0.1358 × 0.1488), and increases by 0.0243 units (0.2199 × 0.1107) for an increase of one standard deviation in *PMS*, *CORE*, and *PCPA*, respectively. Column (4) indicates that the effects of *PMS*, *CORE*, and *PCPA* are still significant when all of the measures of TMT expertise are in the same regression model.

Regarding the results of the control variables, the book-to-market ratio (*BM*) is the most significant control variable that is positively related to *RM*, suggesting that firms with lower potential growth (higher *BM*) would more likely engage in REM activities to boost earnings. The

Table 3
Pearson correlation matrix.
This table presents Pearson correlations of all of the variables. *R_CFO* is abnormal cash flows. *R_PROD* is abnormal production costs. *R_DISX* is abnormal discretionary expenditures. *PMS* is the percentage of a firm's management team with master's degrees. *CORE* is the percentage of management team members in core functional areas: operations and production, research and development, marketing and sales, and finance. *PCPA* is the percentage of a firm's management team who possess public accountant certificate. The control variables include the length of the operating cycle (*OPCY*) in years, firm sales growth (*SG_F*), the absolute value of changes in earnings (*A_DNI*) in trillions, the dummy variable of past negative earnings (*N_NI*), the natural log of firm assets (*SIZE*), the book-to-market ratio (*BM*), the leverage ratio (*LEV*), the current ratio (*CR*), audit quality (*BIG4*), and institutional ownership (*INST*).

	R_CFO	*R_PROD*	*R_DISX*	*PMS*	*CORE*	*PCPA*	*OPCY*	*SG_F*	*A_DNI*	*N_NI*	*SIZE*	*LEV*	*CR*	*BM*	*BIG4*
R_PROD	−0.5195***														
R_DISX	0.1814***	−0.6251***													
PMS	0.1160***	−0.1577***	0.1648***												
CORE	0.0420***	−0.0825***	0.0800***	0.0829***											
PCPA	−0.0367***	0.0557***	−0.0825***	−0.0687***	0.1774***										
OPCY	−0.0023	−0.0226*	−0.0150	−0.0234*	0.0310**	0.0178									
SG_F	−0.0180	0.0053	−0.0171	0.0330**	0.0134	−0.0036	−0.0029								
A_DNI	0.0671***	0.0045	−0.0184	0.1481***	−0.0642***	−0.0621***	−0.0072	0.0087							
N_NI	−0.1121***	0.1277***	−0.0028	−0.0202	−0.0171	0.0180	0.0574***	0.0251**	0.0239*						
SIZE	0.0754***	0.0193	−0.0407**	0.0593***	−0.2524***	−0.1060***	−0.0162	−0.0055	0.4175***	−0.1446***					
LEV	−0.0207*	0.0589***	−0.0269**	−0.0410***	−0.1226**	−0.0320**	0.0254	−0.0054***	0.1077***	0.1735***	0.0966				
CR	0.0284**	−0.0381***	−0.0123	0.0813***	0.0749***	0.0138	0.1385***	0.0050	−0.0165	−0.0018	−0.0578***	−0.0581***			
BM	−0.0369***	0.0735***	−0.0445**	−0.1324***	−0.0884***	−0.0110	0.0140	−0.0123	−0.0259*	0.0318**	0.0065	−0.1727***	−0.0118		
BIG4	0.0284**	−0.0476***	0.0417**	0.0644***	0.0104	−0.0320**	−0.0317***	−0.0094	0.0021	−0.1308***	0.0716***	−0.0813***	0.0225*	−0.0195	
INST	0.0657***	−0.0387***	0.0017	0.0598***	−0.0306**	−0.0307**	−0.0177**	−0.0102	0.0631***	−0.0977***	0.2017***	0.0227*	−0.0162	−0.1096***	0.0898***

Table 4
Regression of management team expertise against real earnings management (*RM, RM1, RM2*).
This table shows the results of eight regressions for various variables of management team expertise with RM, RM1, and RM2 as the dependent variable by using observations from 2006 to 2010. The fixed effects (industry and year) and one-way clustering by firm are considered in these results. Management team expertise includes *PMS*, *CORE*, and *PCPA*. The control variables include the length of the operating cycle (*OPCY*), the absolute value of changes in earnings (*A_DNI*), the dummy variable of past negative earnings (*N_NI*), the natural log of firm assets (*SIZE*), firm sales growth (*SG_F*), the leverage ratio (*LEV*), the current ratio (*CR*), the book-to-market ratio (*BM*), audit quality (*BIG4*), and institutional ownership (*INST*). ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	Pred. sign	RM				RM1				RM2			
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Intercept		−0.2318*	−0.1375	−0.1432	−0.0692	−0.2602***	−0.1951**	−0.2465**	−0.2011**	−0.0676	−0.0209	−0.0339	0.0165
		(−1.8657)	(−1.1141)	(−1.1557)	(−0.5294)	(−2.7193)	(−2.0492)	(−2.5315)	(−1.9791)	(−1.0398)	(−0.3187)	(−0.5223)	(0.2375)
PMS	+/−	−0.2432***			−0.1827***	−0.1923***			−0.1606***	−0.1359***			−0.1018***
		(−4.9866)			(−3.6427)	(−5.1625)			(−4.1773)	(−4.8752)			(−3.5127)
CORE	+/−		−0.1358**		−0.1478**		−0.0836**		−0.0985**		−0.0766**		−0.0935***
			(−2.4298)		(−2.4550)		(−1.9928)		(−2.1026)		(−2.4451)		(−2.6489)
PCPA	+/−			0.2199**	0.2165**			0.1909***	0.1826***			0.1320***	0.1326***
				(2.4705)	(2.4093)			(2.8839)	(2.7323)			(2.7695)	(2.7463)
OPCY	+/−	−0.0001	−0.0000	0.0204***	0.0176***	−0.0002	−0.0001	0.0093***	0.0069**	0.0001	0.0002	0.0116***	0.0101***
		(−0.1891)	(−0.0026)	(4.6938)	(4.1602)	(−0.7284)	(−0.4755)	(2.7545)	(2.1044)	(0.7275)	(0.8880)	(3.7166)	(3.2831)
A_DNI	–	−0.0022	−0.0034*	−0.0023	−0.0009	−0.0001	−0.0011	−0.0008	0.0004	−0.0017	−0.0023**	−0.0020*	−0.0011
		(−1.1593)	(−1.8643)	(−1.2445)	(−0.5035)	(−0.0443)	(−0.8770)	(−0.6254)	(0.3382)	(−1.6395)	(−2.3196)	(−1.9178)	(−1.1576)
N_NI	+	0.1085***	0.0977***	0.0933***	0.0926***	0.0637***	0.0576***	0.0599***	0.0596***	0.0532***	0.0485***	0.0492***	0.0480**
		(4.5566)	(4.4468)	(4.1219)	(4.0429)	(3.8437)	(3.6414)	(3.4493)	(3.4391)	(2.9257)	(2.9506)	(2.6038)	(2.5080)
SIZE	+/−	0.0069	0.0007	−0.0010	−0.0029	0.0111*	0.0064	0.0078	0.0071	0.0009	−0.0023	−0.0018	−0.0033
		(0.8436)	(0.0883)	(−0.1169)	(−0.3336)	(1.7849)	(1.0557)	(1.2321)	(1.0824)	(0.2076)	(−0.5449)	(−0.4116)	(−0.7410)
SG_F	+	0.0206	0.0223	0.0851*	0.0831*	0.0044	0.0057	0.0363***	0.0345**	0.0017	0.0016	0.0023	0.0024
		(0.6181)	(0.6691)	(1.8448)	(1.8013)	(0.3388)	(0.4322)	(2.6582)	(2.5709)	(1.0064)	(0.9571)	(1.2408)	(1.2777)
LEV	+	0.1275*	0.1192*	0.0579	0.0722	0.1069*	0.1053**	0.0776	0.0898	0.0342	0.0278	−0.0157	−0.0070
		(1.7029)	(1.7420)	(0.7468)	(0.9096)	(1.8479)	(2.0120)	(1.3007)	(1.4571)	(0.8415)	(0.7508)	(−0.3679)	(−0.1586)
CR	–	−0.0053	−0.0059	−0.0266***	−0.0231***	−0.0022	−0.0028	−0.0125***	−0.0094**	−0.0034	−0.0038	−0.0158***	−0.0138***
		(−1.4041)	(−1.4176)	(−5.3956)	(−4.7432)	(−1.1883)	(−1.2518)	(−3.1438)	(−2.4309)	(−1.3797)	(−1.3836)	(−4.5400)	(−3.9290)
BM	+	0.0641***	0.0667***	0.0837***	0.0776***	0.0507***	0.0531***	0.0644***	0.0596***	0.0270***	0.0288***	0.0331***	0.0291***
		(4.9771)	(5.6085)	(6.3917)	(5.9155)	(5.0842)	(5.7801)	(6.1830)	(5.7067)	(3.9635)	(4.5702)	(4.6307)	(4.0058)
BIG4	–	0.0045	−0.0014	−0.0024	−0.0034	−0.0039	−0.0082	−0.0085	−0.0102	0.0033	0.0001	0.0005	0.0005
		(0.2325)	(−0.0751)	(−0.1229)	(−0.1712)	(−0.2598)	(−0.5800)	(−0.5493)	(−0.6582)	(0.3187)	(0.0107)	(0.0505)	(0.0446)
INST	–	−0.0041	−0.0042	−0.0037	−0.0030	−0.0013	−0.0014	−0.0013	−0.0007	−0.0024	−0.0025*	−0.0027*	−0.0022
		(−1.4417)	(−1.5052)	(−1.2955)	(−1.0392)	(−0.6217)	(−0.6835)	(−0.6121)	(−0.3253)	(−1.5999)	(−1.6857)	(−1.6924)	(−1.4124)
Obs		3,880	4,147	3,618	3,531	3,880	4,147	3,618	3,531	4,060	4,337	3,782	3,693
R^2		0.0773	0.0657	0.1102	0.1228	0.0753	0.0599	0.0859	0.1033	0.0588	0.0486	0.0688	0.0799
Adj R^2		0.0694	0.0582	0.1020	0.1143	0.0674	0.0524	0.0775	0.0945	0.0511	0.0413	0.0606	0.0714

Table 5
Regression of management team expertise against real earnings management (*R_CFO, R_PROD, R_DISX*).
This table shows the results of eight regressions for various variables of management team expertise with RM as the dependent variable by using observations from 2006 to 2010. The fixed effects (industry and year) and one-way clustering by firm are considered in these results. Management team expertise includes *PMS*, *CORE*, and *PCPA*. The control variables include the length of the operating cycle (*OPCY*), the absolute value of changes in earnings (*A_DNI*), the dummy variable of past negative earnings (*N_NI*), the natural log of firm assets (*SIZE*), firm sales growth (*SG_F*), the leverage ratio (*LEV*), the current ratio (*CR*), the book-to-market ratio (*BM*), audit quality (*BIG4*), and institutional ownership (*INST*). ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	Pred. sign	*R_CFO*				*R_PROD*				*R_DISX*			
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Intercept		−0.0324	−0.0568	−0.0734*	−0.1051**	−0.1503***	−0.1100*	−0.1307**	−0.1050*	0.0910**	0.0681*	0.1105***	0.0899**
		(−0.8115)	(−1.3968)	(−1.8025)	(−2.3687)	(−2.6461)	(−1.9302)	(−2.2509)	(−1.7106)	(2.2798)	(1.7246)	(2.7009)	(2.1553)
PMS	+/−	0.0584***			0.0438**	−0.1175***			−0.1067***	0.0822***			0.0739***
		(3.3158)			(2.2231)	(−5.3182)			(−4.5737)	(5.1111)			(4.4118)
CORE	+/−		0.0481**		0.0566**		−0.0514**		−0.0580**		0.0291		0.0403*
			(2.2923)		(2.3741)		(−2.0332)		(−2.0452)		(1.5468)		(1.9118)
PCPA	+/−			−0.0290	−0.0341			0.0946**	0.0892**			−0.0903***	−0.0857***
				(−0.9575)	(−1.0894)			(2.2886)	(2.1321)			(−3.3615)	(−3.1703)
OPCY	+/−	−0.0001	−0.0001	−0.0052*	−0.0050*	−0.0003	−0.0002	0.0039	0.0036*	−0.0001	−0.0001	−0.0025**	−0.0015
		(−0.5191)	(−0.6703)	(−1.6983)	(−1.7632)	(−1.2700)	(−1.0431)	(1.6092)	(1.8389)	(−1.0899)	(−1.2572)	(−2.4120)	(−1.5428)
A_DNI	–	0.0020**	0.0023***	0.0020**	0.0016*	−0.0004	−0.0009	−0.0008	0.0000	−0.0006	−0.0001	0.0001	−0.0006
		(2.3241)	(2.6983)	(2.2429)	(1.8800)	(−0.4131)	(−1.0845)	(−0.8424)	(0.0206)	(−1.2092)	(−0.2779)	(0.1071)	(−1.0517)
N_NI	+	−0.0510***	−0.0460***	−0.0463***	−0.0462***	0.0615***	0.0555***	0.0594***	0.0604***	−0.0051	−0.0050	−0.0055	−0.0048
		(−3.6663)	(−3.6304)	(−3.1057)	(−3.0230)	(5.5808)	(5.3321)	(5.0574)	(5.0761)	(−0.6809)	(−0.6913)	(−0.6733)	(−0.6020)
SIZE	+/−	0.0043*	0.0057**	0.0069***	0.0081***	0.0059	0.0031	0.0034	0.0032	−0.0045*	−0.0027	−0.0049*	−0.0045*
		(1.6672)	(2.2457)	(2.6475)	(2.8979)	(1.5952)	(0.8542)	(0.8869)	(0.8035)	(−1.7687)	(−1.0901)	(−1.8521)	(−1.6933)
SG_F	+	−0.0009	−0.0008	−0.0013	−0.0013	−0.0061	−0.0061	0.0041	0.0047	−0.0007	−0.0007	−0.0008	−0.0008*
		(−0.7476)	(−0.7094)	(−0.9667)	(−1.0038)	(−0.9739)	(−0.9741)	(0.5029)	(0.6358)	(−1.4625)	(−1.3440)	(−1.5914)	(−1.7055)
LEV	+	−0.0163	−0.0098	0.0044	0.0036	0.0729**	0.0719**	0.0614*	0.0652*	−0.0231	−0.0237	−0.0147	−0.0209
		(−0.6832)	(−0.4320)	(0.1594)	(0.1313)	(2.1312)	(2.2994)	(1.7165)	(1.7825)	(−0.9533)	(−1.0919)	(−0.5914)	(−0.8076)
CR	–	0.0027	0.0028	0.0090***	0.0085***	−0.0013	−0.0016	−0.0063**	−0.0054**	0.0008	0.0011	0.0036***	0.0022**
		(1.3738)	(1.3766)	(2.8417)	(2.7554)	(−1.0072)	(−1.0879)	(−2.3018)	(−2.1978)	(1.3264)	(1.3392)	(3.0892)	(2.0236)
BM	+	−0.0118***	−0.0126***	−0.0146***	−0.0123***	0.0339***	0.0356***	0.0419***	0.0384***	−0.0142***	−0.0152***	−0.0174***	−0.0150***
		(−2.8696)	(−3.2644)	(−3.3432)	(−2.6719)	(5.4692)	(6.1732)	(6.2235)	(5.6727)	(−3.7054)	(−4.2574)	(−4.2417)	(−3.7060)
BIG4	–	−0.0072	−0.0058	−0.0067	−0.0076	0.0003	−0.0025	−0.0015	−0.0012	0.0028	0.0049	0.0048	0.0057
		(−1.1120)	(−0.9595)	(−1.0020)	(−1.1104)	(0.0307)	(−0.3009)	(−0.1616)	(−0.1293)	(0.4126)	(0.7584)	(0.6838)	(0.8137)
INST	–	0.0022***	0.0023***	0.0022**	0.0021**	−0.0012	−0.0012	−0.0012	−0.0009	−0.0003	−0.0002	−0.0001	−0.0004
		(2.6939)	(2.8321)	(2.5334)	(2.3762)	(−0.9962)	(−1.0735)	(−0.9585)	(−0.7471)	(−0.3733)	(−0.3040)	(−0.0954)	(−0.4545)
Obs		4,404	4,690	4,079	3,981	4,213	4,489	3,907	3,811	4,060	4,337	3,782	3,693
R^2		0.0474	0.0443	0.0557	0.0604	0.0758	0.0634	0.0761	0.0913	0.0553	0.0373	0.0491	0.0705
Adj R^2		0.0402	0.0376	0.0480	0.0523	0.0685	0.0565	0.0682	0.0831	0.0475	0.0299	0.0407	0.0618

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Table 6
Regression of management team expertise against earnings management for firms with earnings management incentives (*RM, RM1, RM2*).
This table shows the results of eight regressions for various variables of management team expertise with *RM* as the dependent variable by using sample firms with earnings change per assets ranging from 0% to 1%. The fixed effects (industry and year) and one-way clustering by firm are considered in these results. Management team expertise includes *PMS*, *CORE*, and *PCPA*. The control variables include the length of the operating cycle (*OPCY*), the absolute value of changes in earnings (*A_DNI*), the dummy variable of past negative earnings (*N_NI*), the natural log of firm assets (*SIZE*), firm sales growth (*SG_F*), the leverage ratio (*LEV*), the current ratio (*CR*), the book-to-market ratio (*BM*), audit quality (*BIG4*), and institutional ownership (*INST*). ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	Pred. sign	*RM*				*RM1*				*RM2*			
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Intercept		−0.0900	0.0858	−0.0888	−0.0919	−0.2236	−0.0999	−0.2389	−0.2513	0.0358	0.1242	0.0167	0.0278
		(−0.3504)	(0.3305)	(−0.3330)	(−0.3349)	(−1.0834)	(−0.4854)	(−1.1081)	(−1.1678)	(0.2703)	(0.9122)	(0.1211)	(0.1973)
PMS	+/−	−0.2600***			−0.2553**	−0.1801**			−0.1772**	−0.1062*			−0.1068*
		(−2.7340)			(−2.5793)	(−2.4367)			(−2.2544)	(−1.7859)			(−1.7883)
CORE	+/−		−0.1219		−0.1498		−0.0740		−0.0981		−0.0801		−0.0933
			(−0.9979)		(−1.0609)		(−0.7169)		(−0.8210)		(−1.2534)		(−1.3032)
PCPA	+/−			0.3871**	0.3729**			0.3073**	0.2989**			0.2472***	0.2492***
				(2.2703)	(2.2712)			(2.2430)	(2.2545)			(2.6472)	(2.7080)
OPCY	+/−	0.0092	0.0096	0.0069	0.0074	0.0056	0.0057	0.0041	0.0044	0.0036	0.0038	0.0019	0.0023
		(1.3594)	(1.5300)	(1.0827)	(1.0907)	(1.1420)	(1.2166)	(0.8634)	(0.8887)	(0.8753)	(0.9859)	(0.4555)	(0.5494)
A_DNI	–	0.0366	0.0425	0.0361	0.0320	0.0245	0.0292	0.0234	0.0195	0.0270	0.0299	0.0252	0.0220
		(0.4963)	(0.5373)	(0.4335)	(0.4091)	(0.4874)	(0.5388)	(0.4090)	(0.3661)	(0.6518)	(0.6792)	(0.5495)	(0.5054)
N_NI	+	0.0973	0.0971*	0.1064	0.1164	0.0665	0.0682*	0.1002**	0.1072**	0.0505	0.0520	0.0561	0.0639
		(1.5096)	(1.6985)	(1.4550)	(1.5378)	(1.4820)	(1.7099)	(2.0736)	(2.1433)	(1.3471)	(1.5771)	(1.1366)	(1.2258)
SIZE	+/−	0.0054	−0.0067	0.0022	0.0053	0.0136	0.0051	0.0120	0.0147	−0.0040	−0.0100	−0.0039	−0.0032
		(0.3313)	(−0.4139)	(0.1296)	(0.3045)	(1.0410)	(0.3938)	(0.8701)	(1.0797)	(−0.4728)	(−1.1674)	(−0.4477)	(−0.3640)
SG_F	+	0.0986	0.1140*	0.1256	0.1094	0.0818*	0.0900**	0.1001*	0.0898	0.0943*	0.0974**	0.1178**	0.1118*
		(1.5150)	(1.8493)	(1.6089)	(1.3739)	(1.7526)	(2.0013)	(1.8258)	(1.6212)	(1.9476)	(2.1153)	(2.1789)	(1.9535)
LEV	+	−0.1369	−0.1254	−0.1504	−0.1074	−0.0720	−0.0751	−0.0905	−0.0428	−0.0142	−0.0216	−0.0355	−0.0016
		(−0.8897)	(−0.8474)	(−0.8294)	(−0.6008)	(−0.5731)	(−0.6230)	(−0.6131)	(−0.2920)	(−0.1387)	(−0.2243)	(−0.3172)	(−0.0139)
CR	–	−0.0408***	−0.0423***	−0.0467***	−0.0408**	−0.0246**	−0.0254**	−0.0289**	−0.0246**	−0.0175*	−0.0186**	−0.0207**	−0.0173*
		(−2.6986)	(−2.7769)	(−2.7573)	(−2.5829)	(−2.3914)	(−2.4569)	(−2.5068)	(−2.2734)	(−1.9233)	(−1.9867)	(−2.0627)	(−1.8433)
BM	+	0.0555***	0.0599***	0.0676***	0.0596***	0.0380**	0.0413***	0.0478***	0.0430**	0.0269***	0.0304***	0.0328***	0.0288***
		(2.7478)	(3.2431)	(3.1200)	(2.7841)	(2.3208)	(2.7812)	(2.7095)	(2.4616)	(2.6273)	(3.0735)	(2.9443)	(2.6798)
BIG4	–	0.0112	0.0068	0.0051	−0.0003	0.0094	0.0072	0.0068	0.0001	0.0038	0.0032	0.0008	−0.0035
		(0.3576)	(0.2248)	(0.1468)	(−0.0094)	(0.3741)	(0.2921)	(0.2414)	(0.0041)	(0.2163)	(0.1895)	(0.0414)	(−0.1911)
INST	–	−0.0006	−0.0000	−0.0021	−0.0018	0.0007	0.0012	−0.0007	−0.0004	−0.0003	−0.0000	−0.0014	−0.0010
		(−0.1322)	(−0.0071)	(−0.4235)	(−0.3594)	(0.1923)	(0.3229)	(−0.1744)	(−0.0908)	(−0.1232)	(−0.0099)	(−0.5038)	(−0.3525)
Obs		386	422	349	340	386	422	349	340	405	443	367	357
R^2		0.1730	0.1446	0.1679	0.1978	0.1627	0.1294	0.1545	0.1854	0.1396	0.1227	0.1462	0.1690
Adj R^2		0.0981	0.0718	0.0836	0.1084	0.0868	0.0554	0.0688	0.0946	0.0656	0.0519	0.0644	0.0813

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Table 7
Regression of management team expertise against earnings management: Firm age perspective.
This table shows the results of nine different regressions for various variables of TMT expertise with *RM*, *RM1*, and *RM2* as the dependent variables by using data observations from 2006 to 2010. The fixed effects (industry and year) and one-way clustering by firm are considered in these results. TMT expertise includes *PMS*, *CORE*, and *PCPA*. The control variables include the length of the operating cycle (*OPCY*), the absolute value of changes in earnings (*A_DNI*), the dummy variable of past negative earnings (*N_NI*), the natural log of firm assets (*SIZE*), firm sales growth (*SG_F*), the leverage ratio (*LEV*), the current ratio (*CR*), the book-to-market ratio (*BM*), audit quality (*BIG4*), institutional ownership (*INST*), and firm age (*AGE*). *PMS* × *AGE*, *CORE* × *AGE*, and *PCPA* × *AGE* are the interaction terms. The joint significance tests (*PMS*, *PMS* × *AGE*, *AGE*; *CORE*, *CORE* × *AGE*, *AGE*; *PCPA*, *PCPA* × *AGE*, *AGE*) are also provided. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	Pred. sign	*PMS*			*CORE*			*PCPA*		
		(1)RM	(2)RM1	(3)RM2	(4)RM	(5)RM1	(6)RM2	(7)RM	(8)RM1	(9)RM2
Intercept		−0.2211*	−0.2646***	−0.0600	−0.1343	−0.1963**	−0.0195	−0.2103*	−0.2874***	−0.0604
		(−1.7902)	(−2.7878)	(−0.9217)	(−1.0908)	(−2.0801)	(−0.3003)	(−1.6918)	(−2.9510)	(−0.9208)
PMS	+/−	−0.4794***	−0.3576***	−0.2497***						
		(−4.4843)	(−4.4921)	(−4.0944)						
PMS × *AGE*	+/−	0.0117***	0.0080**	0.0061**						
		(2.7273)	(2.4395)	(2.4954)						
CORE	+/−				−0.3565***	−0.2538***	−0.1832***			
					(−3.0616)	(−2.8117)	(−2.8809)			
CORE × *AGE*	+/−				0.0099***	0.0072***	0.0050**			
					(2.8197)	(2.6071)	(2.5265)			
PCPA	+/−							0.5114**	0.3851**	0.2804**
								(2.3572)	(2.4381)	(2.4142)
PCPA × *AGE*	+/−							−0.0121*	−0.0085*	−0.0064*
								(−1.8267)	(−1.7723)	(−1.7959)
AGE	–	−0.0026***	−0.0018**	−0.0012**	−0.0015	−0.0010	−0.0006	0.0008	0.0009	0.0005
		(−2.7311)	(−2.4726)	(−2.3122)	(−1.5616)	(−1.3406)	(−1.1030)	(0.7888)	(1.1596)	(0.9118)
OPCY	+/−	−0.0002	−0.0002	0.0001	−0.0001	−0.0002	0.0002	0.0192***	0.0090***	0.0109***
		(−0.3790)	(−0.8033)	(0.6571)	(−0.1831)	(−0.5744)	(0.8328)	(4.5958)	(2.6446)	(3.6333)
A_DNI	–	−0.0027	−0.0005	−0.0019*	−0.0036**	−0.0013	−0.0023**	−0.0027	−0.0010	−0.0020*
		(−1.3741)	(−0.3884)	(−1.8025)	(−1.9725)	(−1.0986)	(−2.2921)	(−1.4559)	(−0.8017)	(−1.9226)
N_NI	+	0.0952***	0.0585***	0.0378***	0.0902***	0.0558***	0.0369***	0.0867***	0.0558***	0.0339**
		(4.3704)	(3.6474)	(2.8189)	(4.4197)	(3.6044)	(2.9752)	(3.8445)	(3.2523)	(2.3992)
SIZE	+/−	0.0109	0.0144**	0.0023	0.0030	0.0080	−0.0016	0.0028	0.0091	−0.0009
		(1.3269)	(2.3138)	(0.5238)	(0.3739)	(1.3034)	(−0.3800)	(0.3362)	(1.4238)	(−0.2098)
SG_F	+	−0.0073	−0.0010	0.0005*	−0.0049	0.0007	0.0005	0.0320**	0.0327**	0.0012***
		(−0.5866)	(−0.0932)	(1.7337)	(−0.3806)	(0.0610)	(1.5390)	(2.5100)	(1.9834)	(3.3427)
LEV	+	0.1153	0.1060*	0.0338	0.1157*	0.1100**	0.0305	0.0441	0.0786	−0.0159
		(1.5001)	(1.7843)	(0.8090)	(1.6557)	(2.0618)	(0.8052)	(0.5634)	(1.3010)	(−0.3670)
CR	–	−0.0046	−0.0018	−0.0030	−0.0056	−0.0026	−0.0035	−0.0254***	−0.0122***	−0.0150***
		(−1.2822)	(−1.0197)	(−1.2875)	(−1.4078)	(−1.2469)	(−1.3958)	(−5.4762)	(−3.0516)	(−4.5107)
BM	+	0.0673***	0.0519***	0.0302***	0.0696***	0.0539***	0.0315***	0.0838***	0.0647***	0.0367***
		(5.2206)	(5.0431)	(4.7503)	(6.0015)	(5.8353)	(5.5056)	(6.3642)	(6.1297)	(5.5300)
BIG4	–	−0.0039	−0.0069	−0.0013	−0.0041	−0.0074	−0.0018	−0.0043	−0.0073	−0.0019
		(−0.2112)	(−0.4698)	(−0.1290)	(−0.2321)	(−0.5270)	(−0.1875)	(−0.2216)	(−0.4705)	(−0.1841)
INST	–	−0.0039	−0.0013	−0.0022	−0.0044	−0.0017	−0.0025*	−0.0038	−0.0014	−0.0025
		(−1.3853)	(−0.6272)	(−1.4722)	(−1.5863)	(−0.8202)	(−1.7028)	(−1.3184)	(−0.6360)	(−1.5956)
Joint test F statistic		9.4662***	10.2491***	8.2455***	3.1340**	2.6601**	2.8689**	2.2736*	2.6578**	2.4744*
P-value		0.0000	0.0000	0.0000	0.0248	0.0470	0.0355	0.0786	0.0472	0.0603
Obs		3,856	3,856	4,036	4,123	4,123	4,313	3,601	3,601	3,765
R^2		0.0826	0.0817	0.0696	0.0675	0.0636	0.0565	0.0930	0.0842	0.0782
Adj R^2		0.0742	0.0733	0.0615	0.0595	0.0556	0.0488	0.0841	0.0752	0.0695

indication of prior negative earning (*N_NI*) is significantly and positively related to *RM*, implying that firms may avoid the continuity of loss through REM activities. As shown in columns (3) and (4) of Table 4, the other control variables, such as *OPCY*, *SG_F*, and *CR*, are also significantly related to *RM*, suggesting that firms' operating characteristics have significant impacts on REM levels.

The results of columns (5) to (12) of Table 4 show the effects of TMT expertise on REM activity levels as measured by other comprehensive REM variables, *RM1* and *RM2*, respectively. The results are similar to those shown in column (1)–(4) of Table 4. In other words, both *PMS* and *CORE* are significantly and negatively associated with REM, whereas *PCPA* is significantly and positively associated with REM. For example, the results in column (8) of Table 4 show that the *PMS*, *CORE*, and *PCPA* coefficients are −0.1606, −0.0985, and 0.1826, respectively. The *PMS*, *CORE*, and *PCPA* coefficients in column (12) of Table 4 are −0.1018, −0.0935, and 0.1326, respectively, with all exhibiting significance at the 1% level.

These above results reveal that a firm with a higher percentage of TMT members who have a master's degree or manage core functional areas would have a lower REM level. Hypothesis H1 suggests that a TMT with a higher education level and greater core functional expertise is likely to engage in fewer REM activities, supporting the argument that the incentive-reduction effect dominates the managerial entrenchment effect. Specifically, managers with higher education levels and greater core functional knowledge have greater and higher quality management capacity. Hence, they can meet their earnings targets and are less likely to manage earnings through REM.

In contrast with the *PMS* and *CORE* results, a TMT with greater accounting proficiency (*PCPA*) is likely to engage in more REM activities, suggesting that a TMT with more accounting proficiency can induce the managerial entrenchment effect and increase incentives to manage earnings. This finding can be explained by the following: First, a TMT with accounting proficiency has more knowledge of accounting and reporting responsibilities and litigation risk (Aier et al., 2005; Krishnan & Visvanathan, 2008), so it assumes that AEM will be scrutinized by auditors and is therefore less likely to involve in accrual-based earnings management. Furthermore, the regulation risk associated with AEM is higher than REM since the reform of the institutional environment

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Table 8
Endogeneity discussions in the relation between management team expertise and earnings management (omitting variable problem)
This table shows the results of nine different regressions for various variables of TMT expertise with *RM*, *RM1*, and *RM2* as the dependent variables by using data observations from 2006 to 2010. The fixed effects (industry and year) and one-way clustering by firm are considered in these results. Management team expertise includes *PMS*, *CORE*, and *PCPA*. The instrumental variables (*IV*) of *PMS*, *CORE*, and *PCPA* are PMS_{t-1}, $CORE_{t-1}$, and $PCPA_{t-1}$, respectively. The control variables include the length of the operating cycle (*OPCY*), the absolute value of changes in earnings (*A_DNI*), the dummy variable of past negative earnings (*N_NI*), the natural log of firm assets (*SIZE*), firm sales growth (*SG_F*), the leverage ratio (*LEV*), the current ratio (*CR*), the book-to-market ratio (*BM*), audit quality (*BIG4*), and institutional ownership (*INST*),. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	Pred. sign	*RM*			*RM1*			*RM2*		
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Intercept		−0.2046	−0.1027	−0.1068	−0.2464**	−0.1759*	−0.2311**	−0.0652	0.0054	0.0125
		(−1.5544)	(−0.7743)	(−0.7998)	(−2.4408)	(−1.7151)	(−2.1452)	(−0.9037)	(0.0756)	(0.1618)
PMS_{t-1}	+/−	−0.2778***			−0.2266***			−0.1424***		
		(−5.0041)			(−5.3963)			(−4.4049)		
$CORE_{t-1}$	+/−		−0.1617**			−0.0990*			−0.1109***	
			(−2.3180)			(−1.8722)			(−2.8056)	
$PCPA_{t-1}$	+/−			0.2741**			0.2273***			0.1216*
				(2.3670)			(2.6255)			(1.8106)
OPCY	+/−	0.0005	0.0007	0.0075	0.0002	0.0004	0.0007	0.0004	0.0005	0.0045
		(1.3107)	(1.5558)	(1.0008)	(1.1083)	(1.4735)	(0.1465)	(1.3917)	(1.5746)	(1.0359)
A_DNI	–	−0.0010	−0.0024	−0.0015	0.0007	−0.0005	−0.0004	−0.0011	−0.0018*	−0.0012
		(−0.5601)	(−1.3509)	(−0.7778)	(0.5127)	(−0.4410)	(−0.2854)	(−1.1427)	(−1.7799)	(−1.1053)
N_NI	+	0.1247***	0.1124***	0.1076***	0.0757***	0.0683***	0.0717***	0.0554***	0.0495***	0.0399**
		(4.7889)	(4.7011)	(4.3741)	(4.0651)	(3.8519)	(3.5998)	(3.1661)	(3.1680)	(2.5691)
SIZE	+/−	0.0072	0.0003	−0.0016	0.0116*	0.0064	0.0079	0.0006	−0.0037	−0.0051
		(0.8370)	(0.0371)	(−0.1767)	(1.7889)	(0.9869)	(1.1653)	(0.1356)	(−0.7913)	(−1.0125)
SG_F	+	0.0177	0.0196	0.0808	0.0013	0.0028	0.0300**	0.0250	0.0258	0.0695
		(0.5279)	(0.5796)	(1.6041)	(0.1141)	(0.2290)	(2.2919)	(0.8625)	(0.8892)	(1.3572)
LEV	+	0.1217	0.1152	0.0596	0.1015*	0.1026*	0.0774	0.0541	0.0467	0.0134
		(1.5379)	(1.5889)	(0.7205)	(1.6705)	(1.8631)	(1.2165)	(1.2302)	(1.1542)	(0.2766)
CR	–	−0.0062*	−0.0071	−0.0276***	−0.0030	−0.0038	−0.0130***	−0.0041	−0.0046	−0.0184***
		(−1.6501)	(−1.6389)	(−5.0292)	(−1.6088)	(−1.6273)	(−2.7303)	(−1.4409)	(−1.4771)	(−3.5796)
BM	+	0.0666***	0.0710***	0.0876***	0.0527***	0.0564***	0.0679***	0.0292***	0.0312***	0.0403***
		(4.8032)	(5.4144)	(6.1796)	(4.8880)	(5.5683)	(5.9575)	(4.0160)	(4.5147)	(5.6410)
BIG4	–	0.0083	0.0017	−0.0010	−0.0005	−0.0057	−0.0058	0.0065	0.0027	−0.0004
		(0.4243)	(0.0926)	(−0.0487)	(−0.0350)	(−0.3963)	(−0.3722)	(0.5817)	(0.2563)	(−0.0373)
INST	–	−0.0036	−0.0037	−0.0032	−0.0010	−0.0011	−0.0010	−0.0021	−0.0021	−0.0019
		(−1.1567)	(−1.2117)	(−1.0206)	(−0.4305)	(−0.4942)	(−0.4355)	(−1.2624)	(−1.2658)	(−1.0735)
Obs		3,237	3,459	3,014	3,237	3,459	3,014	3,273	3,495	3,048
R^2		0.0803	0.0676	0.1119	0.0818	0.0632	0.0870	0.0727	0.0653	0.1188
Adj R^2		0.0712	0.0589	0.1024	0.0726	0.0544	0.0772	0.0635	0.0566	0.1095

(Chou, 2010; Cohen et al., 2008; Ho et al., 2015) and managers with CPA certificates are more likely to recognize this (Abernathy et al., 2014) than managers without accounting expertise. Thus, a TMT with accounting proficiency would prefer REM to AEM when it has an incentive to manipulate earnings. Third, managers who are more able can mitigate the adverse effect of REM on their firm's value (Huang & Sun, 2014) and seem to have lower costs related to exercising excessive earnings management practices (Geiger & North, 2006). Therefore, the managerial entrenchment effect on REM is expected to be stronger for a TMT with a higher level of accounting expertise.

Table 5 shows the results demonstrating how TMT expertise affects REM activity levels measured by *R_CFO*, *R_PROD*, and *R_DISX*. Columns (1) to (4) of Table 5 show that *PMS* and *CORE* are significantly and positively related to *R_CFO*. These results imply that TMTs with higher education levels, greater core functional knowledge, or less accounting expertise are less likely to engage in sales manipulation. The results in columns (5) to (12) of Table 5 are similar to our main results. In other words, the education level and core functional knowledge of TMTs reduce earnings manipulation through overproduction and reductions in discretionary expenses. However, the TMTs' accounting proficiency has the opposite effect. Overall, the findings are consistent with those shown in Table 4.

4.3. Additional tests

4.3.1. Sample of firms with suspect earnings management

Prior studies document how firms with negative changes in earnings tend to engage in earnings manipulation through real activities (Bartov, 1993). In addition, when firm-year observations are grouped by earnings changes, the distribution typically presents a discontinuity at zero (Burgstahler & Dichev, 1997). Consequently, this study also uses the sample firms with earnings changes per assets ranging from 0% to 1% to reexamine the findings from the main tests. Results are shown in Table 6 which yields results consistent with our main findings. Specifically, columns (1) to (4) of Table 6 demonstrate that *PMS* and *CORE* are negatively associated with REM, whereas *PCPA* has the opposite association. We also employ *RM1* and *RM2* as the measures of REM and columns (5) to (12) presents the similar results. Therefore, TMT expertise has substantial effects on a firm's REM level.

4.3.2. Effect of firm age on the association between TMT expertise and REM

This section discusses how the effects of TMT expertise on REM are moderated by a firm's age. Zhang (2006) indicates that information uncertainty decreases with firm age, implying that managers may have less influence on a firm's operating and financial activities in older firms. In addition, the increased strength of corporate cultures and operating mechanisms in older firms reduces the importance of individual managers to the firm. This study, therefore, proposes that firm age may reduce the association between TMT expertise and REM activity levels. To further test this argument, we define firm age (*AGE*) as the number of years since the firm was founded. Then, we use the interaction terms between the TMT expertise variables (*PMS*, *CORE*, and *PCPA*) and firm age to address the problem. The model specification is shown in Eq. (2):

$$\begin{aligned} R\_RM = {} & \beta_0 + \beta_1 MQ + \beta_2 MQ * AGE + \beta_3 AGE + \beta_4 OPCY \\ & + \beta_5 A\_DNI + \beta_6 N\_NI + \beta_7 SG\_F + \beta_8 SIZE + \beta_9 LEV \\ & + \beta_{10} CR + \beta_{11} BM + \beta_{12} BIG4 + \beta_{13} INST + \varepsilon \end{aligned} \quad (2)$$

where $MQ = PMS$, *CORE* and *PCPA*.

Table 9
Path analysis for the effect of TMT expertise on real earnings management: Performance channel.
This table shows the results of path analysis model for exploring whether the effect of TMT expertise (*PMS*, *CORE*) on real earnings management (*RM*, *RM1*, *RM2*) through performance channels (measured by *ROA*). The control variables include the length of operating cycle (*OPCY*), absolute value of change in earnings (*A_DNI*), the dummy variable of past negative earnings (*N_NI*), the natural log of firm assets (*SIZE*), firm sales growth (*SG_F*), the leverage ratio (*LEV*), current ratio (*CR*), the book to market ratio (*BM*), audit quality (*BIG4*), and institutional ownership (*INST*), The coefficients represent the standardized regression coefficients (path coefficients). ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	Pred.sign	*RM*				*RM1*				*RM2*			
		ROA (1)	*RM* (2)	*ROA* (3)	*RM* (4)	*ROA* (5)	*RM1* (6)	*ROA* (7)	*RM1* (8)	*ROA* (9)	*RM2* (10)	*ROA* (11)	*RM2* (12)
PMS	+/−	0.0318**	−0.1413***			0.0318**	−0.1538***			0.0365**	−0.1355***		
		(2.0026)	(−9.0638)			(2.0026)	(−9.7672)			(2.3534)	(−8.6873)		
CORE	+/−			0.0370**	−0.0520***			0.0370**	−0.0462***			0.0421***	−0.0507***
				(2.4050)	(−3.4083)			(2.4050)	(−2.9893)			(2.7959)	(−3.3163)
ROA	–		−0.2652***		−0.2602***		−0.2187***		−0.2130***		−0.1907***		−0.1864***
			(−15.4770)		(−15.5464)		(−12.6335)		(−12.5758)		(−11.1595)		(−11.1718)
OPCY	+/−		−0.0124		−0.0033		−0.0247		−0.0149		0.0148		0.0224
			(−0.7608)		(−0.2082)		(−1.5047)		(−0.9310)		(0.9159)		(1.4270)
A_DNI	–		−0.0413**		−0.0557***		−0.0161		−0.0321*		−0.0423**		−0.0562***
			(−2.3895)		(−3.3255)		(−0.9209)		(−1.8961)		(−2.4424)		(−3.3514)
N_NI	+		0.0309*		0.0259		0.0265		0.0232		0.0312*		0.0280*
			(1.8547)		(1.5951)		(1.5744)		(1.4122)		(1.8856)		(1.7382)
SIZE	+/−		0.0948***		0.0766***		0.1168***		0.0976***		0.0601***		0.0452**
			(5.0068)		(4.0391)		(6.1057)		(5.0867)		(3.1823)		(2.3929)
SG_F	+		0.0869***		0.0921***		0.0425***		0.0480***		0.0492***		0.0463***
			(5.6786)		(6.1746)		(2.7472)		(3.1754)		(3.2461)		(3.1402)
LEV	+		0.0014		0.0058		0.0146		0.0217		−0.0087		−0.0061
			(0.0851)		(0.3633)		(0.8799)		(1.3408)		(−0.5327)		(−0.3786)
CR	–		−0.0458***		−0.0566***		−0.0237		−0.0360**		−0.0599***		−0.0689***
			(−2.7762)		(−3.5347)		(−1.4251)		(−2.2217)		(−3.6627)		(−4.3364)
BM	+		0.0880***		0.1093***		0.1086***		0.1315***		0.0638***		0.0845***
			(4.8145)		(6.1856)		(5.8804)		(7.3557)		(3.4938)		(4.7919)
BIG	–		0.0092		0.0030		−0.0031		−0.0102		0.0069		0.0005
			(0.5976)		(0.2026)		(−0.1993)		(−0.6725)		(0.4516)		(0.0354)
INST	–		−0.0327**		−0.0382**		−0.0121		−0.0175		−0.0347**		−0.0413***
			(−2.0618)		(−2.4736)		(−0.7548)		(−1.1173)		(−2.1857)		(−2.6730)
Obs		3,880	3,880		4,147		3,880		4,147		4,060		4,337
R^2		0.0209	0.1260		0.1114		0.1079		0.0897		0.0807		0.0672

Table 7 shows how firm age moderates the association between TMT expertise and REM. The results in columns (1), (4) and (7) demonstrate that the coefficients on the interaction terms of *PMS* ∗ *AGE*, *CORE* ∗ *AGE*, and *PCPA* ∗ *AGE* are 0.0117, 0.0099, and −0.0121, respectively, with all exhibiting significance at the 10% level, and the direction of signs of these coefficients are exactly opposite to those of *PMS*, *CORE*, and *PCPA*. The results depicted in other columns are consistent with the findings in columns (1), (4) and (7). In addition, the results of joint tests are all significant, indicating that the coefficients of TMT expertise, firm age, and the interaction terms between TMT expertise and firm age[14] are jointly different from zero. It suggests that there is an impact of TMT expertise for more established firms on RM variables. Similar results are obtained when using *RM1* and *RM2* as the measures of REM (see columns (2), (3), (5), (6), (8), and (9) in Table 7). Finally, we include *PMS*, *CORE*, *PCPA*, *AGE*, *PMS* × *AGE*, *CORE* × *AGE* and *PCPA* × *AGE* in the same regression model and the results (untabulated) are similar to those in Table 7.

Collectively, the empirical results support the argument that firm age weakens the association between TMT expertise and REM, implying that the influence of TMT expertise tends to be weaker in old firms with strong corporate cultures and less information asymmetry. Therefore, the impacts of TMT expertise on REM activity levels are attenuated in an older or more established firm.

4.3.3. Endogeneity problems

Although this study includes industry and year fixed effects to mitigate a possible omitted variables bias, the bias cannot be completely eliminated (Ahmed & Duellman, 2013). To solve this problem, this study employs the instrumental variable regressions suggested by Maddala and Lahiri (2009) and Wooldridge (2003). Following Sovey and Green (2011), this study uses lagged independent variables as the instrumental variables of TMT expertise. Consistent with the main results discussed in Section 4.2, the results of the two-stage regressions (Table 8) indicate that TMT expertise remains significantly related to a firm's level of REM. The coefficients on the *PMS*, *CORE*, and *PCPA* in columns (1) to (3) are −0.2778, −0.1617, and 0.2741, respectively, with all exhibiting significance at the 5% level. Similarly, the empirical results provided in columns (4) to (9) in Table 8 provide similar results by using another measure of REM (*RM1* and *RM2*). Overall, our results are robust after controlling for the endogeneity problem.

4.3.4. Path analysis for the effect of TMT expertise on REM: The incentive-reduction argument

The empirical results suggest that firms whose TMT members have higher *PMS* and *CORE* are associated with lower REM. It is consistent with the incentive-reduction hypothesis that TMTs with higher education levels or superior core functional knowledge are likely to demonstrate better operating performance, which in turn reduces the incentives to engage in earnings management. To investigate the argument more explicitly, we employ the path analysis model to address this issue. The regression model is shown in Eqs. (3) and (4), as follows.

$$ROA = \alpha_0 + \alpha_1\, MQ + \varepsilon \tag{3}$$

$$R\_RM = \beta_0 + \beta_1\, MQ + \beta_2\, ROA + \beta_3\, OPCY + \beta_4\, A\_DNI + \beta_5\, N\_NI + \beta_6\, SG\_F + \beta_7\, SIZE + \beta_8\, LEV + \beta_9\, CR + \beta_{10}\, BM + \beta_{11}\, BIG4 + \beta_{12}\, INST + \varepsilon \tag{4}$$

where *R_RM* = REM variables (*RM*, *RM1*, *RM2*) and *MQ* = *PMS*, *CORE*. *ROA* refers to the performance channel and is calculated as the ratio of the net

[14] For example, column (1) of Table 7 shows the *F*-statistics of joint significance test for PMS, PMS × AGE, and AGE. Similarly, columns (4) and (7) show the results of joint significance test for CORE, CORE × AGE, and AGE, and PCPA, PCPA × AGE, and AGE, respectively.

Table 10
Consideration for the effect of AEM.
This table shows the results of nine different regressions for various variables of TMT expertise with *RM*, *RM1*, and *RM2* as the dependent variables by using data observations from 2006 to 2010. The fixed effects (industry and year) and one-way clustering by firm are considered in these results. Management team expertise includes *PMS*, *CORE* and *PCPA*. The instrumental variables (*IV*) of *PMS*, *CORE* and *PCPA* are prior *PMS*, prior *CORE*, and prior *PCPA*, respectively. The control variables include the length of operating cycle (*OPCY*), absolute value of change in earnings (*A_DNI*), the dummy variable of past negative earnings (*N_NI*), the natural log of firm assets (*SIZE*), firm sales growth (*SG_F*), the leverage ratio (*LEV*), current ratio (*CR*), the book to market ratio (*BM*), audit quality (*BIG4*), institutional ownership (*INST*), and discretionary accruals (*DA*). The joint significance tests (*PMS*, *PMS* × *DA*, *DA*; *CORE*, *CORE* × *DA*, *DA*; *PCPA*, *PCPA* × *DA*, *DA*) are also provided. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	Pred. sign	*PMS*			*CORE*			*PCPA*		
		RM	RM1	RM2	RM	RM1	RM2	RM	RM1	RM2
Intercept		−0.1883	−0.2461***	−0.0322	−0.1040	−0.1795*	0.0106	−0.1423	−0.2498***	−0.0022
		(−1.5587)	(−2.6036)	(−0.5185)	(−0.8641)	(−1.8979)	(0.1706)	(−1.1888)	(−2.5999)	(−0.0343)
PMS	+/−	−0.2154***	−0.1833***	−0.1111***						
		(−4.8208)	(−5.1235)	(−4.5603)						
PMS × *DA*	+/−	−0.2778	−0.0954	−0.2920						
		(−0.4423)	(−0.1875)	(−0.8150)						
CORE	+/−				−0.1109**	−0.0765*	−0.0610**			
					(−2.1825)	(−1.8782)	(−2.2584)			
CORE × *DA*	+/−				0.0692	0.7559*	−0.5874			
					(0.1227)	(1.7121)	(−1.5481)			
PCPA	+/−							0.2272***	0.1917***	0.1271***
								(2.6742)	(2.9550)	(2.7959)
PCPA × *DA*	+/−							−1.9574**	−1.8446***	−0.3857
								(−2.5654)	(−3.4514)	(−0.6480)
DA	+/−	0.9812***	0.3195***	0.7623***	0.9492***	0.2397***	0.7903***	1.1821***	0.5168***	0.7955***
		(11.0166)	(3.3873)	(9.4755)	(9.1616)	(2.8850)	(9.8846)	(6.8307)	(4.3965)	(7.0646)
OPCY	+/−	−0.0002	−0.0002	0.0001	−0.0001	−0.0002	0.0001	0.0175***	0.0086***	0.0099***
		(−0.4982)	(−0.8899)	(0.4927)	(−0.3172)	(−0.6726)	(0.7103)	(4.4746)	(2.6686)	(3.2326)
A_DNI	–	−0.0015	0.0002	−0.0011	−0.0024	−0.0006	−0.0015	−0.0016	−0.0005	−0.0011
		(−0.7937)	(0.1447)	(−1.1471)	(−1.3685)	(−0.5508)	(−1.6207)	(−0.9049)	(−0.4308)	(−1.1448)
N_NI	+	0.0722***	0.0519***	0.0201	0.0658***	0.0455***	0.0202*	0.0670***	0.0499***	0.0177
		(3.5501)	(3.2662)	(1.5756)	(3.3662)	(2.9355)	(1.7181)	(3.3205)	(3.0818)	(1.3547)
SIZE	+/−	0.0041	0.0102*	−0.0018	−0.0016	0.0053	−0.0047	−0.0007	0.0080	−0.0042
		(0.5214)	(1.6666)	(−0.4525)	(−0.2121)	(0.8795)	(−1.1828)	(−0.0884)	(1.2849)	(−1.0226)
SG_F	+	−0.0129*	−0.0065	0.0004*	−0.0103	−0.0025	0.0003	0.0115	0.0170	0.0010***
		(−1.6883)	(−0.7992)	(1.6807)	(−1.2529)	(−0.2862)	(1.2806)	(0.9411)	(1.2213)	(3.3406)
LEV	+	0.1397*	0.1109*	0.0589	0.1349**	0.1131**	0.0524	0.0759	0.0903	0.0136
		(1.9583)	(1.9500)	(1.5488)	(2.0469)	(2.1851)	(1.4958)	(1.0344)	(1.5466)	(0.3373)
CR	–	−0.0035	−0.0017	−0.0022	−0.0041	−0.0021	−0.0025	−0.0216***	−0.0110***	−0.0124***
		(−1.1268)	(−0.9740)	(−1.0919)	(−1.1740)	(−1.0500)	(−1.1496)	(−4.8461)	(−2.8875)	(−3.3785)
BM	+	0.0618***	0.0500***	0.0265***	0.0643***	0.0520***	0.0282***	0.0742***	0.0614***	0.0305***
		(5.1370)	(5.0958)	(4.4772)	(5.8188)	(5.8309)	(5.1274)	(5.8764)	(5.9639)	(4.8330)
BIG4	–	0.0016	−0.0048	0.0026	−0.0031	−0.0080	−0.0005	−0.0011	−0.0074	0.0007
		(0.0860)	(−0.3269)	(0.2699)	(−0.1822)	(−0.5740)	(−0.0506)	(−0.0615)	(−0.4886)	(0.0676)
INST	–	−0.0030	−0.0010	−0.0016	−0.0030	−0.0010	−0.0016	−0.0027	−0.0009	−0.0017
		(−1.1056)	(−0.4604)	(−1.1120)	(−1.1192)	(−0.4761)	(−1.1310)	(−0.9731)	(−0.4150)	(−1.1819)
Joint test *F* statistic		49.2768***	12.8823***	40.5557***	38.9324***	9.0480***	44.9289***	42.5250***	10.4172***	31.9181***
P value		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Obs		3,880	3,880	4,060	4,147	4,147	4,337	3,618	3,618	3,782
R^2		0.2179	0.1051	0.3029	0.2062	0.0935	0.2942	0.2354	0.1207	0.3157
Adj R^2		0.2108	0.0970	0.2968	0.1994	0.0858	0.2884	0.2280	0.1121	0.3093

income to the book value of assets. It is expected that *PMS* and *CORE* are positively associated with *ROA*, which is expected to negatively associate with *R_RM*. Therefore, α_1 is assumed to be positive and β_2 is assumed to be negative. The empirical results provided in columns (1) and (2) in Table 9 show that the TMT education level (*PMS*) significantly and positively relates to a firm's operating performance (*ROA*), which significantly and negatively relates to the firm's REM (*RM*). In addition, the results found in column (2) also show that *PMS* significantly and negatively relates to the firm's REM level. The results reveal that the effects of TMT education level on REM include the direct effect (path coefficient: −0.1413) and the indirect effect through the performance channel ($0.0318 \times 0.2652 = -0.0084$). Similarly, empirical results demonstrated in columns (3) and (4) in Table 9 show that the TMT core function expertise (*CORE*) significantly and positively relates to the operating performance (*ROA*), which significantly and positively relates to the firm's REM level. Similarly, the empirical results provided in columns (5) to (8) and columns (9) to (12) in Table 9 provide similar results by using another measure of REM (*RM1* and *RM2*).[15] Overall, the above empirical results support the incentive-reduction effect by showing that the TMT education level and core function expertise affect a firm's REM level through the operating performance channel (Chemmanur & Paeglis, 2005; Haleblian & Finkelstein, 1993; Hambrick & D'Aveni, 1992; Hambrick & Mason, 1984).

4.3.5. Association between AEM and REM

Several studies analyze samples taken from U.S. companies and find that firms use REM and AEM as substitutes (Chan et al., 2015; Chen et al., 2015; Cohen et al., 2008; Cohen & Zarowin, 2010; Zang, 2012). By contrast, Achleitner, Günther, Kaserer, and Siciliano (2014) and Cho and Chun (2016) take samples from other countries, such as Germany and Korea, and suggest that REM is positively associated with AEM, thereby suggesting that REM and AEM are used as complements. To ascertain the association between AEM and REM, we include a performance-matched discretionary accrual measure (Kothari, Leone, & Wasley, 2005) as a control variable. Table 10 shows that REM is positively associated with AEM at the 1% significance level, suggesting that firms use a combination of AEM and REM to inflate their earnings, which is consistent with Achleitner et al. (2014) and Cho and Chun (2016). Furthermore, the effect of *PMS*, *CORE* and *PCPA* on REM are

[15] We employ another measure of performance channel (return on equity) and also obtain consistent results.

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consistent with the main results after considering discretionary accruals as a control variable.

In addition, this study adds the interaction terms of TMT expertise and discretionary accruals in the regression models to examine the effect of TMT expertise on the association between AEM and REM. The results of joint tests are significant, implying that there is an impact of AEM on the relationship between TMT expertise and REM. Moreover, Table 10 shows that *PCPA* adversely affects the complementary relationship between AEM and REM while *PMS* and *CORE* do not significantly affect this association. To put it another way, managers with accounting proficiency mitigate the complementarity between AEM and REM. These findings imply that managers with CPA certificates possess a greater understanding of financial reporting requirements and are more aware of the risk of failure in financial statements; therefore, they prefer REM to AEM when they are under earnings pressure, consistent with the main results.

4.3.6. Alternative measures of managers' expertise

Prior studies that examine the effect of education background on firm's performance (Chemmanur and Paeglis, 2005) and earnings quality (Aier et al., 2005; Chemmanur et al., 2009) usually focus on MBA. In addition to *PMS*, we test the effect of managers who have an MBA degree on REM as a robustness test.[16] The untabulated results indicate that the percentage of TMT managers with an MBA degree is negatively associated with REM, which is consistent with the main results.[17]

Finally, a considerable body of research exists that demonstrates the importance of a firm's CEO/CFO when it comes to explaining an organization's financial reporting strategies (Baik et al., 2011; Demers & Wang, 2010; Francis et al., 2008; Jiang et al., 2013; Matsunaga et al., 2013). This study also employs CEO/CFO expertise as proxies for TMT expertise and thereby addresses our research issue in the robustness test. The untabulated results for CEO expertise and CFO expertise are consistent with the main findings in the previous section.

5. Conclusion

Over the last several decades, there has been a tremendous wave of interest in the effects of TMT characteristics. Numerous studies have investigated the impact of TMT characteristics on firms' earnings quality. Specifically, they have found that TMT characteristics are associated with discretionary accruals, the likelihood of restating financial statements, information asymmetry, the frequency of meeting or beating earnings targets, and voluntary disclosure. Since the passing of the SOX Act in 2002, earnings manipulations through real activities have attracted the focus of academic researchers and business practitioners. However, based on our research, there has yet to be a study that addresses the relationship between TMT expertise and REM activity levels. The purpose of this study, therefore, is to explore the effect of TMT expertise on REM activities. The empirical results reveal that education level and core functional expertise are negatively related to REM activities. By contrast, accounting proficiency is positively associated with earnings manipulation through real activities. Moreover, this study finds that these effects are attenuated by firm age. The robustness of several additional tests supports the main results.

The findings of the present study have several implications. For example, our results can serve as a guide for understanding earnings quality. A firm's board of directors should consider the impact of TMT expertise on REM when appointing new TMT members, monitoring its financial reporting, and designing the managers' compensation schemes. This consideration can also assist other capital market participants, such as auditors, investors, and authorities when evaluating the quality of firms' financial reporting. Furthermore, since a firm's non-financial characteristics play a critical role in the operating decisions and performance of a firm, future studies could explore the impact of other TMT characteristics on REM. Thus far, relatively little research has been conducted on the associations among TMT characteristics, earnings management, and non-financial characteristics. These topics merit further exploration.

[16] We focus on managers with master's degrees rather than MBA degrees in the main analysis because most Taiwanese firms are in the electronics industry (about 60% of the total listed firms) and the educational backgrounds of managers in electronics companies are mainly engineering, science and technology, not business administration.

[17] In addition, the coefficients and significance of PMBA are smaller and weaker than those of PMS. One possible explanation for this is that TMT master's degrees not only cover business administration expertise but also industry-specific knowledge. Managers with industry-specific master's degrees are more able to get involved in the research and development for future star businesses in the industry and thereby raise a firm's operating performance and reduce the incentives of earnings management. Thus, the effect of PMS on REM is stronger and more significant than that of PMBA.

References

Abernathy, J. L., Beyer, B., Masli, A., & Stefaniak, C. (2014). The association between characteristics of audit committee accounting experts, audit committee chairs, and financial reporting timeliness. *Advances in Accounting*, *30*(2), 283–297.

Achleitner, A., Günther, N., Kaserer, C., & Siciliano, G. (2014). Real earnings management and accrual-based earnings management in family firms. *The European Accounting Review*, *23*(3), 431–461.

Ahmed, A. S., & Duellman, S. (2013). Managerial overconfidence and accounting conservatism. *Journal of Accounting Research*, *51*(1), 1–30.

Aier, J. K., Comprix, J., Gunlock, M. T., & Lee, D. (2005). The financial expertise of CFOs and accounting restatements. *Accounting Horizons*, *19*(3), 123–135.

Armstrong, C. S., Core, J. E., Taylor, D. J., & Verrecchia, R. E. (2011). When does information asymmetry affect the cost of capital? *Journal of Accounting Research*, *49*(1), 1–40.

Baik, B. O. K., Farber, D. B., & Lee, S. A. M. (2011). CEO ability and management earnings forecasts. *Contemporary Accounting Research*, *28*(5), 1645–1668.

Balsam, S., Haw, I., & Lilien, S. B. (1995). Mandated accounting changes and managerial discretion. *Journal of Accounting and Economics*, *20*(1), 3–29.

Bamber, L. S., Jiang, J., & Wang, I. Y. (2010). What's my style? The influence of top managers on voluntary corporate financial disclosure. *The Accounting Review*, *85*(4), 1131–1162.

Barker, V. L., III, & Mueller, G. C. (2002). CEO characteristics and firm R&D spending. *Management Science*, *48*(6), 782–801.

Bartov, E. (1993). The timing of asset sales and earnings manipulation. *The Accounting Review*, *68*(4), 840–855.

Baruch, Y., & Peiperl, M. (2006). The impact of an MBA on graduate careers. *Human Resource Management Journal*, *10*(2), 69–90.

Bereskin, F. L., Hsu, P., & Rotenberg, W. (2015). The real effects of real earnings management: Evidence from innovation. *Working paper*. University of Delaware, the University of Hong Kong and University of Toronto.

Bertrand, M., & Schoar, A. (2003). Managing with style: The effect of managers on firm policies. *The Quarterly Journal of Economics*, *118*(4), 1169–1208.

Burgstahler, D. C., & Dichev, I. (1997). Earnings management to avoid earnings decreases and losses. *Journal of Accounting and Economics*, *24*(1), 99–126.

Cao, Y., Myers, L. A., & Omer, T. C. (2012). Does company reputation matter for financial reporting quality? Evidence from restatements. *Contemporary Accounting Research*, *29*(3), 956–990.

Chan, L. H., Chen, K. C. W., Chen, T. Y., & Yu, Y. (2015). Substitution between real and accruals-based earnings management after voluntary adoption of compensation clawback provisions. *The Accounting Review*, *90*(1), 147–174.

Chemmanur, T. J., & Paeglis, I. (2005). Management quality, certification, and initial public offerings. *Journal of Financial Economics*, *76*(2), 331–368.

Chemmanur, T. J., Paeglis, I., & Simonyan, K. (2009). Management quality, financial and investment policies, and asymmetric information. *Journal of Financial and Quantitative Analysis*, *44*(5), 1045–1079.

Chen, X., Cheng, Q., Lo, A. K., & Wang, X. (2015). CEO contractual protection and managerial short-termism. *The Accounting Review*, *90*(5), 1871–1906.

Cheng, Q., Lee, J., & Shevlin, T. J. (2016). Internal governance and real earnings management. *The Accounting Review*, *91*(3).

Chevalier, J., & Ellison, G. (1999). Are some mutual fund managers better than others? Cross-sectional patterns in behavior and performance. *Journal of Finance*, *54*(3), 875–899.

Chi, W., Lisic, L. L., & Pevzner, M. (2011). Is enhanced audit quality associated with greater real earnings management? *Accounting Horizons*, *25*(2), 315–335.

Cho, E., & Chun, S. (2016). Corporate social responsibility, real activities earnings management, and corporate governance: Evidence from Korea. *Asia-Pacific Journal of Accounting & Economics* forthcoming.

Chou, H. H. (2010). *The trends in real and accrual-based earnings management: An examination of the Procomp effect.* New Taipei City: Fu Jen Catholic University.

Cohen, D. A., & Zarowin, P. (2010). Accrual-based and real earnings management activities around seasoned equity offerings. *Journal of Accounting and Economics*, *50*(1), 2–19.

Cohen, D. A., Dey, A., & Lys, T. (2008). Real and accrual-based earnings management in the pre- and post-Sarbanes–Oxley periods. *The Accounting Review*, *83*(3), 757–787.

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Cohen, D. A., Mashruwala, R., & Zach, T. (2010). The use of advertising activities to meet earnings benchmarks: Evidence from monthly data. *Review of Accounting Studies*, *15*(4), 808–832.
Combs, J. G., & Skill, M. S. (2003). Managerialist and human capital explanations for key executive pay premiums: A contingency perspective. *Academy of Management Journal*, *46*(1), 63–73.
Dane, E. (2010). Reconsidering the trade-off between expertise and flexibility: A cognitive entrenchment perspective. *Academy of Management Review*, *35*(4), 579–603.
Dechow, P., Ge, W., & Schrand, C. (2010). Understanding earnings quality: A review of the proxies, their determinants and their consequences. *Journal of Accounting and Economics*, *50*(2–3), 344–401.
DeFond, M. L., & Park, C. W. (1997). Smoothing income in anticipation of future earnings. *Journal of Accounting and Economics*, *23*(2), 115–139.
Demerjian, P. R., Lev, B., Lewis, M. F., & McVay, S. E. (2013). Managerial ability and earnings quality. *The Accounting Review*, *88*(2), 463–498.
Demers, E., & Wang, C. (2010). The impact of CEO career concerns on accruals based and real earnings management. *Working paper*. Naval Postgraduate School and University of Virginia.
Ding, Y., Zhang, H., & Zhang, J. (2007). Private vs state ownership and earnings management: Evidence from Chinese listed companies. *Corporate Governance: An International Review*, *15*(2), 223–238.
Doyle, J., Ge, W., & McVay, S. (2007). Determinants of weaknesses in internal control over financial reporting. *Journal of Accounting and Economics*, *44*(1–2), 193–223.
Finkelstein, S. (1992). Power in top management teams: Dimensions, measurement, and validation. *Academy of Management Journal*, *35*(3), 505–538.
Francis, B., Hasan, I., & Li, L. (2016). Abnormal real operations, real earnings management, and subsequent crashes in stock prices. *Review of Quantitative Finance and Accounting*, *46*(2), 217–260.
Francis, J., Huang, A. H., Rajgopal, S., & Zang, A. Y. (2008). CEO reputation and earnings quality. *Contemporary Accounting Research*, *25*(1), 109–147.
Ge, W., & Kim, J. (2014). Boards, takeover protection, and real earnings management. *Review of Quantitative Finance and Accounting*, *43*(4), 651–682.
Ge, W., Matsumoto, D., & Zhang, J. L. (2011). Do CFOs have style? An empirical investigation of the effect of individual CFOs on accounting practices. *Contemporary Accounting Research*, *28*(4), 1141–1179.
Geiger, M. A., & North, D. S. (2006). Does hiring a new CFO change things? An investigation of changes in discretionary accruals. *The Accounting Review*, *81*(4), 781–809.
Graham, J. R., Harvey, C. R., & Rajgopal, S. (2005). The economic implications of corporate financial reporting. *Journal of Accounting and Economics*, *40*(1–3), 3–73.
Gunny, K. A. (2010). The relation between earnings management using real activities manipulation and future performance: Evidence from meeting earnings benchmarks. *Contemporary Accounting Research*, *27*(3), 855–888.
Gupta, M., Pevzner, M., & Seethamraju, C. (2010). The implications of absorption cost accounting and production decisions for future firm performance and valuation. *Contemporary Accounting Research*, *27*(3), 889–922.
Haleblian, J., & Finkelstein, S. (1993). Top management team size, CEO dominance, and firm performance: The moderating roles of environmental turbulence and discretion. *The Academy of Management Journal*, *36*(4), 844–863.
Hambrick, D. C. (2007). Upper echelons theory: An update. *Academy of Management Review*, *32*(2), 334–343.
Hambrick, D. C., & D'Aveni, R. A. (1992). Top team deterioration as part of the downward spiral of large corporate bankruptcies. *Management Science*, *38*(10), 1445–1466.
Hambrick, D. C., & Mason, P. A. (1984). Upper echelons: The organization as a reflection of its top managers. *The Academy of Management Review*, *9*(2), 193–206.
Ho, L. J., Liao, Q., & Taylor, M. (2015). Real and accrual-based earnings management in the pre- and post-IFRS periods: Evidence from China. *Journal of International Financial Management & Accounting*, *26*(3), 294–335.
Hölmstrom, B. (1979). Moral hazard and observability. *The Bell Journal of Economics*, *10*(1), 74–97.
Hölmstrom, B., & Milgrom, P. (1991). Multitask principal-agent analyses: Incentive contracts, asset ownership, and job design. *Journal of Law, Economics, and Organization*, *7*, 24–52.
Huang, S., & Sun, L. (2014). Real earnings management, future firm performance and managerial ability. *Working paper*. Ball State University and University of Tulsa.
Irani, R. M., & Oesch, D. (2016). Analyst coverage and real earnings management: Quasi-experimental evidence. *Journal of Financial and Quantitative Analysis*, *51*(2), 589–627.
Jiang, F., Zhu, B., & Huang, J. (2013). CEO's financial experience and earnings management. *Journal of Multinational Financial Management*, *23*(3), 134–145.
Keating, A. S., & Zimmerman, J. L. (1999). Depreciation-policy changes: Tax, earnings management, and investment opportunity incentives. *Journal of Accounting and Economics*, *28*(3), 359–389.
Kim, B. H., Lisic, L., & Pevzner, M. (2011). Debt covenant slack and real earnings management. *Working paper*. American University and George Mason University.
Klein, A. (2002). Audit committee, board of director characteristics, and earnings management. *Journal of Accounting and Economics*, *33*(3), 375–400.
Kothari, S. P., Leone, A. J., & Wasley, C. E. (2005). Performance matched discretionary accrual measures. *Journal of Accounting and Economics*, *39*(1), 163–197.
Krishnan, G. V., & Visvanathan, G. (2008). Does the SOX definition of an accounting expert matter? The association between audit committee directors' accounting expertise and accounting conservatism. *Contemporary Accounting Research*, *25*(3), 827–858.
Li, C., Sun, L., & Ettredge, M. (2010). Financial executive qualifications, financial executive turnover, and adverse SOX 404 opinions. *Journal of Accounting and Economics*, *50*(1), 93–110.
Liu, C., Wang, T., & Lai, S. (2009). Litigation risk and large audit Firms' acceptable level of clients' financial risk. *NTU Management Review*, *20*(1), 1–40.
Maddala, G. S., & Lahiri, K. (2009). *Introduction to econometrics* (4th ed.). West Sussex, England: John Wiley & Sons.
Matsunaga, S. R., Wang, S., & Yeung, P. E. (2013). Does appointing a former CFO as CEO influence a firm's accounting and disclosure policies? *Working paper*. University of Oregon and Cornell University.
Matsuura, S. (2008). On the relation between real earnings management and accounting earnings management: Income smoothing perspective. *Journal of International Business Research*, *7*(S3), 63–77.
Michel, J. G., & Hambrick, D. C. (1992). Diversification posture and top management team characteristics. *Academy of Management Journal*, *35*(1), 9–37.
Osma, B. G. (2008). Board independence and real earnings management: The case of R&D expenditure. *Corporate Governance: An International Review*, *16*(2), 116–131.
Petersen, M. A. (2009). Estimating standard errors in finance panel data sets: Comparing approaches. *Review of Financial Studies*, *22*(1), 435–480.
Rockness, H. O., & Shields, M. D. (1988). An empirical analysis of the expenditure budget in research and development. *Contemporary Accounting Research*, *4*(2), 568–581.
Roychowdhury, S. (2006). Earnings management through real activities manipulation. *Journal of Accounting and Economics*, *42*(3), 335–370.
Schwenk, C. (1993). Management tenure and explanations for success and failure. *Omega. The International Journal of Management Science*, *21*(4), 449–456.
Shih, C. (2005). *An empirical study of audit quality change to the Procomp event*. Taipei, Taiwan: National Taiwan University.
Siriviriyakul, S. J. (2013). Re-examining real earnings management to avoid losses. *Working paper*. University of California at Berkeley.
Sovey, A. J., & Green, D. P. (2011). Instrumental variables estimation in political science: A readers' guide. *American Journal of Political Science*, *55*(1), 188–200.
Spence, M. (1973). Job market signaling. *The Quarterly Journal of Economics*, *87*(3), 355–374.
Switzer, L. N., & Bourdon, J. F. (2011). Management quality and operating performance: Evidence for Canadian IPOs. *International Journal of Business*, *16*(2), 133–148.
Tan, H., & Jamal, K. (2006). Effect of accounting discretion on ability of managers to smooth earnings. *Journal of Accounting and Public Policy*, *25*(5), 554–573.
Van den Steen, E. (2005). Organizational beliefs and managerial vision. *Journal of Law, Economics, and Organization*, *21*(1), 256–283.
Warfield, T. D., Wild, J. J., & Wild, K. L. (1995). Managerial ownership, accounting choices, and informativeness of earnings. *Journal of Accounting and Economics*, *20*(1), 61–91.
Wongsunwai, W. (2013). The effect of external monitoring on accrual-based and real earnings management: Evidence from venture-backed initial public offerings. *Contemporary Accounting Research*, *30*(1), 296–324.
Wooldridge, J. M. (2003). *Introductory econometrics: A modern approach* (2nd ed.). Mason, OH: Cengage Learning.
Zang, A. Y. (2012). Evidence on the trade-off between real activities manipulation and accrual-based earnings management. *The Accounting Review*, *87*(2), 675–703.
Zhang, X. F. (2006). Information uncertainty and stock returns. *The Journal of Finance*, *61*(1), 105–137.
Zhao, Y., Chen, K. H., Zhang, Y., & Davis, M. (2012). Takeover protection and managerial myopia: Evidence from real earnings management. *Journal of Accounting and Public Policy*, *31*(1), 109–135.

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