Journal of Management and Governance (2024) 28:137–175
https://doi.org/10.1007/s10997-023-09668-7

# Does top management team diversity affect accounting quality? Empirical evidence from Germany

**Felix Schumann**[1] · **Toni W. Thun**[1] · **Tobias Dauth**[1] · **Henning Zülch**[1]

Accepted: 5 January 2023 / Published online: 24 January 2023


## Abstract

Earnings management decisions and ineffective monitoring activities have contributed to financial accounting scandals and reduced confidence in firms' reporting quality among potential investors, lenders and other creditors. The implementation of an effective top management team (TMT) is considered essential in this context. It is well known that top managers have considerable discretion over firms' financial reporting since they choose whether and how to manage earnings. However, research has yet to establish the relationship between top managers' diversity attributes and firms' earnings management levels. Therefore, this study analyses whether and how top managers' nationality, gender and age diversity are associated with accounting quality. Based on a sample of German DAX 30 listed firms from 2011 to 2018, we found that diversity in TMT nationality and gender have a positive impact on accounting quality. This relationship is context-dependent and negatively moderated by the tenure of the chief financial officer. Our findings provide novel insights on accounting quality for practitioners such as investors, regulators and stock corporations. The implications of this study further advance the academic debate on diversity in TMTs and its effects on earnings management.

**Keywords** Accounting quality · Corporate governance · Earnings management · Top management teams · Top management team diversity · Upper echelons theory

✉ Felix Schumann
felix.schumann@hhl.de

Toni W. Thun
toni.thun@hhl.de

Tobias Dauth
tobias.dauth@hhl.de

Henning Zülch
henning.zuelch@hhl.de

[1] HHL Leipzig Graduate School of Management, Jahnallee 59, 04109 Leipzig, Germany

## 1 Introduction

Recent corporate accounting scandals (e.g., Wirecard, Luckin Coffee, Steinhoff International) and low accounting quality have led to a lack of confidence in firms' reporting among shareholders, investors and their advisers. Consequently, management accounting scholars and practitioners are increasingly interested in searching for specific determinants of accounting quality (Francis et al., 2004; Kontesa et al., 2021; Qu, 2020; Weber, 2020). Since organisations' strategic decisions are usually driven by top management teams (TMTs), focusing on their role is essential in understanding the use of earnings management.

Since the seminal article by Hambrick and Mason (1984) on upper echelons theory, the impact of various antecedents and consequences of TMT characteristics have been extensively researched. To a great extent, studies have focused on the relationship between managerial characteristics and firm performance or strategic decision-making (Cannella et al., 2008; Nielsen & Nielsen, 2013; Tanikawa & Jung, 2019). More recently, the role and influence of upper echelons theory have become a relevant field of study not only in management and organisational research but also in related academic disciplines (Plöckinger et al., 2016). Therefore, studies have also begun to investigate whether and how individual executives and their demographics are related to accounting choices (Donatella & Tagesson, 2021; Sun et al., 2019). Observable attributes among top managers that have been analysed regarding their role in financial accounting include demographic variables such as age, education, gender and ethnicity (Homberg & Bui, 2013). For instance, several recent studies (Ali & Zhang, 2015; Buchholz et al., 2020; Dauth et al., 2017; Donatella & Tagesson, 2021; Kontesa et al., 2021; Weber, 2020) have focused on identifying managerial characteristics that can influence firms' level of accounting quality.

However, incomplete proxies in the aforementioned demographic characteristics and inconsistent findings indicate the need for further investigation in this area (Gull et al., 2018). The vast majority of studies use U.S. samples and focus almost exclusively on the chief executive officer (CEO) or chief financial officer (CFO) as the person of interest (Hiebl, 2014; Plöckinger et al., 2016). Consequently, existing research has heavily investigated the prominent role of specific executives at the individual level whilst overlooking team-related organisational outcomes. Focusing strictly on personalities such as the CEO or CFO presents an imperfect view of decision-making within a firm (Zhang, 2019). We subsequently designed our study with TMTs as the focus of our analysis since it is unrealistic to assume that CFOs or CEOs make independent accounting decisions on a large scale.

In fact, TMTs have become increasingly diverse over the last decade (Nielsen & Nielsen, 2013), which indicates the need to decompose their collective attributes. The heterogeneity among these observable demographic characteristics within TMTs remains an under-researched field (Plöckinger et al., 2016; Zhang, 2019). Specifically, this research is needed for governance models with a two-tier board system (Gull et al., 2018). Thus, our study aimed to portray a more reliable picture of the association between the diversity in top managers' demographic attributes and their effect on firms' accounting quality.

An established categorisation distinguishes between observable and underlying diversity attributes (Homberg & Bui, 2013). While the observable attributes include demographic variables such as age, gender or ethnicity, the underlying diversity attributes capture characteristics such as functional background or educational levels (Hiebl, 2014). Although research has begun to examine the effects of selected demographic characteristics, "many observable managerial attributes and facets of personality have remained largely neglected in financial accounting research" (Plöckinger et al., 2016). Therefore, we sought to investigate whether and how TMT nationality, gender and age diversity are associated with firms' levels of discretion in financial reporting.

Our analysis draws on 183 top manager profiles from DAX 30 firms and their accounting quality over 8 years (i.e., 2011–2018). We find that top managers' diversity is an important but neglected factor that shapes cognitive, affective and behavioural profiles and influences the decision to engage in earnings management. Our results suggest that a nationally diverse TMT positively influences a firm's level of accounting quality. Furthermore, we find a significant positive association between TMT gender diversity and accounting quality. Moreover, we reveal that CFO tenure negatively moderates the relationship between TMT nationality diversity and accounting quality. Likewise, we show that CFO tenure negatively modifies the relationship between TMT gender diversity and firms' accounting quality. Although we obtain inconclusive results regarding the association between TMT age diversity and our dependent variable and its interaction effect with CFO tenure, our findings provide important implications connecting the TMT diversity dimensions and accounting quality.

In this way, our paper advances research on top managers' demographic characteristics and earnings management in several ways. First, following recent attempts to consider multiple diversity dimensions simultaneously (Gull et al., 2018; Hoang et al., 2017), we show the association between specific TMT diversity attributes and firms' level of accounting quality. As such, we use upper echelons theory and provide additional insights on top managers' heterogeneity in demographic variables as possible predictors of accounting quality. We can conclude that biographical differences within a TMT have important implications for accounting quality. Second, we respond to the calls for "extending the scope of analysis of upper echelons research in accounting beyond U.S. borders" (Hiebl, 2014; Plöckinger et al., 2016). By relying on a sample of German-listed firms, we complement research results from the Anglo-American context (Buchholz et al., 2020; Cai et al., 2019; Oxelheim & Randøy, 2005). Thus, our study adds empirical evidence for countries with a two-tier system that separates board functions. Third, we add an element to the discussion by integrating CFO tenure as a moderator variable. To date, only a few studies have considered the effect of interactions among demographical attributes on firms' accounting quality levels (Díaz-Fernández et al., 2019). Therefore, it is well known that research in this field would particularly benefit from integrating moderating effects (Plöckinger et al., 2016). In particular, additional research should clarify the influence of unexamined upper echelons characteristics in greater detail (Hiebl, 2014). Here, we focus specifically on the interface between CFO and TMT characteristics since the former typically oversees a firm's financial reporting. To date, the

literature has not yet revealed a consistent pattern regarding the moderating role of long-tenured CFOs in choosing aggressive or conservative accounting approaches (Donatella & Tagesson, 2021; Muttakin et al., 2019). Hence, exploring the impact of CFO tenure as a moderator will be a fruitful contribution to the literature.

Practitioners will likewise benefit from our study. Primarily, we underline the relevance of diversity in TMTs. More specifically, we show that efforts to strengthen diversity in a firm might positively affect accounting quality since higher TMT nationality and gender diversity reduce the level of earnings management. Next, our findings can be helpful for a firm's supervisory board in two-tier systems. Since the supervisory board appoints and supervises the management board, our study indicates critical aspects for the effective composition and monitoring of TMTs. Ultimately, our study also has potential implications for shareholders, investors and their advisers since the extent of a firm's diversity efforts may serve as a signal for critically assessing and interpreting its financial statements.

The remainder of this paper is structured as follows. We first introduce the theoretical background of accounting quality and the regulatory framework within Germany (Sect. 2). Then, we review prior research and introduce our hypotheses (Sect. 3). This section is followed by our research design and the sample selection procedure (Sect. 4). The next section presents the empirical results, robustness checks, and our supplementary analysis (Sect. 5). After that, we explain the limitations of our study and derive recommendations for future research (Sect. 6). In the final section, we discuss our findings and present implications for researchers and practitioners (Sect. 7).

## 2 Theoretical background and regulatory framework

### 2.1 Managerial discretion and accounting quality

For the present study, we draw on the upper echelons theory, which is rooted in the behavioural theory of the firm. This theory assumes that top managers' individual characteristics have an impact on their actions and decisions (Anessi-Pessina & Sicilia, 2020; Donatella & Tagesson, 2021). It is driven by the assumption that top managers' decisions are subject to "bounded rationality, multiple and conflicting goals, myriad options, and varying aspiration levels" (Hambrick & Mason, 1984). These circumstances restrict top managers' ability to make thoroughly informed, rational and optimal decisions. In fact, these situations are not entirely observable but require strategic actions. Thus, decisions are shaped by top managers' experiences, knowledge, personality, values and other idiosyncrasies (Hambrick, 2007). The underlying reasoning for top managers' individual perceptions affecting firm-level outcomes has been empirically supported in several ways (Crossland et al., 2014; Nielsen, 2010). Specifically, it has been argued that top managers' individual attributes are more commonly reflected when decisions and actions are made under high levels of discretion due to uncertainty and ambiguity (Hambrick & Finkelstein, 1987). According to the literature, managerial discretion refers to the latitude of actions available to a TMT (Anessi-Pessina & Sicilia, 2020). It occurs when

constraints on decision-making are not fully binding nor unambiguous (Ma et al., 2019). Managerial discretion might also arise in financial accounting decisions, such as in choosing how to treat depreciation rates or accruals for bad debt (Charitou et al., 2007). If accounting decisions are exercised opportunistically, the credibility of financial reporting will decline since it does not accurately reflect a firm's true economic situation.

Since financial statements provide pertinent information for shareholders, potential investors and creditors, managers may have incentives to manage earnings to maximise their personal benefit. The reasons for engaging in earnings management can include several factors, such as meeting market expectations, fulfilling contractual agreements, or increasing job security. Earnings management arises when "managers use judgement in financial reporting and in structuring transactions to alter financial reports to either mislead some stakeholders about the underlying economic performance of the company or to influence contractual outcomes that depend on reported accounting numbers" (Healy & Wahlen, 1999). Since accounting standards do not offer direct measures of managerial discretion in financial reporting, the related literature approximates the quality of financial statements (Francis et al., 2004). Precisely, discretionary accruals capture distortions and the flexibility used by top managers to influence the reported earnings (Belot & Serve, 2018). Therefore, this study uses discretionary accruals since they serve as an appropriate measure of opportunistic managerial actions or discretion in financial reporting estimating firms' level of accounting quality.

### 2.2 The German corporate governance system

Before we further examine the relationship between TMT nationality, gender and age diversity and accounting quality, we must emphasise particularities concerning German corporate governance regulations. The literature highlights important distinctions between the Anglo-American one-tier system and the German corporate governance system (Goergen et al., 2008). To separate management and control functions, German stock corporations are typically characterised by a two-tier board structure (Quick & Warming-Rasmussen, 2009). Figure 1 illustrates the distinction between a one-tier (unitary) and two-tier (dualistic) board system. One-tier boards consist of a single body with executive and non-executive directors. In contrast, two-tier boards have a separate supervisory board consisting of non-executive directors and an executive or management board representing the top management team. This separation of power and control was established according to the German Stock Corporation Act of 1965. Accordingly, listed corporations (*Aktiengesellschaften*) must be governed by two independent administrative bodies. The management board (*Vorstand*) is responsible for strategic decision-making and operational activities, whereas the supervisory board (*Aufsichtsrat*) monitors and controls the management board members' actions and provides strategic guidance (Du Plessis et al., 2012). On behalf of the shareholders, the supervisory board appoints and removes the members of the management board by resolution (Berger et al., 2014).

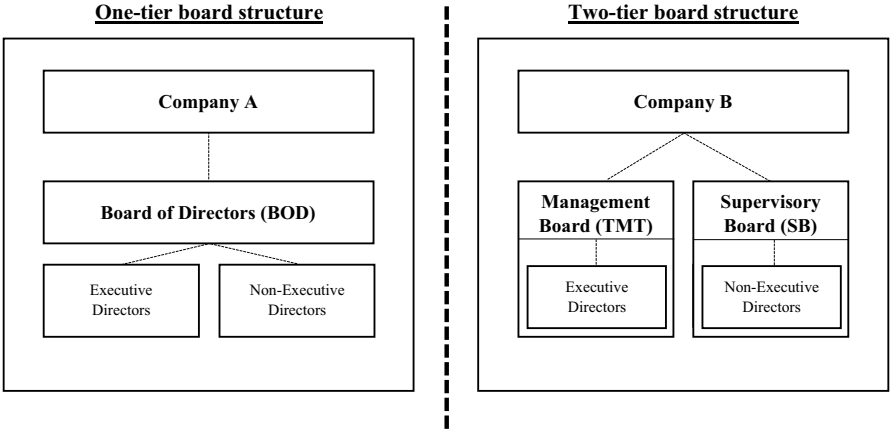


**Fig. 1** One-tier versus two-tier board structure

Management board members cannot be members of the supervisory board and vice versa. When making appointments to the management board, the supervisory board shall consider all relevant aspects of diversity (GCGC, 2022). The number of board members varies according to the company's size. The management board comprises at least one or more members, averaging in 2018 on 6.2 members.[1] For companies with a share capital of at least 3 million EUR, the management board must consist of at least two individuals (Thomson Reuters, 2022). As stipulated by the German Corporate Governance Code (GCGC), consolidated financial statements are prepared by management board members and examined by the auditor as well as supervisory board members (GCGC, 2022). In our study, we rely on the members of the management board due to its primary obligation for the firm's financial reporting and operational decision-making. Notably, we acknowledge that corporate governance systems are country-specific, and career paths remain somewhat bound to culture and nationality (Davoine & Ravasi, 2013). Therefore, we concentrated on a single-country study since this avoids problems related to the heterogeneity of accounting standards, which are inherent in cross-country research designs (Belot & Serve, 2018). Hence, in our case, focusing on a single-country study has certain advantages over a multi-country study design. Based on these considerations, the following section poses the hypotheses to be tested.

[1] Further details on the composition of the different DAX 30 top management team roles can be found in Supplementary material I.

## 3 Literature review and hypotheses development

### 3.1 TMT nationality diversity and accounting quality

With increasing globalisation, firms tend to adjust their governance bodies by appointing more foreigners to the management board (Oxelheim et al., 2013; Sanders & Carpenter, 1998). As a dimension of TMT diversity, nationality diversity among top managers can be defined as the presence of at least one non-national or foreign member within the board of directors (Staples, 2007). An individual's national origin reflects the institutional background of the country where they spent most of their formative years (Hambrick et al., 1998). Prior research has found that national origin has a lasting effect on executives' mindsets (Geletkanycz, 1997). Furthermore, resource dependency theory implies that foreign members add value to their boards and firms due to their different skills and experiences (Hoang et al., 2017). Thus, growing up in a society with certain peculiarities affects how top managers process and interpret information, which impacts decision-making behaviour (Nielsen & Nielsen, 2013). In this way, one's country of origin jointly influences their field of vision, selective perceptions and strategic actions (Hambrick & Mason, 1984). Consequently, nationality-diverse teams are equipped with a broader range of knowledge, which can enhance firms' problem-solving abilities. Multinational teams integrate their embodied experiences and engage in in-depth discussions to consider the best possible solution (Hambrick et al., 1998). In line with this notion, Watson et al. (1993) proved that international teams outperformed homogeneous groups regarding the perspectives and alternatives generated. Additionally, Schmid and Dauth (2014) discovered that investors value the announcement of hiring foreign top managers because they interpret this as an attempt to improve the firm's corporate governance standards. It is well known that good corporate governance, specifically board composition and board independence, is essential to firms' accounting quality (Beekes et al., 2004). The presence of foreign top managers may also result in increased monitoring effectiveness. Prior literature claimed that foreign managers bring about high transparency and accountability while reducing cohesion among TMTs (Srinidhi et al., 2011). Accordingly, recent research from China has shown that the level of earnings management is negatively related to the presence of foreign directors on corporate boards (Du et al., 2017). Hence, we argue that nationality diversity within TMTs will lead to higher accounting quality. Therefore, our first hypothesis is presented as follows:

**Hypothesis H1** TMT nationality diversity is positively associated with firms' accounting quality.

### 3.2 TMT gender diversity and accounting quality

Gender diversity has gained increasing attention throughout the last decades. The appointment of more women directors to corporate boards is of great interest to

policy-makers and practitioners but also to management and accounting scholars. Some countries have recently initiated legislative changes, now requiring a predetermined representation of female directors on the board. For instance, Norway (40% of women on boards), Spain (40% of women on boards) and Sweden (25% of women on boards) are some examples of countries that already require female representation on corporate boards (Zalata et al., 2022). However, even if there is a growing presence among women directors, the appointment of women in large parts of the European Union (EU) is still voluntary (e.g., Croatia, Czech Republic and Hungary). Although, the EU proposed an objective of a 40% board representation of the under-represented gender among non-executive directors or 33% among all directors. In Germany, gender quota legislation reached a milestone in June 2021 when binding regulations for management boards passed for the first time. Since 2016, German law has required listed companies with full employee representation on their supervisory boards to have women in at least 30% of non-executive board seats. Additionally, the recently revised legislation requires listed companies with full employee representation to have at least one woman and one man on the executive board if the total number of seats exceeds three.

Research indicates that gender diversity[2] among a firm's top managers is likely to impact its financial performance (Cabeza-García et al., 2018; Ye et al., 2010). Therefore, scholars have also begun to analyse the association between gender and accounting quality in greater detail (Hoang et al., 2017). Prior literature has argued that female top managers are less likely to act unethically for personal benefit (Betz et al., 1989). Moreover, Kaplan et al. (2009) emphasised that women are more likely to report cases of fraudulent financial reporting. Furthermore, gender differences have been observed in decision-making practices and risk-taking behaviour (Gull et al., 2018). Accordingly, women tend to be more risk-averse (Barber & Odean, 2001), cautious and less aggressive in decision-making processes (Byrnes et al., 1999). Likewise, women also act decisively to improve accounting quality since they are more sensitive to reputational damage and the risk of lawsuits (Srinidhi et al., 2011). Consequently, it is assumed that women will take on a much more conservative attitude toward the level of earnings management (Gul et al., 2009). Using the accrual-based measure of conservatism, a study by Krishnan and Parsons (2008) found that accounting quality is favourably related to gender diversity among senior managers. Moreover, Shawver et al. (2006) proved that female accountants were less likely to engage in earnings management. Therefore, based on the arguments above, we expect that a firm with higher TMT gender diversity will be significantly less likely to engage in earnings management. Consequently, our second hypothesis is presented as follows:

**Hypothesis H2** TMT gender diversity is positively associated with firms' accounting quality.

[2] Women constitute less than 14% (13.8% in 2018) of all DAX 30 board directors, and there are virtually no all-female boards. Therefore, higher gender diversity on boards is achieved through stronger female board participation. Accordingly, we base our argumentation on the effects of having more female directors as TMT gender diversity implies the presence of female and male board representation.

### 3.3 TMT age diversity and accounting quality

According to upper echelons theory, top managers' decisions, actions and judgements are affected by their individual perceptions, which are defined through their personal experiences (Hambrick & Mason, 1984). Innately, younger individuals are physically and ethically different from older ones. As such, Gibbons and Murphy (1992) found that a manager's behaviour and incentives depend on age. In this regard, prior literature has emphasised that older TMT members exhibit a more conservative and moral judgement (McCabe et al., 2006). Additionally, Sundaram and Yermack (2007) observed a positive link between age and ethical behaviour in financial reporting.

However, the second line of argument points in the opposite direction. For example, Davidson et al. (2007) argued that managers nearing retirement age report larger discretionary accruals. They might be less concerned with their firms' long-term performance and have stronger incentives to engage in income-increasing actions (Dechow & Sloan, 1991). This behaviour is well known and has been described as the horizon problem (Davidson et al., 2007). Hence, prior research reported a higher motivation to manipulate earnings before succession or when leaving a company (Lasalle et al., 1993). TMT members who plan to continue working for their firm will be less likely to mortgage the firm's future since they will still be employed. Therefore, to limit managerial self-interest, it is highly encouraged to consider different age groups within TMTs. Moreover, prior literature has argued that age diversity leads to better monitoring by balancing the energy and enthusiasm of younger directors with the experience and greater conservatism of older ones (Ararat et al., 2015). Within this context, TMTs with managers of varying ages will be less likely to engage in earnings management. Thus, our third hypothesis is presented as follows:

**Hypothesis H3** TMT age diversity is positively associated with firms' accounting quality.

### 3.4 Moderating effect of CFO tenure

Prior research relying on upper echelons theory to examine financial reporting quality has shown that CFOs have the most power among all top managers (Sun et al., 2019). Thus, we focus more specifically on the CFO since this person monitors the firm's financial reporting processes and has the most direct impact on accounting-related decisions. In particular, the interface between the TMT and the CFO is especially important in financial reporting decisions. Consistent with scholars who emphasise that specific expertise matters in business contexts, tenure is perhaps the most appropriate way to examine the impact of CFOs' individual practices on accounting decisions over time (Ge et al., 2011). Specifically, the tenure of the CFO is one factor that might affect ethical reasoning and thus influences financial reporting outcomes (Pennino, 2002).

The degree to which CFOs engage in opportunistic accounting behaviours may depend upon how much they can influence the firm's reporting processes. It is argued

that long-tenured CFOs who are more entrenched in their position and more powerful in the organisation tend to choose more aggressive accounting practices (Muttakin et al., 2019). Furthermore, CFOs with longer tenure are more likely to have acquired organisation-specific human capital. They should thus be better equipped to make opportunistic accounting choices (Donatella & Tagesson, 2021). Additionally, newly appointed CFOs may be more prone to take a write-off by impairing the goodwill recognised by their predecessor. On the other hand, longer-standing CFOs might be more resistant to goodwill impairment, thereby admitting that they have not achieved their previously forecasted cash flows (Brochet & Welch, 2011). Ultimately, empirical evidence supports the outlined arguments of a positive relationship between CFO tenure and earnings management, which means lower accounting quality (Geiger & North, 2006; Hazarika et al., 2012).

Building on the above, we argue that CFO tenure may significantly alter the predicted relationships between TMT nationality, gender and age diversity with accounting quality. Therefore, in this study, we use CFO tenure as a moderator variable and argue that it negatively moderates the relationship between TMT diversity and accounting quality. In fact, the high concentration of power in a single executive is often detrimental to accounting quality (Plöckinger et al., 2016). Since longer CFO tenure often leads to more power on the board, it might result in higher levels of earnings management (Brochet & Welch, 2011). Consequently, long-tenured CFOs are more likely to exploit accounting behaviours by linking their managerial compensation to reported earnings (Muttakin et al., 2019). Hence, powerful and long-tenured CFOs will be better able to influence board discussions and decision-making to their personal advantage. For this reason, longer CFO tenure is expected to mitigate the effects of higher diversity on the board. Therefore, we hypothesise as follows:

**Hypothesis H4a** CFO tenure negatively moderates the relationship between TMT nationality diversity and firms' accounting quality.

**Hypothesis H4b** CFO tenure negatively moderates the relationship between TMT gender diversity and firms' accounting quality.

**Hypothesis H4c** CFO tenure negatively moderates the relationship between TMT age diversity and firms' accounting quality.

## 4 Methodology

### 4.1 Sample and data collection

The initial sample for this study consisted of German multinational enterprises (MNEs) listed in the DAX 30 index between 2011 and 2018. The DAX comprises the top 30 German firms according to market capitalisation. Due to German stock exchange regulations, these firms are subject to high transparency and disclosure obligations (Weber, 2020). Therefore, we can obtain the demographic characteristics

of the respective top managers from annual reports, corporate websites or biographical databases. As a first step, we identified all management board members in the years under consideration. Details on managers' career paths were hand collected from curricula vitae (CVs) or other biographical data. The data were rigorously double-checked by the authors to reduce failures in analysing each TMT member's CV. By relying on CVs and other bibliographic documents, we followed an approach typical in career development research since CVs contain all relevant steps in life (Nielsen, 2009; Schmid & Dauth, 2014). In line with other studies, we excluded all firms from the financial services sector (SIC 6000–6999) due to their specific accounting requirements (Wilson & Wang, 2010; Zhang, 2019). Moreover, in the SIC code range 7000–7999, we excluded all computer hardware/software or internet-related ('high-tech') firms since research has revealed systematic differences between high-tech and non-high-tech firms and their levels of earnings management (Kwon & Yin, 2006). The DAX 30 listed companies included in our study can be found in Appendix 1. Ultimately, we matched the biographical information with corresponding industry- and firm-level data drawn from the Refinitiv database. Manager profiles or firms with missing data were excluded from the analysis. The final sample comprised 183 firm-year observations of the DAX 30 firms. This sample size is similar to other studies on financial reporting quality that use data on entire TMT career backgrounds in a specific country (Dauth et al., 2017; Weber, 2020). As a supplement, our detailed sampling procedure is presented in Appendix 2.

### 4.2 Dependent variable

We measure accounting quality by using the absolute values of discretionary accruals. In related studies, this is often referred to as a proxy for the effectiveness of accounting quality (Dechow et al., 1995). In particular, we rely on two distinct measures of discretionary accruals: the modified Jones (1991) model according to Dechow et al. (1995) and the performance-adjusted model based on Kothari et al. (2005). Following prior literature, such models have been established as the preferred methodology in accounting research to capture managerial discretion (Dechow et al., 2010; Hope et al., 2013). Notably, lower absolute values of discretionary accruals represent higher accounting quality and vice versa. We operationalise total accruals $TACC_{it}$ for firm $i$ at time $t$ as follows:

$$TACC_{it} = \left(\Delta CA_{it} - \Delta Cash_{it}\right) - \left(\Delta CL_{it} - \Delta STD_{it}\right) - DA_{it}$$

where $\Delta CA_{it}$ is the change in current assets, $\Delta Cash_{it}$ is the change in cash and cash equivalents, $\Delta CL_{it}$ is the change in current liabilities, $\Delta STD_{it}$ is the change in short-term debt and $DA_{it}$ are the depreciation and amortisation expenses for firm $i$ at time $t$. Change is measured from time $t-1$ to $t$. The discretionary accruals are based on the following models:

Dechow et al. (1995):

$$\frac{TACC_{it}}{TA_{it-1}} = \beta_1 \frac{1}{TA_{it-1}} + \beta_2 \frac{\Delta REV_{it} - \Delta REC_{it}}{TA_{it-1}} + \beta_3 \frac{PPE_{it}}{TA_{it-1}} + \varepsilon_{it}$$

Kothari et al. (2005):

$$\frac{TACC_{it}}{TA_{it-1}} = \beta_1 \frac{1}{TA_{it-1}} + \beta_2 \frac{\Delta REV_{it} - \Delta REC_{it}}{TA_{it-1}} + \beta_3 \frac{PPE_{it}}{TA_{it-1}} + \beta_4 ROA_{it} + \varepsilon_{it}$$

where $TA_{it}$ is total assets, $\Delta REV_{it}$ is the change in revenue, $\Delta REC_{it}$ is the change in receivables, $PPE_{it}$ is plant, property, and equipment, and $ROA_{it}$ is the return on assets for firm $i$ at time $t$. Again, change is measured from time *t-1* to $t$. We used a total of 3533 observations of all German listed firms retrieved from the Refinitiv database between 2011 and 2018 to estimate the measures of discretionary accruals on industry and year basis.[3] The lowest industry and year combination is 12 and thus above our required minimum of at least ten observations.

### 4.3 Independent variables

In this study, we calculate our TMT diversity variables using different measures. We draw on the Blau index (Blau, 1977) and coefficient of variation to measure the diversity of the relevant demographic characteristics reflected in the heterogeneity within a TMT. In prior studies, *TMT nationality diversity* (Hoang et al., 2017; Hutzschenreuter & Horstkotte, 2013; Nielsen & Nielsen, 2013) and *TMT gender diversity* (Hoang et al., 2017; Miller et al., 2009) were measured using the Blau index based on the formula $B = [1 - \sum(p_i)^2]$, where $p_i$ is the proportion of group members in the ith category. The Blau index has been established as a favourable measure of diversity within a group of people and is frequently used for categorical variables (Harrison & Klein, 2007). Furthermore, it is also an ideal construct because it meets the four criteria for a good measure of diversity. According to Miller et al. (2009), "it has a zero point to represent complete homogeneity, larger numbers indicate greater diversity, the index does not assume negative values, and the index is not unbounded". The range of the index depends upon the number of categories from 0 to (i − 1)/i (Blau, 1977). In our case, for both variables, the Blau index ranged from 0 (when there is only one gender or nationality on the TMT) to 0.50 (represents an equal number of men and women or an equal number of German and foreign nationalities on the management board) (Miller et al., 2009). A higher score for the Blau index indicates greater diversity within the TMT (Cho & Hambrick, 2006). In line with related studies, we draw on the coefficient of variation for the variable *TMT age diversity* (Cannella et al., 2008; Rivas, 2012; Tanikawa & Jung, 2019). Hence, to calculate age diversity, we divide the standard deviation of the age for each year and firm by its respective mean.

[3] Further details on the firm-year distribution of discretionary accruals by calendar year can be found in Supplementary material II.

### 4.4 Moderator variable

To calculate our moderator variable, we identified the years that the CFO worked with each firm by reviewing their biographical data. Thus, CFO tenure *(CFOTenure)* was calculated by the total number of years in the current position (Donatella & Tagesson, 2021). This procedure is widely used in the related literature (Sun et al., 2019; Zhang, 2019).[4]

### 4.5 Control variables

To adequately capture the anticipated relationship between TMT diversity and accounting quality, we control for several variables in our analysis. Following Oxelheim et al. (2013), TMT size influences firms' decision-making and corporate governance processes. Additionally, TMT size is expected to control for any size dependence in our diversity measures (Carpenter & Fredrickson, 2001). Thus, we include TMT size *(TMTSize)*, which represents the number of individuals in a TMT as listed in firms' annual reports for the years under consideration (Tihanyi et al., 2000). Additionally, we control for international experience since TMT internationalisation *(TMTIntl)* mitigates the level of managerial discretion in financial reporting (Dauth et al., 2017). We apply an established formula of TMT internationalisation based on an index following Dauth et al. (2017). This measure has also been used in related research (Schmid & Dauth, 2014; Schmid & Wurster, 2017). According to the recent literature, by focusing on single dimensions, important aspects of a top manager's internationalisation might be neglected (Oxelheim et al., 2013). Next, we control for director experience and integrated TMT tenure *(TMTTenure)* as the average number of years that directors have been on the management board (Srinidhi et al., 2011). Moreover, we use firm size *(FirmSize)* measured as the natural logarithm of total assets. Prior studies show that top managers in larger firms face greater pressure to report earnings that are more predictable (Pincus & Rajgopal, 2002). Similarly, Dechow and Dichev (2002) emphasise that larger firms with reputable operations and diversified businesses are more stable, which in turn reduces accruals estimation errors. Next, we control for leverage *(Leverage)* measured as the total liabilities divided by total assets since firms with higher leverage ratios are expected to have stronger incentives to manage earnings, either to fulfil debt agreements such as debt covenants or to avoid a bankruptcy declaration (DeFond & Jiambalvo, 1994; Johnson et al., 2002; Peni & Vähämaa, 2010). Following prior literature (Cannella et al., 2008), we integrate firm age *(FirmAge)* since it varied within the sample. Prior research has discovered that older firms are more likely to have lower levels of earnings management (Beuselinck et al., 2010). As such, more established firms have a reputation to protect and might have improved their financial reporting processes over time (Doyle et al., 2007). Additionally, prior studies have shown that reported firm

[4] We also tested whether our arguments concerning the moderating effect of CFO tenure applied to our CEO tenure data. However, the association between CEO tenure as a moderator and earnings management did not reveal conclusive results. This corresponds with related research in the field, which noted that accounting quality is primarily attributable to the CFO, not the CEO (e.g., Jiang et al. 2013; Dauth et al., 2017).

losses are related to higher earnings management (Baxter & Cotter, 2009). Therefore, our model controls for firm loss *(Loss)*. Moreover, we include the *book-to-market ratios (BTM)* to control for the effect of long-term growth opportunities on firms' discretionary accruals (Hsieh et al., 2018; Wilson & Wang, 2010). Furthermore, we add foreign ownership *(ForeignOwnership)* measured as the percentage of shares held by non-German investors, to account for firms' corporate governance characteristics (Dauth et al., 2017). Scholars have argued that foreign shareholders are likely to function as outsiders who help to increase the firm monitoring level and thereby improve accounting quality (Oxelheim & Randøy, 2003; Oxelheim et al., 2013). Kothari et al. (2005) note that the estimation of discretionary accruals does not consider unusual or extreme firm performance since such periods give accruals a transitory component. Thus, we need to consider operating cash flows *(CashFlow)* to capture the remaining performance-specific effects (Becker et al., 1998; Dechow & Dichev, 2002). Using this control variable reduces estimation bias from the positive link between the measurement error in discretionary accruals and the current earnings level (Albersmann & Hohenfels, 2017; Weber, 2020). To complement this, we include return on assets *(RoA)* in our model. Thereby, we control for the effect of disclosure levels being positively correlated with RoA (Belot & Serve, 2018; Gul & Leung, 2004; Zhang, 2019). Ultimately, we also control for sales growth *(SalesGrowth)* since research has identified its positive relationship with discretionary accruals (Wilson & Wang, 2010). Further details on how all variables were constructed are provided in Appendix 3.

### 4.6 Analytical approach

In line with prior studies that relied on a panel dataset in this field, we test our hypotheses using pooled ordinary least squares (OLS) regressions (e.g. Cai et al., 2019; Wilson & Wang, 2010; Zhang, 2019). The main model is:

$$\begin{aligned}\left|DA_{it}\right| = {} & \alpha_0 + \beta_1 TMT\ nationality\ diversity_{it} + \beta_2 TMT\ gender\ diversity_{it} \\ & + \beta_3 TMT\ age\ diversity_{it} + \beta_4 CFOTenure_{it} + \beta_5 TMTSize_{it} \\ & + \beta_6 TMTIntl_{it} + \beta_7 TMTTenure_{it} + \beta_8 FirmSize_{it} + \beta_9 RoA_{it} \\ & + \beta_{10} Leverage_{it} + \beta_{11} Loss_{it} + \beta_{12} BTM_{it} + \beta_{13} FirmAge_{it} \\ & + \beta_{14} CashFlow_{it} + \beta_{15} ForeignOwnership_{it} + \beta_{16} SalesGrowth_{it} + \varepsilon_i\end{aligned}$$

Furthermore, to test our moderator hypotheses, we add the interaction terms based on the product of the respective independent variable with our moderator variable, CFO tenure:

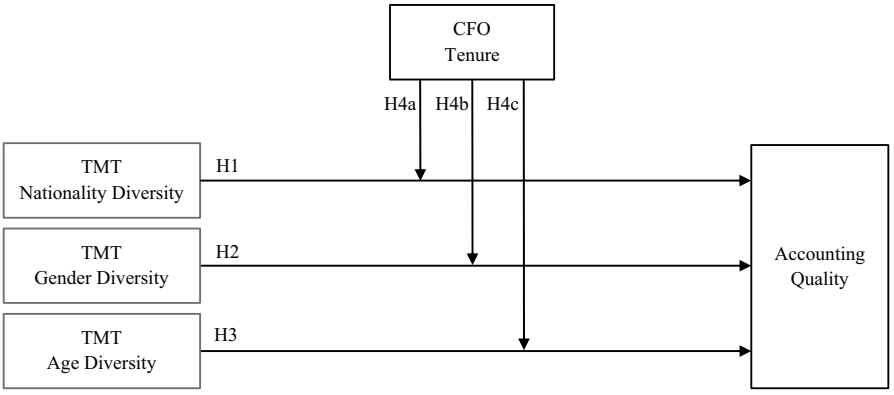


**Fig. 2** Research framework

$$
\begin{aligned}
|DA_{it}| = {} & \alpha_0 + \beta_1 TMT\ nationality\ diversity_{it} + \beta_2 TMT\ gender\ diversity_{it} \\
& + \beta_3 TMT\ age\ diversity_{it} + \beta_4 CFOTenure_{it} \\
& + \beta_5 TMT\ nationality\ diversity_{it} xCFOTenure_{it} \\
& + \beta_6 TMT\ gender\ diversity_{it} xCFOTenure_{it} \\
& + \beta_7 TMT\ age\ diversity_{it} xCFOTenure_{it} + \beta_8 TMTSize_{it} + \beta_9 TMTIntl_{it} \\
& + \beta_{10} TMTTenure_{it} + \beta_{11} FirmSize_{it} + \beta_{12} RoA_{it} + \beta_{13} Leverage_{it} \\
& + \beta_{14} Loss_{it} + \beta_{15} BTM_{it} + \beta_{16} FirmAge_{it} + \beta_{17} CashFlow_{it} \\
& + \beta_{18} ForeignOwnership_{it} + \beta_{19} SalesGrowth_{it} + \varepsilon_i
\end{aligned}
$$

Following prior research, we rely on clustered standard errors (Francis et al., 2014). Additionally, we include industry and year fixed effects to control for industry-specific and time-relevant characteristics. Subsequently, we perform various tests to secure the validity of our regression results (see Sect. 5.2). Our research framework is illustrated in Fig. 2. The results of the analysis are reported in the next section.

## 5 Results

### 5.1 Results of the analysis

Table 1 presents the descriptive statistics of the variables used in this study. As reported, the mean value of discretionary accruals is 0.0307 for |DA1| and 0.0362 for our |DA2| measure. Moreover, the descriptive results for standard deviations are 0.0359 for |DA1| and 0.0471 for |DA2|, with a minimum of 0.0000 for |DA1| and 0.0002 for |DA2|, with maximum values of 0.2765 for |DA1| and 0.3445 for |DA2|. These results indicate a wide range in the level of earnings management. Regarding the independent variables, TMT nationality has a mean value

**Table 1** Descriptive statistics

| Variables | Observations | Mean | Standard deviation | Min | Q1 | Median | Q3 | Max |
|---|---|---|---|---|---|---|---|---|
| \|DA1\| | 183 | 0.030681 | 0.035879 | 0.000044 | 0.009374 | 0.019826 | 0.040759 | 0.276531 |
| \|DA2\| | 183 | 0.036239 | 0.047054 | 0.000155 | 0.009978 | 0.021216 | 0.046169 | 0.344494 |
| TMT nationality diversity | 183 | 0.297758 | 0.177081 | 0.000000 | 0.218750 | 0.375000 | 0.444444 | 0.500000 |
| TMT gender diversity | 183 | 0.102327 | 0.141516 | 0.000000 | 0.000000 | 0.000000 | 0.218750 | 0.480000 |
| TMT age diversity | 183 | 0.096012 | 0.041253 | 0.017174 | 0.068030 | 0.087905 | 0.116046 | 0.422080 |
| CFOTenure | 183 | 14.617490 | 9.434340 | 0.000000 | 7.000000 | 13.000000 | 23.000000 | 34.000000 |
| TMTSize | 183 | 6.049180 | 1.717008 | 2.000000 | 5.000000 | 6.000000 | 7.000000 | 10.000000 |
| TMTIntl | 183 | 3.656225 | 1.114301 | 1.646348 | 2.940907 | 3.536276 | 4.592105 | 6.104849 |
| TMTTenure | 183 | 5.131090 | 3.844330 | − 10.550000 | 3.310000 | 5.010000 | 7.790000 | 22.960000 |
| FirmSize | 183 | 62.543070 | 14.447680 | 31.386140 | 52.625420 | 59.581030 | 72.881290 | 97.932790 |
| RoA | 183 | 0.081967 | 0.275067 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 1.000000 |
| Leverage | 183 | 2.227710 | 1.801710 | 0.339160 | 0.912120 | 1.640660 | 3.160470 | 10.678080 |
| Loss | 183 | 94.956280 | 55.697160 | 7.000000 | 22.000000 | 100.000000 | 140.000000 | 190.000000 |
| BTM | 183 | 0.077076 | 0.042727 | − 0.053631 | 0.051757 | 0.078197 | 0.105725 | 0.222064 |
| FirmAge | 183 | 5.366120 | 5.490490 | 0.000000 | 0.000000 | 5.000000 | 7.000000 | 25.000000 |
| CashFlow | 183 | 5.103610 | 8.042130 | − 20.730000 | 0.380000 | 4.100000 | 9.690000 | 34.140000 |
| ForeignOwnership | 183 | 0.359342 | 0.134588 | 0.070000 | 0.262153 | 0.338636 | 0.443080 | 0.770963 |
| SalesGrowth | 183 | 15.772930 | 5.641970 | 3.000000 | 11.500000 | 15.500000 | 20.666670 | 26.833330 |

**Table 2** Correlation table

| | \|DA1\| | \|DA2\| | TMT nationality diversity | TMT gender diversity | TMT age diversity | CFO tenure | TMT size | TMTIntl | TMT tenure |
|---|---|---|---|---|---|---|---|---|---|
| \|DA1\| | 1 | 0.8800* | − 0.2018* | 0.0183 | 0.1901* | − 0.1331* | − 0.0695 | − 0.2798* | − 0.1728* |
| \|DA2\| | 0.9628* | 1 | − 0.1855* | 0.0129 | 0.1635* | − 0.1007 | − 0.0574 | − 0.2765* | − 0.1550* |
| TMT nationality diversity | − 0.2662* | − 0.2583* | 1 | − 0.0202 | − 0.0638 | 0.1940* | 0.1272* | 0.6282* | 0.2105* |
| TMT gender diversity | − 0.0251 | − 0.0252 | − 0.003 | 1 | − 0.4074* | 0.3235* | 0.4499* | 0.0407 | 0.2533* |
| TMT age diversity | 0.1655* | 0.1516* | − 0.0532 | − 0.2547* | 1 | − 0.4027* | − 0.2082* | − 0.1056 | − 0.3604* |
| CFOTenure | − 0.1038 | − 0.0984 | 0.1929* | 0.3503* | − 0.3350* | 1 | 0.2730* | 0.2660* | 0.6358* |
| TMTSize | − 0.1515* | − 0.1361* | 0.2143* | 0.4318* | − 0.1777* | 0.2857* | 1 | 0.2148* | 0.2822* |
| TMTIntl | − 0.2409* | − 0.2330* | 0.5735* | 0.001 | − 0.0572 | 0.2511* | 0.2075* | 1 | 0.3014* |
| TMTTenure | − 0.1187 | − 0.1125 | 0.1970* | 0.2697* | − 0.2917* | 0.6223* | 0.3014* | 0.2626* | 1 |
| FirmSize | 0.0307 | 0.0324 | − 0.0098 | 0.4123* | − 0.1044 | 0.2816* | 0.5954* | − 0.1692* | 0.2411* |
| RoA | 0.0079 | 0.0103 | 0.1498* | 0.0859 | − 0.0492 | 0.1407* | 0.061 | 0.3062* | 0.2948* |
| Leverage | 0.1089 | 0.1136 | − 0.3333* | 0.1713* | − 0.0441 | − 0.0433 | 0.0629 | − 0.4446* | − 0.1903* |
| Loss | 0.0545 | 0.0418 | − 0.1676* | − 0.1429* | 0.0698 | − 0.1361* | − 0.1482* | − 0.1942* | − 0.2282* |
| BTM | 0.1595* | 0.1546* | − 0.2573* | 0.0275 | 0.0035 | − 0.0862 | − 0.0168 | − 0.4247* | − 0.1176 |
| FirmAge | − 0.0651 | − 0.0806 | 0.1315* | 0.1229* | 0.0075 | 0.1192 | 0.2042* | − 0.0102 | 0.1975* |
| CashFlow | 0.0613 | 0.0415 | 0.0936 | 0.0694 | 0.0151 | 0.0255 | − 0.1163 | 0.1871* | − 0.0534 |
| Foreign Ownership | 0.064 | 0.052 | − 0.1196 | − 0.1009 | 0.0047 | − 0.109 | − 0.2187* | − 0.1957* | − 0.0037 |
| SalesGrowth | − 0.1265* | − 0.0826 | 0.1465* | − 0.0675 | 0.1411* | − 0.0207 | 0.0491 | 0.1660* | 0.085 |
| | Firm size | RoA | Leverage | Loss | BTM | Firm age | Cash flow | Foreign owner-ship | Sales growth |
| \|DA1\| | 0.0894 | − 0.1673* | 0.2139* | 0.1029 | 0.1434* | − 0.0965 | 0.0174 | 0.1833* | − 0.1458* |

**Table 2** (continued)

| | Firm size | RoA | Leverage | Loss | BTM | Firm age | Cash flow | Foreign owner-ship | Sales growth |
|---|---|---|---|---|---|---|---|---|---|
| \|DA2\| | 0.1235* | − 0.2266* | 0.2763* | 0.1048 | 0.1904* | − 0.11 | − 0.0313 | 0.1354* | − 0.0838 |
| TMT nationality diversity | − 0.0533 | 0.1769* | − 0.3213* | − 0.1594* | − 0.2902* | 0.1179 | 0.066 | − 0.1137 | 0.1206 |
| TMT gender diversity | 0.4291* | 0.078 | 0.1897* | − 0.1388* | 0.0346 | 0.2064* | 0.0965 | − 0.0945 | − 0.0545 |
| TMT age diversity | − 0.1848* | − 0.0333 | − 0.0389 | 0.1276* | − 0.0042 | − 0.0956 | 0.0099 | 0.0351 | 0.0484 |
| CFOTenure | 0.2801* | 0.1173 | − 0.0009 | − 0.1234* | − 0.1350* | 0.1380* | 0.0253 | − 0.0752 | 0.0116 |
| TMTSize | 0.5748* | 0.042 | 0.1076 | − 0.1513* | 0.0969 | 0.2490* | − 0.1005 | − 0.2269* | 0.0711 |
| TMTIntl | − 0.1919* | 0.3843* | − 0.4721* | − 0.2099* | − 0.4830* | 0.1327* | 0.1843* | − 0.1487* | 0.1451* |
| TMTTenure | 0.1998* | 0.3137* | − 0.1400* | − 0.2278* | − 0.2050* | 0.2199* | − 0.0369 | 0.0289 | 0.103 |
| FirmSize | 1 | − 0.4230* | 0.6695* | 0.1369* | 0.5765* | 0.1016 | − 0.4709* | 0.0298 | − 0.0431 |
| RoA | − 0.3634* | 1 | − 0.6363* | − 0.4729* | − 0.7564* | 0.2812* | 0.5769* | − 0.0398 | 0.1815* |
| Leverage | 0.6186* | − 0.6557* | 1 | 0.3729* | 0.7816* | − 0.3073* | − 0.5300* | 0.1724* | − 0.1375* |
| Loss | 0.1240* | − 0.6263* | 0.4013* | 1 | 0.3654* | − 0.2052* | − 0.2029* | 0.0441 | − 0.1491* |
| BTM | 0.5036* | − 0.6304* | 0.7084* | 0.4821* | 1 | − 0.3167* | − 0.6319* | 0.0306 | − 0.1451* |
| FirmAge | 0.0592 | 0.1996* | − 0.2687* | − 0.1662* | − 0.1817* | 1 | 0.1379* | − 0.1750* | − 0.0448 |
| CashFlow | − 0.4889* | 0.5326* | − 0.5457* | − 0.1820* | − 0.5177* | 0.0854 | 1 | − 0.1321* | 0.0106 |
| Foreign Ownership | 0.0028 | − 0.0122 | 0.2001* | 0.0237 | 0.0451 | − 0.2688* | − 0.1475* | 1 | − 0.0346 |
| SalesGrowth | − 0.0537 | 0.2536* | − 0.1740* | − 0.1429* | − 0.1618* | − 0.1039 | 0.0585 | 0.0125 | 1 |

Pearson correlation coefficients are shown below and Spearman correlations coefficients above the diagonal

* indicates a significance level of 10%

(standard deviation) of 0.2978 (0.1771), while those for TMT gender diversity and age diversity are 0.1023 (0.1415) and 0.0960 (0.0413), respectively. Reviewing the minimum and maximum values reveals large differences between the different diversity levels in the sample. TMT nationality diversity ranges from 0.0000 to 0.5000, TMT gender diversity from 0.0000 to 0.4800 and TMT age diversity from 0.0172 to 0.4221. Table 2 summarises the Pearson and Spearman correlation coefficients for the variables used. Our data structure did not suffer crucial multicollinearity issues since the variables do not show any high (> 0.80) positive or negative correlations (Hair et al., 2006). To corroborate this observation, multicollinearity diagnostic was conducted by computing *variance inflation factors (VIFs)*. Our results reveal that in all our regression models, the VIF scores are well below the value of 10. Therefore, we can reasonably conclude that multicollinearity was not a constraint in our study.

We estimate two regression models to analyse the effects of TMT nationality, gender and age diversity on accounting quality. In Model 1, the dependent variable |DA1| is calculated using the modified Jones (1991) model by Dechow et al. (1995). The variable |DA2| relies on the performance-adjusted discretionary accruals framework by Kothari et al. (2005). Table 3 presents the results of the main regression analysis.

Hypothesis 1 predicts a positive effect between TMT nationality diversity and accounting quality. Both models reveal a significant and negative association between TMT nationality diversity and the level of discretionary accruals ($ß_{model1} = -0.0564$, $p < 0.05$; $ß_{model2} = -0.0515$; $p < 0.05$). This suggests that firms with more nationalities in their TMT have lower discretionary accruals and, thus, higher accounting quality. Accordingly, Hypothesis 1 is empirically supported.

Hypothesis 2 proposes a positive association between TMT gender diversity and accounting quality. For the two models, we find a significant and negative effect between TMT gender diversity and the level of discretionary accruals ($ß_{model1} = -0.0414$, $p < 0.1$; $ß_{model2} = -0.0473$; $p < 0.05$). This negative association implies that firms with a more balanced TMT in terms of gender have a higher accounting quality. Thus, Hypothesis 2 is empirically supported.

Hypothesis 3 predicts that TMT age diversity is positively associated with accounting quality. Throughout the models, we find no significant effect between TMT age diversity and accounting quality ($ß_{model1} = 0.1400$, $p > 0.1$; $ß_{model2} = 0.1256$; $p > 0.1$). Therefore, Hypothesis 3 is rejected. Apparently, TMT age diversity does not influence accounting quality directly.

Table 4 includes the moderation with CFO tenure and reports the empirical results of our analysis with interaction effects. For each hypothesis, we again estimate two different models and include the respective interaction effect using the different measures of discretionary accruals. Additionally, we utilise a full model for each discretionary accruals measure, which comprises all three interaction terms. A finer illustration of the underlying relationship is achieved by including all variables simultaneously.

Hypothesis 4a predicts that CFO tenure negatively moderates the relationship between nationality diversity and accounting quality. The interaction term is highly significant, with a positive coefficient for both models ($ß_{model3} = 0.0063$,

**Table 3** Main analysis

| Dependent variable | \|DA1\| Model 1 | \|DA2\| Model 2 |
|---|---|---|
| TMT nationality diversity | − 0.0564** | − 0.0515** |
| | (0.018) | (0.044) |
| TMT gender diversity | − 0.0414* | − 0.0473** |
| | (0.055) | (0.038) |
| TMT age diversity | 0.1400 | 0.1256 |
| | (0.168) | (0.203) |
| CFOTenure | 0.0002 | 0.0001 |
| | (0.580) | (0.638) |
| TMTSize | − 0.0057* | − 0.0040 |
| | (0.089) | (0.267) |
| TMTIntl | − 0.0558 | − 0.0455 |
| | (0.134) | (0.215) |
| TMTTenure | − 0.0007 | − 0.0005 |
| | (0.424) | (0.525) |
| FirmSize | 0.0054 | 0.0035 |
| | (0.347) | (0.551) |
| RoA | 0.0019 | 0.0020 |
| | (0.397) | (0.446) |
| Leverage | 0.0005 | 0.0004 |
| | (0.156) | (0.204) |
| Loss | 0.0232 | 0.0152 |
| | (0.213) | (0.470) |
| BTM | − 0.0013 | 0.0000 |
| | (0.576) | (0.988) |
| FirmAge | − 0.0000 | − 0.0000 |
| | (0.622) | (0.549) |
| CashFlow | 0.1463 | 0.1264 |
| | (0.326) | (0.472) |
| ForeignOwnership | − 0.0006 | − 0.0009 |
| | (0.379) | (0.302) |
| SalesGrowth | − 0.0003 | − 0.0000 |
| | (0.423) | (0.972) |
| Intercept | 0.0060 | − 0.0090 |
| | (0.864) | (0.803) |
| Year-fixed-effects | Yes | Yes |
| Industry fixed effects | Yes | Yes |
| N | 183 | 183 |
| $R^2$ | 0.455 | 0.424 |
| Adj. $R^2$ | 0.356 | 0.319 |

p values in parentheses

** and *indicate a significance level of 5% and 10%, respectively

**Table 4** Analysis with interaction effects

| Dependent variable | \|DA1\| | \|DA2\| | \|DA1\| | \|DA2\| | \|DA1\| | \|DA2\| | \|DA1\| | \|DA2\| |
|---|---|---|---|---|---|---|---|---|
| | Model 3 | Model 4 | Model 5 | Model 6 | Model 7 | Model 8 | Model 9 | Model 10 |
| TMT nationality diversity | − 0.1497*** | − 0.1318*** | − 0.0555** | − 0.0509** | − 0.0563** | − 0.0514** | − 0.1458*** | − 0.1290*** |
| | (0.000) | (0.002) | (0.012) | (0.034) | (0.019) | (0.046) | (0.000) | (0.001) |
| TMT gender diversity | − 0.0350* | − 0.0419** | − 0.1294*** | − 0.1157*** | − 0.0398* | − 0.0455* | − 0.1124*** | − 0.1010*** |
| | (0.064) | (0.046) | (0.001) | (0.003) | (0.095) | (0.063) | (0.001) | (0.004) |
| TMT age diversity | 0.1408 | 0.1263 | 0.1548 | 0.1371 | 0.1241 | 0.1072 | 0.0800 | 0.0708 |
| | (0.138) | (0.171) | (0.104) | (0.151) | (0.354) | (0.390) | (0.374) | (0.451) |
| CFOTenure | − 0.0019*** | − 0.0017** | − 0.0005 | − 0.0004 | 0.0000 | − 0.0001 | − 0.0033*** | − 0.0029*** |
| | (0.007) | (0.012) | (0.143) | (0.135) | (0.987) | (0.934) | (0.000) | (0.000) |
| TMT nationality diversity × CFOTenure | 0.0063*** | 0.0054*** | | | | | 0.0061*** | 0.0053*** |
| | (0.001) | (0.004) | | | | | (0.002) | (0.004) |
| TMT gender diversity × CFOTenure | | | 0.0050*** | 0.0039** | | | 0.0048*** | 0.0037*** |
| | | | (0.003) | (0.020) | | | (0.001) | (0.010) |
| TMT age diversity × CFOTenure | | | | | 0.0020 | 0.0023 | 0.0096 | 0.0085 |
| | | | | | (0.825) | (0.782) | (0.128) | (0.213) |
| TMTSize | − 0.0048 | − 0.0032 | − 0.0057* | − 0.0040 | − 0.0058* | − 0.0040 | − 0.0050 | − 0.0033 |
| | (0.122) | (0.333) | (0.078) | (0.259) | (0.090) | (0.267) | (0.103) | (0.316) |
| TMTIntl | − 0.0641* | − 0.0527 | − 0.0643 | − 0.0522 | − 0.0570 | − 0.0469 | − 0.0777** | − 0.0639* |
| | (0.084) | (0.151) | (0.106) | (0.182) | (0.105) | (0.173) | (0.035) | (0.078) |
| TMTTenure | − 0.0001 | 0.0000 | − 0.0005 | − 0.0004 | − 0.0007 | − 0.0006 | 0.0000 | 0.0001 |
| | (0.921) | (0.970) | (0.556) | (0.642) | (0.425) | (0.523) | (0.963) | (0.953) |
| FirmSize | 0.0021 | 0.0007 | 0.0058 | 0.0038 | 0.0054 | 0.0035 | 0.0028 | 0.0012 |
| | (0.692) | (0.900) | (0.262) | (0.472) | (0.346) | (0.547) | (0.541) | (0.795) |
| RoA | 0.0017 | 0.0018 | 0.0021 | 0.0022 | 0.0019 | 0.0020 | 0.0018 | 0.0019 |
| | (0.414) | (0.466) | (0.320) | (0.396) | (0.403) | (0.451) | (0.346) | (0.425) |
| Leverage | 0.0004 | 0.0004 | 0.0005 | 0.0004 | 0.0005 | 0.0004 | 0.0004 | 0.0004 |
| | (0.209) | (0.292) | (0.122) | (0.239) | (0.153) | (0.202) | (0.182) | (0.311) |

**Table 4** (continued)

| Dependent variable | \|DA1\| Model 3 | \|DA2\| Model 4 | \|DA1\| Model 5 | \|DA2\| Model 6 | \|DA1\| Model 7 | \|DA2\| Model 8 | \|DA1\| Model 9 | \|DA2\| Model 10 |
|---|---|---|---|---|---|---|---|---|
| Loss | 0.0209 | 0.0132 | 0.0277 | 0.0187 | 0.0230 | 0.0150 | 0.0244 | 0.0158 |
| | (0.224) | (0.506) | (0.125) | (0.360) | (0.229) | (0.487) | (0.158) | (0.427) |
| BTM | 0.0007 | 0.0017 | − 0.0024 | − 0.0008 | − 0.0013 | 0.0000 | − 0.0004 | 0.0009 |
| | (0.702) | (0.197) | (0.355) | (0.655) | (0.576) | (0.991) | (0.828) | (0.533) |
| FirmAge | − 0.0001 | − 0.0001 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | − 0.0001 |
| | (0.284) | (0.309) | (0.584) | (0.516) | (0.720) | (0.659) | (0.434) | (0.454) |
| CashFlow | 0.1404 | 0.1214 | 0.1332 | 0.1163 | 0.1464 | 0.1266 | 0.1285 | 0.1122 |
| | (0.309) | (0.464) | (0.335) | (0.489) | (0.328) | (0.474) | (0.331) | (0.487) |
| ForeignOwnership | − 0.0008 | − 0.0010 | − 0.0006 | − 0.0009 | − 0.0006 | − 0.0009 | − 0.0008 | − 0.0010 |
| | (0.246) | (0.218) | (0.371) | (0.300) | (0.384) | (0.307) | (0.248) | (0.227) |
| Sales growth | − 0.0002 | 0.0001 | − 0.0002 | 0.0001 | − 0.0003 | 0.0000 | 0.0000 | 0.0002 |
| | (0.579) | (0.840) | (0.640) | (0.872) | (0.445) | (0.990) | (0.916) | (0.646) |
| Intercept | 0.0328 | 0.0141 | 0.0067 | − 0.0084 | 0.0069 | − 0.0079 | 0.0371 | 0.0179 |
| | (0.368) | (0.701) | (0.832) | (0.803) | (0.845) | (0.825) | (0.266) | (0.594) |
| Year-fixed-effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Industry fixed effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| N | 183 | 183 | 183 | 183 | 183 | 183 | 183 | 183 |
| $R^2$ | 0.491 | 0.451 | 0.47 | 0.433 | 0.455 | 0.424 | 0.504 | 0.460 |
| Adj. $R^2$ | 0.395 | 0.347 | 0.369 | 0.325 | 0.352 | 0.315 | 0.403 | 0.349 |

p values in parentheses

***, ** and * indicate a significance level of 1%, 5% and 10%, respectively

$p < 0.01$; $ß_{model4} = 0.0054$; $p < 0.05$). This positive coefficient implies that the moderating effect of higher nationality diversity with constant CFO tenure or vice versa increases discretionary accruals, which results in lower accounting quality. Hence, we find empirical support for Hypothesis 4a. Furthermore, considering the direct association of CFO tenure on our dependent variable and against our expectations, we find a positive impact on accounting quality in this setting.

Hypothesis 4b assumes a negative moderating influence of CFO tenure on the relationship between gender diversity and accounting quality. Our results reveal a significant, positive interaction effect for our discretionary accruals measures ($ß_{model5} = 0.0050$, $p < 0.05$; $ß_{model6} = 0.0039$; $p < 0.05$), which implies a negative impact on accounting quality. Consequently, we find empirical support for Hypothesis 4b.

Hypothesis 4c proposes that CFO tenure negatively moderates the relationship between age diversity and accounting quality. The coefficient of the interaction term remains insignificant and negative for all our models ($ß_{model7} = 0.0020$, $p > 0.1$; $ß_{model8} = 0.0023$; $p > 0.1$). Therefore, Hypothesis 4c is not supported.

Ultimately, the results of our full model mirror those of the previous analysis. When including CFO tenure, we observe significant and positive interaction terms for TMT nationality diversity ($ß_{model9} = 0.0061$, $p < 0.01$; $ß_{model10} = 0.0053$; $p < 0.01$) and TMT gender diversity ($ß_{model9} = 0.0048$, $p < 0.01$; $ß_{model10} = 0.0037$; $p < 0.01$). The interaction term of CFO tenure and TMT age diversity remains insignificant ($ß_{model9} = 0.0096$, $p > 0.1$; $ß_{model10} = 0.0085$; $p > 0.1$). Once again, CFO tenure shows a significant positive impact on accounting quality. However, we do not consider the positive influence to be proven since CFO tenure was not significant in all models. In the next section, we further verify our results.

### 5.2 Robustness checks and additional tests

We perform additional tests by modifying our regressions' specifications to corroborate the robustness of the results. Primarily, we aim to demonstrate that our results are robust to different proxies for earnings management based on discretionary accruals. Therefore, we employ two different measures of accounting quality. Regardless of our accruals measure, the coefficients for TMT nationality diversity and TMT gender diversity remain negative and statistically significant in all our models. The robustness of our findings also holds when adding the interaction term with the moderator variable CFO tenure. Both interaction terms, *TMT nationality diversity x CFO tenure* and *TMT gender diversity x CFO tenure*, remain positive and statistically significant in all models. Furthermore, we find no significant association between TMT age diversity in the direct effect and the interaction term *TMT age diversity x CFO tenure* in all different models on discretionary accruals. Additionally, throughout our analysis, we stepwise integrate the variables of interest and analyse them individually. Subsequently, our full model, which includes all variables simultaneously, confirms the observed tendencies. Moreover, to determine the impact of outliers, we re-estimate our analysis and winsorise the data at the 1 and 99% levels. These results substantiate the findings of our previous analysis.

Following prior studies in this field (Belot & Serve, 2018; Weber, 2020), we control for potential bias by excluding certain control variables from our analysis and replacing them with different measures. In particular, we use return on equity (RoE) defined as the ratio of net income to total equity as an alternative measure to serve as a proxy for firm performance. In line with previous research, we exclude the variable RoA and replaced it with RoE (Gul & Leung, 2004; Qi et al., 2018). Similarly, to capture future growth opportunities, we exclude the BTM and replace it with Tobin's Q, which has also been used in related literature (Gull et al., 2018; Jiang et al., 2013). We further modify the variable *Leverage* (total liabilities to total assets) and use the ratio of total debt to total assets instead (Dauth et al., 2017; Srinidhi et al., 2011). Lastly, we change our firm size variable and exclude the natural logarithm of total assets, which is replaced by the natural logarithm of market capitalisation (Buchholz et al., 2020; Malmendier & Tate, 2009). Notably, our variables of interest remain stable to the changes mentioned above in the model specification.[5]

Furthermore, reverse causation was not a problem in our analysis since the level of discretionary accruals is unlikely to influence the composition and diversity of the management board in the same year (Zhang, 2019). Typically, it takes several years for accounting errors to be discovered and restated. However, as with many other studies in the field of upper echelons theory, we admit that our analysis is susceptible to endogeneity concerns.[6] Endogeneity may be tackled by using the lagged endogenous regressor technique (Zaefarian et al., 2017). Thus, temporal separation by introducing a time lag between the independent and dependent variables can reduce this bias (Cabeza-García et al., 2018). Hence, to maintain some control over endogeneity problems, we lag all independent variables by 1 year. To test our results with the lagged variables, we use the following model:

$$\begin{aligned}\left|DA_{it}\right| = {} & \alpha_0 + \beta_1 TMT\ nationality\ diversity_{it-1} + \beta_2 TMT\ gender\ diversity_{it-1} \\ & + \beta_3 TMT\ age\ diversity_{it-1} + \beta_4 CFOTenure_{it} + \beta_5 TMTSize_{it} \\ & + \beta_6 TMTIntl_{it} + \beta_7 TMTTenure_{it} + \beta_8 FirmSize_{it} + \beta_9 RoA_{it} \\ & + \beta_{10} Leverage_{it} + \beta_{11} Loss_{it} + \beta_{12} BTM_{it} + \beta_{13} FirmAge_{it} \\ & + \beta_{14} CashFlow_{it} + \beta_{15} ForeignOwnership_{it} + \beta_{16} SalesGrowth_{it} + \varepsilon_i\end{aligned}$$

The results are reported in Table 5 and support our findings indicating that TMT nationality diversity ($ß_{model1a} = -0.0596$, $p < 0.1$; $ß_{model2a} = -0.0579$; $p < 0.1$) and TMT gender diversity ($ß_{model1a} = -0.0455$, $p < 0.05$; $ß_{model2a} = -0.0428$; $p < 0.1$) positively impact accounting quality. For TMT age diversity ($ß_{model1a} = 0.1101$, $p < 0.1$; $ß_{model2a} = 0.0985$; $p > 0.1$), we find a significant positive effect in Model 1a, which implies that firms with greater TMT diversity in terms of age have a lower accounting quality in this setting. However, this finding is not corroborated in Model 2a ($p > 0.1$). Even if the positive coefficient is supported, the effect remains insignificant. Using the 1-year lagged model, we can confirm our observations from the main

[5] Results for the robustness checks are available from the authors upon request.

[6] We acknowledge that using instrumental variables is also a common method for dealing with endogeneity concerns. However, despite difficulties in finding a suitable instrumental variable, Larcker and Rusticus (2010) concluded that 'OLS estimation is preferred to IV estimation' in accounting research.

analysis. Despite being popular among researchers, we admit that this procedure has certain restrictions (see Sect. 7). Hence, before we interpret our findings, we discuss the limitations of our results and derive recommendations for future research.

### 5.3 Supplementary analysis

We conduct a supplementary analysis to corroborate our results by using different proxies for our TMT diversity variables. Since nationality, gender and age diversity are "unit-level, compositional-constructs" (Harrison & Klein, 2007) of demographic differences, they can be meaningfully conceptualised in different ways. Thus, we include alternative measures for the independent variables *TMT nationality diversity*, *TMT gender diversity*, and *TMT age diversity*. In particular, we use the ratio of foreign directors on the board to the total number of board directors (*TMT foreigner ratio)*. Likewise, we draw on the ratio of women directors on the board to the total number of board directors (*TMT female ratio)*. Concerning age, we calculate the spread in years (highest age to lowest age) within the management board (*TMT age distance*). Hence, we extend our analysis by testing additional diversity measures that have been used in related studies (Goergen et al., 2015; Gull et al., 2018; Harrison & Klein, 2007; Zaid et al., 2020).

To perform the analysis, we exclude the previous diversity variables from the analysis and replace them with the aforementioned measures. The model used is similar to our main model except for the change in independent variables. For both models, our results reveal a significant and negative effect between TMT foreigner ratio ($ß_{model1b} = -0.0444$, $p < 0.05$; $ß_{model2b} = -0.0422$; $p < 0.05$) as well as TMT female ratio ($ß_{model1b} = -0.0534$, $p < 0.1$; $ß_{model2b} = -0.0621$; $p < 0.1$) and the level of discretionary accruals. Again, this implies that firms with a higher proportion of foreigners and a higher proportion of female directors in their TMT report lower levels of discretionary accruals and, thus, higher accounting quality. Hence, this supports our findings for Hypothesis 1 and Hypothesis 2 from the main analysis by using different diversity measures. Additionally, we find a significant and positive effect for TMT age distance ($ß_{model1b} = 0.0015$, $p < 0.05$; $ß_{model2b} = 0.0013$; $p < 0.1$) on the level of discretionary accruals in this setting. This implies that firms with a higher age spread in years within their TMT demonstrate lower accounting quality. This is consistent with research from Omoro et al. (2015), who found that "good financial reporting improves with the reduction of diversity in age". However, since we could not demonstrate a significant positive influence of age diversity on accounting quality in our main model, this latter analysis does not confirm our previous findings. Consequently, we do not find empirical support for Hypothesis 3. The results of our additional analysis are reported in Table 6.

**Table 5** Main analysis with lagged independent variables

| Dependent variable | \|DA1\| Model 1a | \|DA2\| Model 2a |
|---|---|---|
| Lagged TMT nationality diversity | − 0.0596* | − 0.0579* |
| | (0.059) | (0.068) |
| Lagged TMT gender diversity | − 0.0455** | − 0.0428* |
| | (0.044) | (0.060) |
| Lagged TMT age diversity | 0.1101* | 0.0985 |
| | (0.086) | (0.185) |
| Lagged CFOTenure | 0.0003 | 0.0001 |
| | (0.447) | (0.834) |
| TMTSize | − 0.0066 | − 0.0044 |
| | (0.127) | (0.339) |
| TMTIntl | − 0.0736* | − 0.0558 |
| | (0.080) | (0.127) |
| TMTTenure | − 0.0006 | − 0.0003 |
| | (0.522) | (0.779) |
| FirmSize | 0.0059 | 0.0032 |
| | (0.387) | (0.637) |
| RoA | 0.0001 | − 0.0002 |
| | (0.980) | (0.917) |
| Leverage | 0.0003 | 0.0002 |
| | (0.532) | (0.622) |
| Loss | 0.0223 | 0.0124 |
| | (0.224) | (0.516) |
| BTM | − 0.0023 | − 0.0011 |
| | (0.393) | (0.577) |
| FirmAge | 0.0000 | 0.0000 |
| | (0.931) | (0.949) |
| CashFlow | 0.0793 | 0.0523 |
| | (0.638) | (0.788) |
| ForeignOwnership | − 0.0005 | − 0.0007 |
| | (0.503) | (0.386) |
| SalesGrowth | − 0.0002 | 0.0000 |
| | (0.669) | (0.937) |
| Intercept | 0.0393 | 0.0319 |
| | (0.374) | (0.491) |
| Year-fixed-effects | Yes | Yes |
| Industry fixed effects | Yes | Yes |
| N | 160 | 160 |
| $R^2$ | 0.467 | 0.426 |
| Adj. $R^2$ | 0.358 | 0.309 |

p values in parentheses

** and * indicate a significance level of 5% and 10%, respectively

## 6 Limitations and future research

The study is subject to certain limitations that serve as promising avenues for further research. Notably, our sample consisted of German DAX 30 listed firms only. Hence, the results are only generalisable to a limited extent for other countries. We have explained the importance of considering the specific institutional setting since it defines accounting and corporate governance regulations (Andreas et al., 2012). However, the characteristics of German legislation might have affected top managers' individual characteristics and affiliations in our sample. Even if we have good reasons for carrying out a single-country research study, it would be interesting to explore the extent to which our findings are applicable in other countries or institutional environments.

Moreover, despite using data over 8 years, this study is limited to its investigation period (i.e., 2011–2018) and its sample size consisting of non-financial companies, thereby restricting the generalisability of our results. Future studies might investigate the impact of TMT demographics on accounting quality for small and medium-sized enterprises (SMEs) or consider indices besides the DAX 30. Our research could also be replicated using different diversity variables. The influence of TMTs on accounting quality might be observed, drawing on demographic characteristics such as education, culture or religion. Moreover, since we focus on the moderating effect of CFO tenure on the association between TMT diversity and accounting quality, future studies might investigate the impact of other CFO characteristics. In particular, the interaction of CFO and CEO biographies on accounting quality opens avenues for further research. Furthermore, it would be promising to shed more light on the particularities of different industries. Thus, further research might specifically focus on firms operating in the banking and insurance industry or other financial services sectors.

Additionally, several studies in the field, including ours, have drawn on secondary data sources (Plöckinger et al., 2016). While secondary data is favourable for building large sample sizes, the use of primary data can provide a more detailed understanding of the specific characteristics that affect financial reporting quality. Therefore, we encourage future scholars to create and utilise primary data sources from interviews with TMT members or surveys. For instance, qualitative approaches could complement the findings of our study and explain the underlying mechanisms that affect decision-making in financial reporting. However, we acknowledge that conducting interviews with firms' top managers would be challenging.

Furthermore, the study is restricted to the use of discretionary accruals as a proxy for accounting quality. Since the discretionary accrual measures might be subject to measurement failures, the present study used several procedures and robustness checks to minimise potential errors. Although we used two distinct measures to estimate discretionary accruals, future research could be conducted using different measures and other indices of reporting quality. Furthermore, there are possible data collection risks when hand-collecting observable demographic characteristics. Measuring TMT diversity requires the intensive collection of top managers'

**Table 6** Main analysis with additional diversity measures

| Dependent variable | \|DA1\| Model 1b | \|DA2\| Model 2b |
|---|---|---|
| TMT foreigner ratio | − 0.0444** | − 0.0422** |
| | (0.029) | (0.038) |
| TMT female ratio | − 0.0534* | − 0.0621* |
| | (0.085) | (0.062) |
| TMT age distance | 0.0015** | 0.0013* |
| | (0.042) | (0.066) |
| CFOTenure | 0.0002 | 0.0001 |
| | (0.568) | (0.634) |
| TMTSize | − 0.0075* | − 0.0056 |
| | (0.066) | (0.183) |
| TMTIntl | − 0.0417 | − 0.0310 |
| | (0.449) | (0.563) |
| TMTTenure | − 0.0005 | − 0.0003 |
| | (0.584) | (0.678) |
| FirmSize | 0.0030 | 0.0012 |
| | (0.616) | (0.835) |
| RoA | 0.0022 | 0.0023 |
| | (0.340) | (0.394) |
| Leverage | 0.0006 | 0.0005 |
| | (0.115) | (0.126) |
| Loss | 0.0217 | 0.0138 |
| | (0.278) | (0.538) |
| BTM | − 0.0015 | − 0.0001 |
| | (0.498) | (0.926) |
| FirmAge | − 0.0000 | − 0.0000 |
| | (0.758) | (0.651) |
| CashFlow | 0.1275 | 0.1103 |
| | (0.384) | (0.521) |
| ForeignOwnership | − 0.0006 | − 0.0008 |
| | (0.449) | (0.353) |
| SalesGrowth | − 0.0003 | 0.0000 |
| | (0.466) | (0.980) |
| Intercept | − 0.0039 | − 0.0176 |
| | (0.906) | (0.600) |
| Year-fixed-effects | Yes | Yes |
| Industry fixed effects | Yes | Yes |
| N | 183 | 183 |
| $R^2$ | 0.443 | 0.413 |
| Adj. $R^2$ | 0.341 | 0.306 |

p values in parentheses

** and * indicate a significance level of 5% and 10%, respectively

individual backgrounds. This non-standardised procedure might be affected by subjectivity, even if we strictly double-check our data.

Ultimately, endogeneity might not have been completely removed from our study by employing lagged independent variables, even if we used an established procedure (Larcker & Rusticus, 2010). Moreover, in line with prior studies, we constructed a panel dataset, included several control variables at the individual, team and firm levels and used a set of robustness tests (Adams & Ferreira, 2009; Ahern & Dittmar, 2012). However, even if we corrected for potential endogeneity problems with our variable of interest and with many other studies in the field of upper echelons, they cannot be excluded entirely. Thus, our limitations warrant future research to re-explore this phenomenon and test our findings' overall generalizability.

## 7 Discussion and conclusions

The objective of our study was to determine the effects of demographic TMT diversity on accounting quality for German DAX 30 listed firms. Accounting scholars have emphasised that firms' financial reporting quality might depend upon the biographical characteristics of their TMTs. Prior research has found that top managers have considerable discretion over a firm's financial accounting statements (Anessi-Pessina & Sicilia, 2020; Donatella & Tagesson, 2021; Zhang, 2019). Despite the rising presence of TMT research in accounting decisions, our empirical understanding of the explanatory power of TMT diversity on accounting quality is far from complete (Hiebl, 2014; Plöckinger et al., 2016). More precisely, the heterogeneity among top managers' demographic characteristics in affecting financial reporting decisions remains a relatively under-examined field of study (Gull et al., 2018). Therefore, in this context, we examined whether and how TMT nationality, gender, and age diversity can significantly alter the accounting quality of a firm's financial reporting.

Our results indicate that firms with higher TMT nationality diversity and higher TMT gender diversity have lower levels of earnings management. Thus, nationality diversity within a TMT induces a decrease in discretionary accruals, which results in higher accounting quality. Respectively, having a gender-diverse TMT also reduces discretionary accruals. Furthermore, we respond to the calls for integrating moderating effects to obtain a more holistic picture of the contingencies that impact accounting quality (Plöckinger et al., 2016). The results reveal a negative moderating influence of CFO tenure on the relationship between TMT nationality diversity and accounting quality. Similarly, CFO tenure negatively moderates the association between TMT gender diversity and accounting quality. Accordingly, in both cases, the interaction with CFO tenure significantly increases discretionary accruals. Our results further show that the mitigating effect of CFO tenure is weaker in relation to the positive effects of TMT nationality diversity and gender diversity on accounting quality. This underlines the prominent role of nationality and gender diversity in enhancing accounting quality.

Additionally, our results for the positive influence of TMT nationality and gender diversity on accounting quality are supported using alternative diversity proxies. Moreover, no significant effect was found for TMT age diversity on the level of accounting quality within a firm. More precisely, no significant relationship is reported between the direct effect of age diversity and the interaction term with CFO tenure. This corroborates prior research findings from the U.S. (Feng et al., 2010; Schrand & Zechman, 2012), indicating that age differences among top managers do not lead to financial misreporting. Consequently, we conclude that TMT age diversity does not influence accounting quality based on the coefficient of variation. However, this should be interpreted with care since this observation was not confirmed when using our alternative age diversity measure.

We extend the perspective of upper echelons theory in the management accounting literature in several ways. Notably, it is the first study to explore the effects of TMT diversity in a two-tier board system. Relying on a sample of German DAX 30 listed firms, we complement research findings that are primarily based on the Anglo-American one-tier system (Davidson et al., 2007; Oxelheim et al., 2013). Furthermore, our results highlight important implications for understanding accounting decisions. We have demonstrated that a proportion of variation in accounting quality could be attributed to the diversity of top managers' managerial characteristics.

Our study enhances existing research by providing empirical evidence for two-tier board models and suggesting that heterogeneity in TMT nationality demonstrates a willingness to expose TMTs to improved corporate governance, reducing a firm's earnings management level. Primarily, we have shown that foreign top managers on the board decrease the likelihood of engaging in earnings management. In turn, the accounting quality is significantly higher for firms with nationally diverse TMTs. Our findings complement the research of Nielsen and Nielsen (2013), who found a significant and positive association between TMT nationality diversity and firms' overall performance. Additionally, our results are in line with Oxelheim and Randøy (2003), who observed that foreign board members signal a higher commitment to corporate governance systems and transparency.

Furthermore, our study adds to the controversial debate on whether and how gender quotas should be implemented (Gull et al., 2018). In that vein, we can empirically show that a higher proportion of females on a TMT decreases earnings manipulation. Consistent with prior research from the U.S. (Krishnan & Parsons, 2008; Srinidhi et al., 2011), our findings confirm a negative link between gender diversity on boards and the level of earnings management. Therefore, decisions to appoint women to corporate boards should be of strategic importance. Gender diversity enhances not only TMTs' business expertise and monitoring skills (Gull et al., 2018) but also improves accounting quality. However, it should be noted that large changes to board composition within a short time negatively affect financial reporting (García et al., 2022).

Additionally, the positive effect of higher TMT nationality and gender diversity is mitigated by the tenure of the CFO. Hence, longer-tenured CFOs are more likely to negatively affect board financial decision-making and thereby decrease firms' accounting quality. It appears that CFOs who have become entrenched in their positions over time are more likely to assert their interests over other TMT members, which does

not contribute to more reliable and objective financial reporting. In this manner, we are gathering novel insights into the roles that longer-standing CFOs can play within TMTs and how this affects the quality of financial reporting. This corroborates recent research on Australian-listed firms by Muttakin et al. (2019). They found that "the presence of more-entrenched CFOs via their board membership and longer tenure leads to lower levels of accounting conservatism".

Our study is also of managerial relevance. The advantage of TMT demographics is that they are directly observable (Hambrick & Mason, 1984). Therefore, our results have potential implications for investors and their advisers since the appearance of a homogeneous TMT in terms of gender and nationality may serve as a signal for critically assessing and interpreting earnings. Furthermore, the findings also yield important implications for the supervisory board in two-tier models concerning national origin or gender in appointing members to a management board. This underlines that effective supervisory boards can assist with their appointment decisions and monitoring abilities to ensure a high level of accounting quality. Moreover, our results encourage firms to focus on gender and multinational diversity in their C-suite. In turn, this might positively reflect on the level of confidence among shareholders, investors and other stakeholders in firms' financial statements. Likewise, it also helps regulators in the debate on gender quotas in TMTs and assists in improving investor protection since firms' diversity efforts may result in greater transparency and accountability in financial reporting.

## Appendix 1: DAX 30 listed companies

| | | |
|---|---|---|
| Firms included in the final sample (2011–2018) | | |
| Adidas AG | Deutsche Post AG | K+S AG |
| BASF SE | Deutsche Telekom AG | Lanxess AG |
| Bayer AG | E.ON AG | Linde AG |
| Beiersdorf AG | Fresenius Medical Care AG & KGaA | Merck KGaA |
| BMW AG | Fresenius SE | RWE AG |
| Continental AG | HeidelbergCement AG | Siemens AG |
| Daimler AG | Henkel AG | Thyssenkrupp AG |
| Deutsche Lufthansa AG | Infineon Technologies AG | Volkswagen AG |
| Firms excluded from the final sample (SIC) | | |
| Deutsche Bank AG (6021) | Deutsche Börse AG (7374) | SAP AG (7372) |
| Commerzbank AG (6021) | Munich Re AG (6411) | Wirecard AG (6099) |

## Appendix 2: Sample selection process

| Sampling procedure | Years (2011–2018) | Observations (DAX 30) | ∑ |
|---|---|---|---|
| Initial sample | 8 | 30 | 240 |
| Exclude firms (*see Appendix* 1) | 8 | 6 | – 48 |
| Missing values *(no observations)* | – | 9 | – 9 |
| Final sample | | | 183 |

## Appendix 3: Variable definitions

| Main analysis | | |
|---|---|---|
| Variable | Description | Source (exemplary reference) |
| \|DA1\| | Absolute value of discretionary accruals as measured by the Jones (1991) model specification in Dechow et al. (1995) | Jones (1991); following Dechow et al. (1995) |
| \|DA2\| | Absolute value of discretionary accruals, computed following Kothari et al. (2005) | Jones (1991); following Kothari et al. (2005) |
| TMT nationality diversity | Using Blau's index with a classification of foreign and domestic directors | Hoang et al. (2017), Hutzschenreuter and Horstkotte (2013), Nielsen and Nielsen (2013) |
| TMT gender diversity | Using Blau's index with a classification of male and female directors | Hoang et al. (2017), Miller et al. (2009) |
| TMT age diversity | Standard deviation of top management's age divided by the top management's mean age | Dauth et al. (2017), Nielsen and Nielsen (2013) |
| CFOTenure | Number of years the executive served as the CFO | Donatella and Tagesson (2021), Zhang (2019) |
| TMTSize | Number of top managers (i.e., all management board members) | Qu (2020), Cabeza-García et al. (2018) |
| TMTIntl | Internationalisation index score of the TMT, computed following Dauth et al. (2017) | Dauth et al. (2017), Schmid and Wurster (2017), Schmid and Dauth (2014), |
| TMTTenure | Average number of years that the directors have been on the management board | Srinidhi et al. (2011), Nielsen and Nielsen (2013) |
| FirmSize | Natural logarithm of total assets | Weber (2020), Francis et al. (2014), Srinidhi et al. (2011) |
| RoA | Return on assets | Ma et al. (2019), Nielsen and Nielsen (2013) |
| Leverage | Financial leverage, total liabilities to total assets | Ma et al. (2019), Zhang (2019) |

| Main analysis | | |
|---|---|---|
| Variable | Description | Source (exemplary reference) |
| Loss | Indicator variable that takes the value of 1 if a listed firm records negative net income in year t and 0 otherwise | Weber (2020), Gull et al. (2018) |
| BTM | book-to-market value, the total book value of equity divided by the firms' market capitalization | Hsieh et al. (2018), Dauth et al. (2017), Wilson and Wang (2010) |
| FirmAge | Age of the firm in years, subtracting the year of incorporation from the current year | Tanikawa and Jung (2019), Cannella et al. (2008) |
| CashFlow | Cash from operating activities scaled by lagged total assets | Weber (2020), Dauth et al. (2017) |
| ForeignOwnership | Percentage of shares held by foreign citizens or foreign institutions (all nationalities) in relation to the total shares of the firm | Dauth et al. (2017), Oxelheim et al. (2013) |
| SalesGrowth | Measured as the change in sales divided by lagged sales | Ma et al. (2019), Peni and Vähämaa (2010) |
| Variable | Description | Source (exemplary reference) |
| Robustness checks | | |
| RoE | Return on equity | Qi et al. (2018), Gul and Leung (2004) |
| Tobin's Q | Tobin's Q, the book value of assets minus the book value of equity, plus the market value of equity, scaled by the book value of assets | Gull et al. (2018), Srinidhi et al. (2011) |
| FirmSize | Natural logarithm of market capitalization | Buchholz et al. (2020), Malmendier and Tate (2009) |
| Leverage | Ratio of total debt to total assets | Buchholz et al. (2020), Dauth et al. (2017), Srinidhi et al. (2011) |
| Additional analyses | | |
| TMT nationality ratio | Ratio of foreign directors on the board to the total number of board directors | Gull et al. (2018), Zaid et al. (2020) |
| TMT female ratio | Ratio of women directors on the board to the total number of board directors | Gull et al. (2018), Zaid et al. (2020) |
| TMT age distance | Spread (highest age to lowest age) on the management board | Goergen et al. (2015), Harrison and Klein (2007) |

**Supplementary Information** The online version contains supplementary material available at https://doi.org/10.1007/s10997-023-09668-7.

**Acknowledgements** We would like to express our sincere appreciation to the Managing Editor Professor Andrea Melis and two anonymous reviewers for their valuable and constructive comments. Furthermore, we would like to thank our anonymous peer reviewers from the European Academy of Management

(EURAM) 2022 Conference in Winterthur, Switzerland, as well as our fellow researchers, for the fruitful discussions.

**Funding** Open Access funding enabled and organized by Projekt DEAL.



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**Felix Schumann** is Postdoctoral Researcher at the Chair of International Management at HHL Leipzig Graduate School of Management, Leipzig, Germany.

**Toni W. Thun** is Research Associate at the Chair of Accounting and Auditing at HHL Leipzig Graduate School of Management, Leipzig, Germany.

**Tobias Dauth** is Full Professor and holds the Chair of International Management at HHL Leipzig Graduate School of Management, Leipzig, Germany.

**Henning Zülch** is Full Professor and holds the Chair of Accounting and Auditing at HHL Leipzig Graduate School of Management, Leipzig, Germany.