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The impact of CEO dominance on Earnings Management: Controlling for selection bias

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Abstract

This paper examines whether dominant CEOs are more likely to participate in earnings management. This paper constructs a CEO dominance index that comprises CEO duality, centrality, expertise, stock ownership and equity based compensation because one sole variable is unlikely to capture the entire effect. The data sample used in this empirical research contains S&P 1000 firms between 2010 and 2019. The results of this paper suggest that dominant CEOs are positive associated with accrual based earnings management. Secondly, this paper accounts for a potential selection bias using the Heckman's two-stage model. Furthermore, the findings are robust to using multiple CEO dominance measures, but not significant for real earnings management. Collectively, the results of this paper suggest the CEO dominance index provides as a useful tool for examining the likeliness to participate in earnings management.

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Table of Contents

1. Introduction

The relationship between a dominant CEO and earnings management has been the subject of numerous studies. Despite the fact that previous research tends to suggest that a dominant CEO is more likely to participate in earnings management, it remains an open question whether a dominant CEO will solely be harmful for a firm and their stakeholders (Han, Nanda & Silveri, 2016; Lewellyn & Muller-Hakle, 2012). Namely, literature suggests that dominant CEOs possess too much power over the board of directors and the other top executives (Cornett, Marcus & Tehranian, 2008). As a result, CEO dominance will lead to more opportunistic managerial behavior and can become problematic for the firms' overall performance. Hence, shareholders and other groups of stakeholders are aware of the possibility that dominant CEOs are more likely to participate in earnings management and therefore reduces the overall relevance and reliability of accounting numbers (Muttakin, Khan & Mihret, 2018; Roodposhti & Chashmi, 2011).

Prior research has already extensively studied the relation between several internal and external corporate governance mechanisms and earnings management. For example, Klein (2002) and Xie, Davidson III & DaDalt (2003) provide evidence on the association between the board of directors and audit committee on earnings management[1]. Whereas Chung, Firth & Kim (2002) and Zhong, Gribbin & Zheng (2007) have studied the relationship between external corporate governance mechanisms and earnings management[2]. In addition, previous research has also looked into the relationship between several CEO characteristics and earnings management (e.g. Ali & Zhang, 2015; Davidson III, Xie, Xu & Ning, 2007)[3]. However, existing literature lacks an extensive empirical research on the effect of CEO dominance on earnings management. As CEO dominance exists of a rich set of relations which is able to capture a wide scope of aspects of firms' behavior and performance (Bebchuk, Cremers & Peyer, 2011). Namely, various studies have constructed a CEO dominance index that measures how a CEO is able to become dominant and affects the firms overall performance based on various variables. Muttakin et

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[1] Klein (2002) as well as Xie et al. (2003) show that the board of directors and audit committee independence substantially reduce the amount of discretionary accruals.

[2] Chung et al. (2002) demonstrates that large institutional shareholders effectively constrain executives in managing earnings toward their favorable level, whereas Zhong et al. (2007) shows that outside blockholders are not effective monitors.

[3] Ali & Zhang (2015) show that CEOs are more likely to overstate earnings in the early years than in the later years of CEOs' tenure. Furthermore, Davidson III et al. (2017) demonstrate that the amount of discretionary accruals is substantially higher at the CEOs' retirement age.

al. (2018) construct an index based on CEO duality, ownership, tenure and whether the CEO was a family member of the firm and demonstrate that a dominant CEO is negatively related with corporate social responsibility (CSR) disclosures and reduces the positive effect of outside directors' expertise and experience on CSR disclosures. Han et al. (2016) construct another CEO dominance index based on their structural power, ownership power and expert power and prestige. Their results show that for firm under pressure dominant CEOs perform significantly worse compared to other non-dominant CEOs. However, prior studies on the relationship between dominant CEOs and earnings management have mainly focused on CEO duality and therefore acknowledge a dominant CEO is he or she is also the chairman of the board of directors. Only Baker, Lopez, Reitenga & Ruch (2019) have studied the relationship between earnings management and dominant CEOs and also studied the effect of CEO centrality. However, their CEO dominance index does not contain other important dimensions of CEO dominance as described before.

Therefore, this paper aims to contribute to the subject by constructing an index that is more powerful compared to prior research on earnings management as this index captures five dimensions a CEO is able to obtain too much dominance. Namely, the CEO dominance index captures the effects of CEO duality, centrality, expertise, stock ownership and equity based compensation. For the sample period 2010-2019, this paper finds that CEO dominance is significantly positive associated with discretionary accruals. Therefore, suggesting that dominant CEOs are more likely to participate in accrual based earnings management.

On the other hand, prior research reports that most samples are not randomly chosen. Hence, there could be a selection bias. Namely, CEOs sometimes purposefully choose their firms based on favorable firm characteristics (Chen, Li & Yi, 2008; Choi, Kwak & Choe, 2014). Therefore, this paper uses Heckman's two-stage approach to control for a potential selection bias. The results of the second stage regression suggest that the sample used for this paper does not suffer from a potential selection bias.

Besides, the results of this paper are robust to several additional tests. The findings of this paper suggest that relatively more dominant CEOs are more likely to participate in accrual based earnings management compared to relatively less dominant CEOs. Furthermore, this paper demonstrates that the association between CEO dominance and the amount of discretionary accruals becomes even more significant by using other CEO dominance measures. Next to this, the findings of this paper suggest that several CEO characteristics are significantly related to the amount of abnormal discretionary

expenditures, similar to prior research. However, the coefficient of CEO dominance on abnormal discretionary expenditures does not suggest that a dominant CEO is more likely to participate in real earnings management.

As a result, this paper makes the following contribution to existing literature. Firstly, this study complements the findings of Baker et al. (2019) and Roodposhti & Chashmi (2011). Namely, both papers also find a positive relationship between CEO dominance and earnings management. However, Baker et al. (2019) recognize a CEO as dominant CEOs based on the variables CEO duality and centrality, whereas Roodposhti & Chashmi (2011) only look at the variable CEO duality. Therefore, the findings of this paper provide further evidence on the relation between CEO dominance and earnings management by shedding light on several dimensions of CEOs and firms' behavior which are not yet been examined. Secondly, the insignificant Inverse Mills ratio in Heckman's second stage contradicts the findings of Chen et al. (2008) and Iyengar & Zampelli (2009). Both papers find evidence that the relationship between firm performance and CEO duality suffers from selection bias. This means that CEO duality is endogenously determined based on favorable firm characteristics. However, the outcomes of this study suggest that the relationship between earnings management and CEO dominance does not suffer from a potential selection bias. Therefore, the CEO dominance index variable is less endogenously determined compared to the variable CEO duality. Thirdly, this paper provides more evidence on the effectiveness of the CEO Pay Slice (CPS) as a reliable measure to examine the inner workings of the top executive team. The findings in Section 6.1.3 suggest that CPS does not suffer from distributional problems, as suggested by Zagonov & Salganik-Shoshan (2018). On the other hand, Wang (2013) shows that firms with relatively high CPS ratios are more likely to participate in earnings management, this paper finds a negative relationship between CEO centrality and real earnings management.

The remainder of this paper is organized as follows. Section 2 reviews the background literature and presents the main hypothesis of this paper. Section 3 discusses the research design, Section 4 the data selection and descriptive statistics, Section 5 and 6 the empirical results and additional tests and Section 7 concludes this paper.

2. Background literature and hypothesis development.

2.1 Background literature on earnings management

Literature on earnings management suggests that there are two main motives for executives to participate in earnings management. The first motive is that executives may use accruals over earnings to enhance the quality of earnings information because executives are able to communicate private information to their stockholders and other groups of stakeholders (Jiraporn, Miller, Yoon & Kim, 2008). The second motive arises from investors' demand towards earnings persistence as the stock market reacts more intense to income fluctuations over time. Furthermore, as the stock market reacts even stronger to negative earnings announcement compared to positive outcomes, executives are even more inclined to participate in earnings management (Nichols & Wahlen, 2004). Several papers have already provided us with evidence that earnings management may indeed be beneficial to their stockholders and other groups of stakeholders (Healy & Palepu, 1993) On the other hand, other research argues in favor of the opportunistic use of earnings management. As components of the executives' total compensation consist of various bonuses and stock options that depends upon specific earnings numbers, some managers are more likely to be active in earnings management to increase their own total compensation. That could potentially harm their shareholders' interest as well as the firms' performance because the flexibility provided by the accounting standards may encourage executives to manage earnings opportunistically and therefore lead to further misalignment of executives' and shareholders' interests (Jiraporn et al., 2008). Therefore, it is important to study the role of a CEO and their incentives to participate in earnings management.

2.2 Background literature on the role of a CEO

Prior research has already extensively investigated various relationships between several CEOs' characteristics and firm performance and it lead to believe that the role of a CEO indeed affects firm performance (Bebchuk et al., 2010; Peterson, Galvin & Lange, 2012)[4]. Being a chief executive is more than just the responsibility to deal with your employees and contribute to the profitability and long term survival of the firm (Mackey, 2008). Since the last decades the role of a CEO has changed into becoming the face of their

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[4] E.g. Peterson et al. (2012) empirically show that the type of leadership applied by the chief executive affects firm performance. Using a sample of 126 CEOs from the United States, they find a positive association between servant leadership applied by the chief executives and firm performance.

firm and all the firms' social corporate responsible activities also affects the daily life of the CEO. As well as the duty to make frequent appearances on prime time television shows to defend their activities if their firm is in the news due to positive or negative activities (Malmendier & Tate, 2009). Together with the empirical evidence that CEOs are able to positively affect firm performance it is not irrational that CEOs receive so much total compensation. On the other hand, an increase in firm performance does not per se have to lead to a growth in their shareholders wealth and since most of a CEOs' total compensation contains various bonuses and stock options that depends upon specific earnings numbers, a problem could arise (Jiraporn et al., 2008). Namely, literature suggests that most choices made by CEOs are influenced by private interests and therefore sometimes depart from the optimal level for the wealth of the firms' shareholders. In addition, this agency problem is most likely to increase due to the equity based compensation of the CEOs (Fama & Jensen, 1983; Bebchuk et al., 2010). To align the interest of the chief executives with the firms' shareholders, strict rules have been altered in their compensation contract and various outside monitors limit the growth of the CEO wealth at the expense of the firms' shareholders. For example, Mouselli & Hussainey (2014) found that the amount of analysts following the firm partially depends on how much compensation executives receive. In addition, they demonstrate that the total level of corporate governance is positively associated with the amount of analyst following and therefore argue that the higher amount of analysts following a firm will mitigate the agency problem. Another mechanism used by shareholders to limit the power of the chief executive that could rise the agency problems is the board of directors. The main role of the board of directors is to monitor management on behalf of the firms' shareholders (Hillman & Dalziel, 2003). Ideally, the members of the board mainly consist of outside directors as boards with more outside directors concentration do a better job of monitoring executive management. In addition, Helland & Sykuta (2005) argue that the boards with a higher proportion of outside directors are more faithful to the interest of the firm's shareholders and suggests that the size of the board of directors does not per se lead to less or better monitoring. However, sometimes a CEO becomes too powerful and various inside and outside monitors lose their functionality and as a result further increase the agency problem.

In the following sections, this paper will study how a CEO becomes too dominant and is able to achieve excess power over the other executives of the firm to increase his own wealth and whether this harms the firm.

2.3 Background literature on CEO dominance

Over the years, the relationship between a powerful CEO and the firms' behavior has become more important under researchers and financial economists and therefore received more attention as this relation examines whether and how a dominant CEO is able to affect several aspects of various dimensions of firm performance (Bebchuk et al., 2011; Muttakin et al., 2018; Baker et al., 2019).

Even though prior research tends to suggest that a powerful CEO is more likely to harm a firm, it remains an open question whether a dominant CEO will solely be harmful for a firm as literature suggests that sometimes a dominant CEO can be an advantageous for a firm[5] (Han et al., 2016; Lewellyn & Muller-Hakle, 2012).

In earlier studies, the main proxy researchers use to acknowledge a dominant CEO is if he or she is also the chairman of the board of directors (e.g. Roodposhti & Chashmi, 2011). Namely, when an executive holds both titles, this will most likely result in less effective supervision as the board of directors are required to monitor the CEO and if a CEO obtains too much power this dual structure allows CEOs to effectively control information to other board members (Cornett et al., 2008). Therefore, a dominant CEO can become problematic for the firms' overall performance as this dual role will lead to more opportunistic managerial behavior (Roodposhti & Chashmi, 2011). Next to this, Cornett et al. (2008) indicate that this behavior is most likely associated with a greater use of discretionary accruals. As a result, shareholders and stakeholders are aware of the possibility that CEO dominance is associated with more earnings management and therefore reduces the overall relevance and reliability of accounting numbers (Roodposhti & Chashmi, 2011).

However, more recent studies have questioned the use of solely looking at this dual structure to identify a dominant CEO as this measure only captures the CEO's ability to influence decision-making and policy through the board of directors (Baker et al., 2019). Therefore, this proxy does not provide us with information about other important relations between executives and firms' behavior (Bebchuk et al., 2011). As a result, several studies have constructed an index to proxy for a powerful CEO based on different variables that take into account various aspects and dimensions of several relations between executives and firms' behavior. The most relevant and generally used factors of these indexes are based

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[5] Literature suggests that from an agency principal theory perspective, too powerful CEOs will negatively affect the firm value. However, Lewellyn & Muller-Hakle (2012) demonstrate that too entrenched CEOs are more risk taken and this sometimes leads to higher future firm performances.

on duality and centrality power. As well as controlling for CEO tenure, stock ownership and whether the CEO is the founder of the firm (Han et al., 2016; Muttakin et al., 2018; Baker et al., 2019).

2.3.1 Duality power

As already described, duality allows CEOs to exert a greater influence over the board of directors decision-making and policy (Baker et al., 2019). E.g. a chairman is in general the responsible director of the board to set the agenda for meetings as well as having a final vote on the selection of candidates for open seats (Muttakin et al., 2018). Therefore, this dual structure allows the CEO to effectively control information to other board directors and gives the ability to appoint board members who are less likely to be independent (Cornett et al., 2008). Next to this, Roodposhti & Chashmi (2011) report that having more independent members on the board will lead to better oversight of management and further constrain earnings management activities by executives. Therefore, CEO duality will decrease the board independence from the firm and could become problematic for the firm's performance (Prencipe & Bar-Yosef, 2011). Cornett et al. (2008) and Klein (2002) support this negative relationship between board independence and likelihood of managing earnings up- and/or downwards. Supporting prior findings, Efendi, Srivastava & Swanson (2007) report that firms without CEO duality are less likely to restate financial statements than firm with both roles. However, other related research has shown that the separation of these two roles is not always needed. As many firms where the CEO is also the chairman of the board of directors are well managed and show effective board monitoring (Haniffa & Cooke, 2002). In summary, when a CEO is also the chairman of the board of directors, the CEO will most likely be more active in earnings management because this dual role allows him or her to possess greater influence over the board of directors.

2.3.2 Centrality power

On the other hand, centrality power reflects how dominant a CEO is compared to the other top executives of the respective firm (Baker et al., 2019). This relationship is measured by calculating the CEO Pay Slice (CPS) and provides us with information about the inner workings of the top executive team and their importance for managing earnings. Next to this, CPS is based on compensation information from executives which are all working at the same firm and therefore controls for any firm-specific characteristics that could

potentially affect the average level of compensation (Bebchuk et al., 2011). Therefore, examining the fraction of the total compensation of the top five executives that is captured by the CEO gives us a better understanding whether and to what extent internal relations and their incentives determine the behavior of individuals inside an organization (Park, 2017). Generally speaking, the findings of Bebchuk et al. (2011) indicate that CPS can be seen as an useful tool for better understanding the association between the inner working behavior and incentives of executives and the firm. Supporting these findings, Wang (2013) demonstrates that firms with relative high levels of CPS ratios are more likely to manage earnings and at the same time have an increased likelihood of manipulating its earnings more aggressively. Alternatively, Park (2017) demonstrates that pay disparity between the CEO and the next executive in the top management team is positive and significant related to real earnings management. Namely, firms with a larger pay disparities are more likely to engage in more aggressive behavior and could as a result harm the future firm performance. In addition, Bebchuk et al. (2011) show that a higher gap between the pay slice of the CEO relative to the other top executives is negative and significant related to accounting profitability and firm performance. One reason for this could be that the ratio of CEO dominance affects shareholders' perception of earnings reliability and relevance as a dominant CEO is more probable to be active in purposely managing earnings (Roodposhti & Chashmi, 2011). Therefore, centrality power goes along with higher levels of CPS ratios and gives CEOs the ability to manipulate earnings through the inner workings of the top executive team.

2.3.3 Expert power

Another dimension to take into account is the expert power of a CEO. Expertise is based upon the perception that the CEO has a high level of knowledge that other members of the firm do not have. Therefore, a CEO that has held his or her position for a longer time will most likely possess more expert power compared to a CEO that is just introduced to his role (Han et al., 2016). Supporting this relationship, Ryan & Wiggins (2004) describe that CEO tenure has been shown to increase managerial power as for CEOs having a long tenure will increase their influence over the board of directors. Next to this, other prior research claims that as CEO tenure increases the possibility of a CEO getting replaced over the time decrease because CEOs gain more power through board selections and investment choices (Wang, 2013). However, examining the relationship between CEO tenure and

earnings management, findings of prior research do not per se suggest a positive significant relationship. Several studies suggest that CEOs are more likely to manage earnings in the early years of their service due to the market perception of his or her ability as well as in their final year of service in order to boost their final year's pay (Ali & Zhang, 2014). Namely, new CEOs are motivated to work harder in the early years of service while the market is still assessing their ability (Holmstrom, 1982). Prior studies support this relationship that CEOs are more likely to manage earnings downwards in their first year of service and attribute them to the previous CEO. As well as taking credit for the resulting higher reported earnings in the following years (Ali & Zhang, 2014). In addition, Ali & Zhang (2014) report that CEOs are more likely to overstate earnings in their final year of CEOs' service in order to realize contractual objectives to maximize his or her own total compensation. However, these results are only significant after controlling for earnings management in the early years. In summary, a CEO that has held his or her position for a longer time will most likely have more expert power. However, this does not per se lead to an increased likelihood of managing earnings up- or downwards.

2.3.4 Ownership power

Other studies demonstrate that CEOs are also capable of receiving extra influence and control over the firm because of their ownership power. Ownership power can be examined by looking at the amount of equity based compensation and their status as founder (Muttakin et al., 2018). Namely, founder CEOs are more likely to play an important role in the top executive team. Fahlenbrach (2009) explains that founder CEOs are remarkably different from non-founder CEOs and therefore may be more powerful. Founder CEOs have an increased likelihood to possess more decision-making power and influence over the firm because of their equity share. Adams, Almeida & Ferreira (2009) show that founder CEOs have a positive effect on firm performance and demonstrate that this positive relationship is mainly driven by their relatively large amount of equity stakes as this can potentially reduce the principal-agent problem. In addition, founder CEOs are more likely to consider their company as their own life's achievement. Therefore, founder CEOs are more likely to put more emphasis on long term investments as well as having different attitudes towards risk to continue the survival of the firm in the future (Fahlenbrach, 2009). Although prior research explains that founder CEOs may be more powerful that non-founder CEOs, founder CEOs are not per se more likely to manipulate earnings due to their power. Wang

(2013) shows a negative relationship between overvalued firms that have a founder CEOs and earnings manipulation because of various reasons. Namely, founder CEOs are more sensitive for detection of earnings management as this could potentially harm the firm in the future as well as hurting the family name. In summary, founder CEOs may have more ownership power over the firm due to various reasons and this power sometimes goes along with an increase in firm performance as well as less active earnings management.

Next to this, several studies argue that the amount of shares owned by the CEO is also related to their ownership power. Namely, when CEOs are holding a large fraction of the firm's total shares, CEOs may become too entrenched (Muttakin et al., 2018). Entrenched CEOs may reduce the influence of the board of directors and as a result dominate board of directors' decisions on firm strategies and therefore obtain too much power (Han et al., 2016). On the other hand, if a CEO owns a large fraction of the outstanding shares of the firm and his total compensation is mostly equity based, a CEO has the incentive to be active in earnings management. Namely, future stock prices rely on beliefs about current and future earnings and therefore CEOs are more likely to manage earnings upwards and take advantage of the increased future share price. Supporting this belief, Cheng & Warfield (2005) show that CEOs with large amounts of equity based compensation are significantly more likely to meet or beat analyst forecast. Next to this, other related research found that especially firms where the CEOs' total compensation is more aligned with current as well as future value of stock and options are more likely to be active in earnings management (Bergstresser & Philippon, 2006). Therefore, CEOs that own a relatively large fraction of the total amount of shares along with a high proportion of equity based compensation may be more powerful and as a result is more likely to be active in earnings management than less equity based compensation CEOs.

2.4 Hypothesis development

As described, a CEO is able to influence decision-making and policy through several aspects of CEO power. Firstly, their duality power gives CEOs the ability to effectively control information to other board directors as well as having a final vote on the selection of candidates for open seats (Muttakin et al., 2018). Secondly, their centrality power demonstrates how much power a CEO possess in relation to the other firm's top executives. Namely, a CEO that receives more total compensation relative to the other top executives is more likely to act dominant (Bebchuk et al., 2011). Thirdly, their expertise power gives

CEOs the ability to gain more influence over investment choices and board selections because of their superior knowledge obtained during their long tenure (Wang, 2013). At last, founder CEOs differ in several aspects from non-founder CEOs and as a result are more likely to obtain greater influence and power over the firm. Next to this, CEOs that own a large fraction of the outstanding shares of the firm may also become too entrenched (Fahlenbrach, 2009). Supporting the relationship between agency principal theory literature and powerful CEOs, prior research has shown that dominant CEOs are more likely to participate in earnings management as their power gives them the ability to influence decision-making and policies (e.g. Baker et al., 2019). Although earnings management does not per se have to harm the firm[6], earnings management is most likely to reduce the relevance and reliability of accounting numbers. Given the findings of prior studies, a dominant CEO is associated with an higher participation in earnings management compared to less powerful CEOs. Roodposhti & Chashmi (2011) find that a dominant CEO is positive and significant related to earnings management as powerful CEOs have the ability to effectively control information to other board members and could lead to more opportunistic managerial behavior. Supporting this relationship, Wang (2013) shows that especially for firms with too entrenched CEOs overvalued firms are more likely to be active in opportunistic earnings management. Namely, CEOs of overvalued firms are more likely to manipulate earnings to preserve their high stock price. Next to this, Baker et al. (2019) show that dominant CEOs were more likely to participate in accrual based earnings management before the introduction of the Sarbanes-Oxley Act (SOX) compared to non-powerful CEOs. Interestingly, after the SOX the incentives for dominant CEOs to primarily use accrual based earnings management have substitute towards real earnings management to influence accounting numbers.

Therefore, from existing research it is expected that dominant CEOs are able to influence several dimensions of firm policies and strategies because of their duality, centrality, expert and ownership power and as a result it is hypothesized that

h1 = dominant CEOs are positive related to earnings management

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[6] Earnings management gives CEOs the ability to present more reliable accounting numbers if their cash flows suffer from matching problems and therefore will improve the relevance and quality of accounting numbers (Donelson, Jennings & McInnis, 2011).

However, Iyangar & Zampelli (2009) address that sometimes firms purposefully choose their type of governance structure (e.g. the choice between a dominant CEO or not). As well as the fact that top executives self-select their firms based on favorable firm characteristics (Chen et al., 2008; Choi et al., 2014) Therefore, the sample selection of firms with dominant CEOs in this paper may not be random. Hence, there could be a selection bias. This could mean that the firms that are more likely to engage in earnings management may choose for dominant CEOs instead of less dominant CEOs. On the other hand, dominant CEO may choose firms depending on their corporate structure or likeliness to participates in earnings management. As a result, the findings of this paper could be driven by self-selection instead of CEO dominance.

Chen et al. (2008) show that the variable CEO duality suffers from endogeneity problems, depending on their ownership structure and firm characteristics. Namely, their results suggest that firms endogenously and optimally choose either a dual or non-dual CEO structure. Supporting Chen et al. (2008), Iyengar & Zampelli (2009) find that the variable CEO duality also suffers from selection bias when firm performance is measured as the total market return to shareholders or the earnings per share. In addition, the findings of Choi et al. (2014) demonstrate that their sample firms with CEO turnover suffer from selection bias as these firms replace their CEOs for specific reasons.

Therefore, from existing literature it is expected that the sample of this paper may suffer from selection bias, meaning that firms prone to earnings management do not randomly choose their type of dominant CEO. As a result it is hypothesized that

h2 = the relationship between CEO dominance and earnings management suffers from selection bias

3. Research design

3.1 Measures of CEO dominance

As already described, it is unlikely that one sole variable is able to capture the entire effect of a dominant CEO. Namely, CEOs have the ability to exercise power through several dimensions. Therefore, consistent with prior research this paper has constructed an index that is able to capture all these dimensions.

In addition to Baker et al. (2019) and Han et al. (2016), this paper will combine duality, centrality, expertise and ownership power into an index for each executive and firm. In particular, a CEO is able to obtain a dominance index score between zero and five depending on: (1) if the CEO is also the chairman of the board of directors, (2) the CEOs' CPS ratio is higher than the yearly industry median, (3) the CEOs' tenure is higher than the yearly industry median, (4) the amount of stock ownership by the CEO is above the yearly industry median and (5) the total amount of equity based compensation of the CEO is higher than the yearly industry median. Therefore, the CEO dominance index ranges from zero to five and this means that higher index values indicate greater CEO dominance.

3.2 Measure of earnings management

Prior research has identified that earnings management by executives occurs in three ways. Namely, through changes in specific accounting procedures, the structuring of specific expense or revenue transactions and/or accruals[7] (e.g. Nichols & Wahlen, 2004). In previous studies, earnings management is mainly measured by discretionary accruals as discretionary accruals are accounting adjustments to cash flows deliberately chosen by executives. Whereas non-discretionary accruals on the other hand are mandated adjustments to cash flows by the accounting standard setters and therefore are not suitable as a proxy for earnings management (Roodposhti & Chashmi, 2011).

Similar to Baker et al. (2019) and Ali & Zhang (2015), this paper will look at the discretionary accruals to measure the extent of earnings management. This paper uses a cross sectional derivation of the modified Jones model described by Kothari, Leone & Wasley (2005). Model (1) is estimated for each two-digit standard industrial classification (SIC) with at least 20 observations per year:

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[7] Accruals are the difference between the firms' total earnings and their cash flows from operating activities during that year and consists of discretionary and non-discretionary accruals (Roodposhti & Chashmi, 2011).

$$\frac{TACC_{it}}{A_{it-1}} = \alpha_t \left[\frac{1}{A_{it-1}}\right] + \beta_1 \left[\frac{(\Delta REV_{it} - \Delta REC_{it})}{A_{it-1}}\right] + \beta_2 \left[\frac{(PPE_{it})}{A_{it-1}}\right] + \varepsilon_{i,t}(DA) \qquad (1)$$

$TACC_{it}$ is the income before extraordinary items minus cash flows from operating activities and defined as the total accruals of firm i in year t. A_{it-1} is the total asset of firm i at the beginning of year t. ΔREV_{it} is the change in operating revenues/sales of firm i from year t-1 to year t. ΔREC_{it} is the change in net account receivables of firm i from year t-1 to year t. PPE_{it} is the gross property, plant and equipment of firm i at the beginning of year t. The residual from DA is the estimate of discretionary accruals of firm i in year t. Accordingly, higher values of DA indicate greater differences between reported earnings and accounting fundamentals and could suggest potential accrual based earnings management.

3.3 Empirical model to test hypothesis 1

This paper uses a model (2) of discretionary accruals to investigate whether a dominant CEO is positive related to earnings management. In addition, this paper has implemented several control variables that tended to be significant based on previous research (e.g. Ali & Zhang, 2015; Baker et al., 2019; Bebchuk et al., 2011; Han et al., 2018; Roodposhti & Chashmi, 2011).

$$\begin{aligned}
DA_{it} = \ & \alpha_0 + \alpha_1 CEO\ dominance\ index_{it} + \alpha_2 Firm\ size_{it} + \alpha_3 Leverage_{it} \\
& + \alpha_4 MB_{it} + \alpha_5 R\&D_{it} + \alpha_6 R\&D\ missing_{it} + \alpha_7 MV\ equity_{it} \\
& + \alpha_8 Industry\ CPS_{it} + \alpha_9 Negative\ earnings_{it} \\
& + \alpha_{10} Operating\ CF_{it} + \alpha_{11} Sales_{it} + \alpha_{12} Operating\ Cycle_{it} \\
& + \alpha_{13} Industry\ Tobin's\ q_{it} + \alpha_{14} Gender_{it} + \varepsilon_{it}
\end{aligned}$$

$$(2)$$

DA_{it} is calculated by the residual from model (1) and defined as the amount of discretionary accruals of firm i in year t. $CEO\ dominance\_index_{it}$ is the variable of interest and ranges from zero to five and captures the influence of CEO dominance on earnings management via five different dimensions. Namely via $CEO\ duality_{it}$, $CEO\ centrality_{it}$, $CEO\ expertise_{it}$, $CEO\ ownership_{it}$ and $CEO\ equity\ compensation_{it}$. Thus, a higher index value of $CEO\ dominance\_index_{it}$ indicates greater CEO dominance.

$CEO\ duality_{it}$ captures a value of 1 if the CEO is also the chairman of the board of directors. Similar to Bebchuk et al. (2010), Ali & Zhang (2015) and Baker et al. (2019), this paper observes the CEOs' annual title and gives the CEO the value 1 if the their annual title exists of *"chairman"*, *"chmn"*, *"Chairman"*, *"Chair"* and/or *"chair"*. $CEO\ centrality_{it}$

captures a value of 1 if the CEOs' CPS ratio is higher than the yearly industry median[8]. $CEO\ expertise_{it}$ takes a value of 1 if the CEOs' tenure is higher than the yearly industry median. $CEO\ ownership_{it}$ captures a value of 1 if the amount of stock ownership held by the CEO is above the yearly industry median. Similar to Han et al. (2018), this paper calculates the amount of stock ownership held by the CEO based on their fraction of shares hold divided by the sum of the variables total shares owned exclusive options and total amount of shares outstanding. $CEO\ equity\ compensation_{it}$ takes a value of 1 if the total amount of equity based compensation of the CEO is higher than the yearly industry median. Consistent with Bebchuk et al. (2011), this paper defines the amount of equity based compensation by the CEO based on their fraction divided by their total compensation and relative to the other top five executives. Cheng & Warfield (2015) consider the sum of options granted in the current period, exercisable options and non-exercisable, restricted stock grants and stock ownership divided by the total amount of shares outstanding of the firm as their measure for the equity bases incentives managers could have to manipulate earnings. However, due to data unavailability's of various variables to calculate the equity based incentives and the reason that this paper primarily focuses on the fraction of equity based compensation to observe a dominant CEO. This paper measures the amount of equity based compensation by subtracting the non-equity based components from their total compensation and similar to Bebchuk et al. (2011), this paper calculates the fraction relative to the other top five executives[9].

3.4 Empirical model to test hypothesis 2

This paper follows Chen et al. (2008) & Choi et al. (2014) using Heckman's two-step model to control for a possible selection bias. This model is designed to control for the possibility that unobservable firms' characteristics affect both the aspects of CEO dominance and likeliness to participate in earnings management. In the first stage, this paper uses a multivariate probit model (3) to obtain the estimates of CEO dominance as a function of various control variables.

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[8] Consistent with Bebchuk et al. (2011), this paper removed all observations where ExecuComp variable *tdc1* is missing along with firms in the sample with less than five executives listed. As well as observations where there has been a change in CEO during the year and the CEO is required to be in office for a full year. This to avoid observations with extremely low CPS values.

[9] For each top executive, this paper subtracts the total amount of earned salary during the year from their total amount of compensation. Therefore, their total amount of equity based compensation exists of Bonus, Other Annual, Restricted Stock Grants, LTIP Payouts, All Other plus Value of Options Grants.

$$Pr(Dominant)_{it} = \alpha_0 + \alpha_1 Shares_{it} + \alpha_2 Equity_{it} + \alpha_3 Firm\ size_{it} + \alpha_4 Leverage_{it} + \alpha_5 MV\ equity_{it} + v_{i,t}$$

(3)

$Pr\ (Dominant)_{it}$ is the probability that the firm has a dominant CEO of firm i in year t. and takes a value of one if the CEO has a dominance index score of four and/or five and zero otherwise. $Shares_{it}$ is defined as the amount of stock ownership held by the CEO based on their fraction of shares hold divided by the sum of the variables total shares owned exclusive options and total amount of shares outstanding of firm i in year t. $Equity_{it}$ is defined as the amount of equity based compensation by the CEO based on their fraction divided by their total compensation of firm i in year t. v_{it} is defined as the unspecified random factors. The variables $Firm\ size_{it}$, $Leverage_{it}$ and $MV\ Equity_{it}$ are described in the following section.

In the second stage, this paper uses model (4) that regresses discretionary accruals as the measure of earnings management as a function of CEO dominance, various control variables and the inverse Mills ratio (IMR) obtained from model (3). The inclusion of IMR accounts for potential selection bias.

$$DA_{it} = \beta_0 + \beta_1 Dominant_{it} + \beta_2 IMR_{it} + \beta_i Control\ Variables_{it} + \varepsilon_{it}$$

(4)

$Dominant_{it}$ is a dummy variable that takes the value of one if the CEO has a dominance index score of four/or five and zero otherwise of firm i in year t. IMR_{it} or lambda is calculated as the standard normal density divided by the standard normal cumulative distributed function and obtained from the probit model (3). Intuitive, a significant coefficient of IMR indicates the existence of a potential selection bias. The Control Variables$_{it}$ are identical to the control variables implemented in model (2). ε_{it} are the unspecified random factors.

3.5 Explanatory variables

This paper controls for the following variables that previous studies find important for determining influence on earnings management. The explanatory variables are briefly described below. Whereas, the empirical results section will extensively discuss their relationship with discretionary accruals if the variable shows significant explanatory power. $Firm\ size_{it}$ is calculated as the natural logarithm of the total assets of firm i in year t. $Leverage_{it}$ is defined as the ratio of debt to equity of firm i in year t. MB_{it} is defined as the market-to-book ratio and measured as the market value of equity divided by the book value

of equity of firm i in year t. In addition, this paper eliminate all firm-year observations where the market-to-book ratio is lower than zero as well as larger than one. $R\&D_{it}$ is defined as the percentage of research and development expenses to the lagged value of total assets of firm i in year t. $R\&D\ missing_{it}$ is set to one if $R\&D_{it}$ is missing and zero otherwise. $MV\ equity_{it}$ is calculated as the logarithm of market value of equity of firm i in year t. $Industry\ CPS_{it}$ is measured as the median CPS in the two-digit SIC group of firm i in year t. $Negative\ earnings_{it}$ is defined as the sum of negative earnings years in the past five years of firm i in year t. $Operating\ CF_{it}$ is measured as the standard deviation of operating cash flows in the past five years of firm i in year t. $Sales_{it}$ is calculated as the standard deviation of total sales in the past five years divided by the assets in year t of firm i in year t. $Operating\ Cycle_{it}$ is measured as the logarithm of the past five years average of $\left[\frac{365}{(cogs/inventory)} + \frac{365}{(sales/accounts\ receivable)}\right]$ of firm i in year t. $Industry\ Tobin's\ q_{it}$ is defined as the firms' median market value of equity plus the book value of assets minus the book value of equity divided by the book value of assets in the two-digit SIC group of firm i in year t. $Gender_{it}$ captures the value of one if the CEO is male and zero otherwise.

Compared to the other control variables, $Negative\ earnings_{it}$, $Operating\ CF_{it}$, $Sales_{it}$ and $Operating\ Cycle_{it}$ are scaled on a five year basis. Consistent with prior literature, controlling for changes over time gives more accurate results on the persistence of current and future earnings and their operating cycles compared to calculations based on the firms' current year (Nichols & Wahlen, 2004). Therefore, Baker et al. (2019) suggests that firms with a history of negative earnings are most likely positively related to accrual earnings management. Thus, this paper expects a positive association between $Negative\ earnings_{it}$ and DA_{it}. In addition, from prior literature it is expected that firms operating in more volatile environments will lead to a higher likelihood of earnings management (Baker et al., 2019). Therefore, this paper also predicts positive coefficients for $Operating\ CF_{it}$, $Sales_{it}$ and $Operating\ Cycle_{it}$.

4. Sample selection and descriptive statistics

4.1 Sample selection

For the years 2010-2019, this paper obtains executive data from the ExecuComp database and merges it with specific firm financial data from the Compustat database. The sample selection is presented in *Table I: Panel A*. Consistent with prior studies, all financial services and firms between SIC codes 6000-6799 are excluded from the sample selection as this industry is most likely to fundamentally differ in accounting regulation. In addition, this paper uses selection criteria similar to Ali & Zhang (2015) and Baker et al. (2019).

Firstly, this paper classifies CEOs based on their position identifier description in the database and are eliminated from the sample selection if missing. On the other hand, as already described, this paper excludes all firm-years observations from the data sample where the total compensation variable is missing along with firms in the sample with less than five executives listed. As well as observations where there has been a change in CEO during the year and the CEO is required to be in office for a full year. Secondly, this paper eliminates observations where there are less than twenty two-digit SIC observations per year. Thirdly, this paper excludes all firm-year observations where there is missing data in one of the explanatory variables. Finally, as various explanatory variables depend on their lagged value and others on the average of their past five years, this paper extends their time period to 2006 to calculate the five year average of year 2010. This, to overcome sample attribution. However, immediately after the two datasets have been merged, the years from 2006 to 2009 are eliminated. As a result, the final sample for model (2) exists of 43,045 firm-year observations and 8,609 CEOs observations.

4.2 Descriptive statistics

Table I shows the descriptive statistics for the dependent and independent variables in model (2). Panel A reports the final sample for model (2) and shows that more than half of the sample selection (58.11%) is represented by the manufacturing industry. However, this is consistent with prior research and therefore will most likely not affect the findings of this paper. In Panel B the firm characteristics are reported. The mean (median) value of DA is 0.2028 (-0.0044). This suggests that the discretionary accruals are on average 20.28% of total assets. These values are somewhat higher than Baker et al. (2019), as their absolute value of discretionary accruals are on average 4.2%. Therefore, our findings suggest greater differences between reported earnings and accounting fundamentals. This difference could

Table I. Descriptive Statistics

This table presents the descriptive statistics for the key variables in this analysis. The data sample consists of firms in the United Stated spanning 2010-2019. Panel A reports the distribution of the different industry classifications over the sample period. **N** shows the individual amount of industry observations spanning from various sic codes. **Cum. N(%)** measures the cumulative amount of observations over the sample period as a percentage. In Panel B the firm characteristics are reported. **DA** is the residual of the discretionary accruals model (1) and defined as the amount of discretionary accruals of firm i in year t. **Firm size** is calculated as the natural logarithm of the total assets of firm i in year t. **Leverage** is defined as the ratio of debt to equity of firm i in year t. **M/B** is defined as the market-to-book ratio and measured as the market value of equity divided by the book value of equity of firm i in year t. **MV Equity** is calculated as the logarithm of market value of equity of firm i in year t. **R&D** is defined as the percentage of research and development expenses to the lagged value of total assets of firm i in year t. **R&D Missing** is set to one if R&D is missing and zero otherwise. **Industry Tobin's q** is defined as the firms' median market value of equity plus the book value of assets minus the book value of equity divided by the book value of assets in the two-digit SIC group of firm i in year t. **Industry CPS** is measured as the median CPS in the two-digit SIC group of firm i in year t. **Negative Earnings** is defined as the sum of negative earnings years in the past five years of firm i in year t. **Operating CF** is measured as the standard deviation of operating cash flows in the past five years of firm i in year t. **Sales** is calculated as the standard deviation of total sales in the past five years divided by the assets in year t of firm i in year t. **Operating Cycle** is measured as the logarithm of the past five years average of $[\frac{365}{(cogs/inventory)} + \frac{365}{(sales/accounts\ receivable)}]$ of firm i in year t. **Gender** captures the value of one if the CEO is male and zero otherwise. Panel C reports components of CEO dominance. **CEO Duality** captures a value of 1 if the CEO is also the chairman of the board of directors. **CEO Centrality** captures a value of 1 if the CEOs' CPS ratio is higher than the yearly industry median. **CEO Expertise** takes a value of 1 if the CEOs' tenure is higher than the yearly industry median. **CEO Ownership** captures a value of 1 if the amount of stock ownership held by the CEO is above the yearly industry median. **CEO equity compensation** takes a value of 1 if the total amount of equity based compensation of the CEO is higher than the yearly industry median. In Panel D, **CEO dominance index** is the sum of the five CEO dominance variables from Panel C. Panel E reports the **Pearson correlations** between each of the five components of CEO dominance index. All continuous variables are winsorized at the 5th and 95th percentiles.

Sic code	Industry Name	N	Cum. N(%)
Panel A. Industry classification (https://siccode.com)			
01-09	Agriculture, Forestry & Fishing	0	0.00
10-14	Mining	2,670	6.20
15-17	Construction	570	7.53
20-39	Manufacturing	25,015	65.64
40-49	Transportation & Public Utilities	5,005	77.27
50-51	Wholesale Trade	2,080	82.10
52-59	Retail Trade	3,765	90.85
60-67	Finance, Insurance & Real Estate	-	-
70-89	Services	3,835	99.76
90-99	Public administration	105	100.00
	Total amount of observations	43,045	100.00

Table I. Descriptive Statistics (Continued)

Variables	Mean	SD	Minimum	Median	Maximum
Panel B. Firm characteristics (Total 43,045 firm-year observations)					
DA	0.2028	0.9901	-1.2097	-0.0044	3.5619
Firm Size	8.0037	1.5103	5.4851	7.9120	10.8545
Leverage	0.5337	0.1887	0.1781	0.5468	0.8499
M/B	3.2434	2.4283	0.8642	2.4200	10.2597
MV Equity	8.0443	1.4808	5.5732	7.9128	10.8644
R&D	0.0289	0.0447	0	0.0045	0.1549
R&D Missing	0.6527	0.4761	0	1	1
Industry Tobins'q	1.6590	0.3664	1.0688	1.6896	2.2957
Industry CPS	0.4142	0.0240	0.3665	0.4175	0.4541
Negative Earnings	0.7772	1.2197	0	0	5
Operating CF	0.0351	0.0237	0.0080	0.0287	0.0965
Sales	0.1380	0.1124	0.0185	0.1029	0.4405
Operating Cycle	3.8622	1.0871	1.2265	4.1232	5.3387
Gender	0.9080	0.2891	0	1	1
Variables	**Mean**	**SD**	**Minimum**	**Median**	**Maximum**
Panel C. CEO dominance components (Total 8,609 CEOs)					
CEO duality	0.4205	0.4937	0	0	1
CEO centrality	0.5226	0.4996	0	1	1
CEO expertise	0.4647	0.4988	0	0	1
CEO ownership	0.9348	0.2468	0	1	1
CEO equity compensation	0.9031	0.2958	0	1	1
Variables	**Mean**	**SD**	**Minimum**	**Median**	**Maximum**
Panel D. CEO dominance measure					
CEO dominance index	3.2458	1.0862	0	3	5
	1	**2**	**3**	**4**	**5**
Panel E. Individual components of CEO dominance					
1. CEO duality	1.000				
2. CEO centrality	0.035*	1.000			
3. CEO expertise	0.238*	0.001	1.000		
4. CEO ownership	0.082*	0.088*	0.117*	1.000	
5. CEO equity compensation	-0.014	0.315*	-0.033*	0.031*	1.000
*Significant at the 0.01 level					

be explained by their use of absolute values of discretionary accruals. Furthermore, the average firm size is about $8 billion and their leverage ratio is 0.53. Similar to Bebchuk et al. (2011), this paper founds an industry CPS ratio around 40% and consistent with Baker et al. (2019), this paper found likewise values for Negative Earnings, Operating CF, Sales and Operating Cycle. Interestingly, only 390 (4.53%) CEOs are female, indicating that females are still underrepresented in top executive functions.

The CEO dominance characteristics are reported in Panel C. 42 percent of the time the CEO is also the chairman of the board of directors. The CEO receives 52 percent of the time a higher CPS than the yearly industry median, are working on average 46 percent of the time longer at their firm than the industry yearly median and owns on average 93 percent more stocks than the other four top executives per industry and year. Han et al. (2016) find that CEOs only own a little more than 2 percent of the firms' total stock and therefore differ substantially from our findings. However, as already described, this paper uses other measures to calculate the fraction of stock ownership and studies the CEOs relations relative to the other four top executives per industry and year. Therefore, this difference is not per se incorrect. Furthermore, the CEOs receive on average 90 percent of the time more equity based compensation relative to the other four top executives and industry counterparts per year. This suggests that almost ninety percent of the sample CEOs receive a substantial higher amount of equity based compensation compared to the other executives. Panel D shows the CEO dominance index statistics. The index ranges from zero to five with a mean just above 3. Lastly, Panel E shows that almost all the components of the CEO dominance index are significantly correlated with each other at a 0.01 level. Therefore, these significant values indicate that the individual components are detecting different dimensions of CEO dominance.

5. Empirical results

5.1 Empirical results for hypothesis 1

Table II shows the outcomes of the OLS regressions based on robust standard errors clustered at the two-digit SIC industry code and firm fixed effects regression on discretionary accruals to answer $h1$ and the main question of this paper. Recall that this hypothesis predicts a positive relationship between dominant CEOs and the use of discretionary accruals, as the measure of earnings management. Column (1) contains the OLS regression results for the five specific characteristics a CEO is able to be dominant along with the use of earnings management. The coefficients of $CEO\ duality_{it}$, $CEO\ expertise_{it}$, $CEO\ ownership_{it}$ and $CEO\ equity\ compensation_{it}$ are all positive related with discretionary accruals, whereas the coefficient of $CEO\ centrality_{it}$ shows a negative relationship. However, without the inclusion of several control variables, none of the five coefficients have significant power in column (1) and therefore cannot provide as further evidence that the CEO is able to influence discretionary accruals through the dimensions discussed. Next to this, the intercept of the OLS regression is negative and also not significant and therefore cannot be interpreted.

Column (2) has implemented several control variables in the OLS regression to strengthen the general findings of the regression. Compared to the characteristics variables in column (1), this regression also finds none significant coefficients. The results of the positive coefficient of $CEO\ duality_{it}$ have increased in significant level (p-value 0.12), however the coefficient is still not significant and therefore the positive coefficient of $CEO\ duality_{it}$ cannot be interpreted. Therefore, the findings of regression (2) suggests that the different characteristics of a CEO do not have significant power in explaining the amount of discretionary accruals. After implementing various control variables, the coefficient of $CEO\ ownership_{it}$ changes from positive to negative. Consistent with prior literature, a negative coefficient could be explained by the fact that holding a relative large fraction of the total amount of the firms' outstanding on itself does not per se have to lead to an increase in the likeliness of discretionary accruals. Another explanation could be that this paper uses a unique measure to control for the amount of stock ownership held by the CEO as already described and therefore could differ from previous research. However, the negative coefficient of $CEO\ ownership_{it}$ is not significant and therefore unable to strengthen or contradict findings of prior research.

Table II. CEO dominance and discretionary accruals

Table II presents the ordinary least squares (OLS) regressions in Columns (1), (2) and (3) and the firm fixed effects regression in Column (4). The sample period if from 2010 to 2019 and exists of 8,609 cross sectional observations. All four models include year dummy variables (not shown) and are clustered by the two-digit SIC industry code. **Column (1)** shows the OLS regression for the five individual CEO dominance dimensions and discretionary accruals. **Column (2)** has implemented several control variables in the OLS regression from Column (1). **Column (3)** presents the OLS regression for the CEO dominance index and discretionary accruals with control variables. **Column (4)** presents the firm fixed effects regression for the CEO dominance index and discretionary accruals with t-statistics based on robust standard errors. See **Table I** for additional variable description. The t-Statistic are in brackets.

Variables	DA			
	(1)	(2)	(3)	(4)
CEO duality	0.0214	0.0304		
	(1.10)	(1.57)		
CEO centrality	-0.0052	-0.0049		
	(-0.50)	(-0.34)		
CEO expertise	0.0095	0.0063		
	(0.53)	(0.36)		
CEO ownership	0.0035	-0.0037		
	(0.09)	(-0.09)		
CEO equity compensation	0.0466	0.0520		
	(1.03)	(1.20)		
CEO dominance index			0.0138**	0.0138
			(2.19)	(1.44)
CEO gender		-0.0295	-0.0297	-0.0297
		(-0.40)	(-0.40)	(-0.60)
Firm size		-0.0658**	-0.0646**	-0.0646**
		(-2.38)	(-2.36)	(-2.21)
Leverage		0.3338**	0.3310***	0.3310***
		(2.64)	(2.69)	(3.51)
M/B		-0.0099	-0.0097	-0.0097
		(-1.24)	(-1.19)	(-1.24)
MV Equity		0.0581**	0.0584**	0.0584**
		(2.18)	(2.18)	(2.05)
R&D		0.7011	0.7011	0.7011**
		(0.60)	(0.60)	(2.39)
R&D Missing		0.0734	0.0740	-0.0740***
		(0.78)	(0.79)	(-0.93)
Industry Tobin's q		0.0093	0.0073	0.0073
		(0.05)	(0.04)	(0.21)

Negative Earnings		-0.0041	-0.0041	-0.0041
		(-0.36)	(-0.37)	(-0.38)
Operating CF		-0.6336	-0.6273	-0.6273
		(-0.75)	(-0.74)	(-1.10)
Sales		0.6167**	0.6136**	0.6136***
		(2.06)	(2.04)	(5.79)
Operating Cycle		0.0026	0.0028	0.0028
		(0.08)	(0.09)	(-0.27)
Constant	0.0849	-0.1279	-0.1242	-0.0625
	(0.53)	(-0.26)	(-0.26)	(-0.53)
Number of observations	8,609	8,609	8,609	8,609
R-squared	0.080	0.090	0.090	0.081
Firm fixed effects	NO	NO	NO	YES
Year dummies	YES	YES	YES	YES

*Significant at the 0.10 level

**Significant at the 0.05 level

***Significant at the 0.01 level

The coefficients of $CEO\ centrality_{it}$, $CEO\ expertise_{it}$, $CEO\ equity\ compensation_{it}$ and intercept are yet again not significant and therefore it is not possible to interpret these coefficients.

Furthermore, several control variables in the discretionary accruals regression are also significant. Column (2) shows that the coefficient of $Firm\ size_{it}$ is significantly negative, similar to prior research. Literature states that larger firms are less volatile and under more scrutiny and therefore suggests firm size to be negatively related with discretionary accruals (Baker et al., 2019). The coefficient of $Leverage_{it}$ is positive and also significant at the 0.05 level. Literature on the relationship between leverage and discretionary accruals is mixed. Ali & Zhang (2015) argue that firms with higher leverage have more incentives to reduce earnings as these distressed firms do not have an optimal position in contractual renegotiations. On the other hand, more recent literature argues that highly leveraged firms may be under more pressure to maintain their current earnings and therefore expects leverage to be positively related with discretionary accruals. Similar to Baker et al. (2019), this paper finds a significantly positive coefficient of $Leverage_{it}$ and is therefore consistent with more recent literature. The coefficient of $MV\ equity_{it}$ is also positive and significant at the 0.05 level. Recall that the market value of equity is the logarithm of the stock price at fiscal years' end multiplied by the total amount of shares outstanding. Watts &

Zimmerman (1986) argue that firms with higher market values of equity use less discretionary accruals because of their subject to greater political costs. However, other and more recent research suggests that firms with higher market values of equity are more concerned about missing earnings forecasts and other benchmarks (Ali & Zhang, 2015). The coefficient of $Sales_{it}$ is also significantly positive at the 0.05 level. Consistent with Baker et al. (2019), this paper suggests that firms that are operating in more volatile environments are more likely to participate in earnings management.

Column (3) presents the OLS regression results of the $CEO\ dominance\_index_{it}$ variable on discretionary accruals. The findings in column (3) show that higher values of CEO dominance are significantly positive related with the use of accrual based earnings management. Therefore, this significant positive coefficient suggests that CEOs use their dominance to increase the value of discretionary accruals at the 0.05 level. Similar to column (2), the control variables $Firm\ size_{it}$, $MV\ equity_{it}$ and $Sales_{it}$ are also significant at the 0.05 level. The positive coefficient of the explanatory variable $Leverage_{it}$ becomes even highly significant at the 1% level.

Column (4) presents the firm fixed effects regression of CEO dominance index on discretionary accruals based on robust standard errors. Compared to the results in column (3), column (4) does not show a significant coefficient for $CEO\ dominance\_index_{it}$ (p-value 0.15) and therefore cannot be interpreted. Similar to the results in columns (2) and (3), the coefficients of $Firm\ size_{it}$ and $MV\ equity_{it}$ are still positive at the significance level of 5%. Whereas the coefficients of $Leverage_{it}$ and $Sales_{it}$ have even become highly significant at the 0.01 level. On the other hand, after controlling for firm factors that vary over time the coefficients of $R\&D_{it}$ and $R\&D\ missing_{it}$ have become significant. The coefficient of $R\&D_{it}$ is positive and significant at the 0.05 level, whereas the coefficient of $R\&D\ missing_{it}$ is even highly significant at the 1% level. Literature argues that firms operating in financial distress lean towards less R&D investments and firms in financial distress tend to use less discretionary accruals (Kini & Williams, 2012). Therefore, these coefficient suggest that the amount of discretionary accruals by the firms will increase with the sum of the 0.7011 and the value of R&D expenditures during that year.

In conclusion, the results in columns (1) and (2) show that a CEO is not inclined to increase or decrease the amount of discretionary accruals through the five different dimensions of CEO dominance as these variables are not significant and therefore cannot be interpreted. The results in columns (3) show that the index variable CEO dominance is

significantly positive related with the use of discretionary accruals and this finding suggests that higher values of CEO dominance are associated with an increase in the use of accrual based earnings management compared to less dominant CEOs. With the control variables $Firm\ size_{it}$, $Leverage_{it}$, $MV\ equity_{it}$ and $Sales_{it}$ having significant values. Recall the first hypothesis: *dominant CEOs are positive related to earnings management*. Therefore, the findings of this paper suggest that dominant CEOs are significantly positive related to discretionary accruals, the measure for earnings management and as a results does not reject the first hypothesis. However, the results of the firm fixed effects regression of CEO dominance index on discretionary accruals suggest that the CEO dominance index variable cannot be interpreted and therefore reject the hypothesis.

5.2 Empirical results for hypothesis 2

Before this paper gives an answer to the second hypothesis, this paper will investigate whether firms' characteristics differ between firms with dominant CEOs and less dominant CEOs. Recall that dominant CEOs are categorized if he or she has a CEO dominance index score of four or five. As a result, Table III in the appendix presents the different firm characteristics between firms with dominant CEOs (41%) and without dominant CEOs (59%). The descriptive statistics in Table III suggests that on average the characteristics of a firm with a dominant CEO do not substantial differ from firms without dominant CEOs. Interestingly, firms with dominant CEOs have on average higher values of discretionary accruals (9,8%), firm size (4,2%) and market value of equity (4,6%) compared to firms without a dominant CEO. On the other hand, firms without dominant CEOs have on average more negative earnings years in the past five years (38%) compared to firms with a dominant CEO. Therefore, the findings suggest that on average dominant CEOs are more likely to work at larger firms and are able to better tackle negative earnings persistence.

Table IV shows the outcomes of the Heckman two-stage model to examine if the sample suffers from selection bias. The findings from the first-stage probit model (un-tabulated) suggest that the probability of firms having a dominant CEO is significantly higher for larger firms. As well as significantly positive related to leverage, the amount of shares and ratio of equity based compensation. Table IV shows the findings of the Heckman second stage regression based on robust standard errors and are clustered by the two-digit SIC industry code. Firstly, the coefficient of the IMR or lambda is positive but not significant, meaning that the sample most likely not suffers from selection bias.

Table IV. Heckman two-stage model

This table presents the results of Heckman two-stage model for selection bias. Table IV shows the second stage of the Heckman two-stage model based on t-statistics based on robust standard errors and are clustered by the two-digit SIC industry code. **Dominant** is a dummy variable that takes the value of one if the CEO has a dominance index score of four/or five and zero otherwise of firm i in year t. **IMR** or lambda is calculated as the standard normal density divided by the standard normal cumulative distributed function and obtained from the first stage. See **Table I** for additional variable description. The regression includes year dummy variables (not shown). The t-Statistic are in brackets.

Variables	DA
Dominant	0.0346*
	(1.84)
CEO gender	-0.0297
	(-0.40)
Firm size	-0.0662**
	(-2.41)
Leverage	0.3401***
	(2.78)
M/B	-0.0099
	(-1.22)
MV Equity	0.0622**
	(2.35)
R&D	0.6859
	(0.59)
R&D Missing	0.0735
	(0.79)
Industry Tobin's q	0.0064
	(0.03)
Negative Earnings	-0.0046
	(-0.41)
Operating CF	-0.6216
	(-0.72)
Sales	0.6182**
	(2.04)
Operating Cycle	0.0035
	(0.11)
IMR	0.0267
	(1.39)
Constant	-0.1449
	(-0.32)

Number of observations	8,600
R-squared	0.090
Firm fixed effects	NO
Year dummies	YES

*Significant at the 0.10 level

**Significant at the 0.05 level

***Significant at the 0.01 level

Namely, a significantly positive coefficient of the inverse Mills ratio indicates that the estimate of β_1 would have been upward-biased (Certo, Busenbark, Woo & Semadeni, 2016). However, the coefficient of the inverse Mills ratio is not significant and therefore further strengthen the findings of this paper as this sample most likely does not suffer from a potential selection bias. Secondly, consistent with the findings of Column 3 in Table II, the dummy variable $Dominant_{it}$ is significantly positive indicating that firms with a dominant CEO have higher values of discretionary accruals compared to firms without dominant CEOs. Furthermore, the coefficient of the control variables $Firm\ size_{it}$, $Leverage_{it}$, $MV\ equity_{it}$ and $Sales_{it}$ are still significantly positive.

In summary, the findings of Table III and IV suggest that firms with a dominant CEO do not substantially differ compared to firms without dominant CEOs. However, looking at the characteristics between the two groups, dominant CEOs are more likely to work at larger firms, have higher values of discretionary accruals and are better in tackling negative earnings persistence. On the other hand, the inverse Mills ratio is not significant meaning that the two samples do not substantially differ from each other. Recall the second hypothesis: *the relationship between CEO dominance and earnings management suffers from selection bias*. Therefore, the findings of this paper reject the second hypothesis as the inverse Mills ratio is not positive. Thus, the results suggest that the sample used in this paper does not suffer from selection bias.

6. Additional tests

This paper will perform four additional robustness checks to strengthen the findings of Table II. Firstly, this paper will group the dominance index variable into low, middle or high levels of dominance based on their score. Secondly, this paper will critically look at the CEO centrality variable as recent research has questioned the reliability of CPS as a measure of CEO dominance (Zagonova & Salganik-Shoshan, 2018). Thirdly, this paper will exclude the variables ownership and equity compensation to examine whether this will affect the results in Table II. Lastly, this paper will look at another measure for earnings management. Namely, Real Earnings Management (REM).

6.1 Alternative measures of CEO dominance
6.1.1 Low, middle & high CEO dominance

As described, this paper looks at five different dimensions a CEO is able to become too dominant within the firm. Therefore, this dominance index ranges from zero to five and captures the influence of CEO dominance on earnings management via five different dimensions. To further strengthen the significantly positive association between a dominant CEO and discretionary accruals as presented in Table II column (3), this paper creates three groups of CEO dominance to examine whether relatively more dominant CEO are more likely to positively influence the amount of discretionary accruals compared to less dominant CEOs. Therefore, the groups CEO dominance_low, CEO dominance_middle and CEO dominance_high will be created. The group CEO dominance_low will correspond to the lowest quartile of the CEO dominance index. Therefore, the variable CEO dominance_low will equal one if the CEO dominance index value is zero, one or two and zero otherwise. The group CEO dominance_middle will correspond to the values between the upper and lower quartiles of the CEO dominance index. Therefore, the variable CEO dominance_middle will equal one if the CEO dominance index value is three or four and zero otherwise. The group CEO dominance_high will correspond to the upper quartile of the CEO dominance index. Therefore, the variable CEO dominance_high will equal one if the CEO dominance index value is five and zero otherwise. Panel A of Table V in the appendix reports the distribution between the three CEO dominance groups. Panel A of Table V shows that almost 15% of the CEOs are highly dominant within the firm, meaning that these CEOs are also the chairman of the board of directors, receive more compensation and have a longer tenure than the yearly industry median, own a larger fraction of

outstanding shares and receive relative more equity based compensation compared to the other four top executives.

Panel B of Table V presents the OLS regression results of the three CEO dominance index groups, with CEO dominance_low as reference variable. The findings in Panel B show that the coefficient of CEO dominance_middle is positive but not significant and therefore cannot be interpreted. On the other hand, the coefficient of CEO dominance_high is significantly positive at the 0.10 level and therefore indicates that CEOs that have an index score of five will increase the amount of discretionary accruals with 0.0384 compared to CEOs that only have an index score of zero, one or two. Thus, this significantly positive coefficient suggests that relatively more dominant CEOs are associated with higher values of discretionary accruals compared to less dominant CEOs. Hence, provide further evidence that relatively more dominant CEOs are more likely to participate in earnings management than relatively less dominant CEOs. Similar to the findings of column (3) in Table II, the control variables $Firm\ size_{it}$, $Leverage_{it}$, $MV\ equity_{it}$ and $Sales_{it}$ having significant values.

In conclusion, the findings in Table V provide further evidence that relatively more dominant CEOs are more likely to participate in earnings management than relatively less dominant CEOs.

6.1.2 Stock ownership and Equity based compensation excluded

Following Han et al. (2016), this paper has recognized the relative amount of stock ownership held by the CEO as a measure of CEO dominance. Namely, the CEOs may become too entrenched and therefore obtain too much power over the board of directors' decision on firm strategies. As already described, from literature it becomes clear that the amount of stock ownership held by the CEO provides as an incentive for them to participate in earnings management because future stock prices rely on the belief about current and future earnings. However, other research has questioned the use of the amount of stock ownership held by the CEO as an effective measure for dominance. Similar motives are given to the effectiveness of the influence of the amount of equity based compensation as a measure of CEO dominance. Namely, Baker et al. (2019) and Ali & Zhang (2015) suggest that CEOs that own a relatively large fraction of the total amount of shares along with a high proportion of equity based compensation may have more incentives to participate in

earnings management because their compensation is more aligned with current as well as future value of stock prices and accounting numbers.

Therefore, this paper will exclude the variables stock ownership and equity based compensation from the CEO dominance index, but implement both in the OLS regression as control variables. As a result, the variable of interest CEO dominance index will now range from zero to three. Panel A of Table VI shows that the new CEO dominance index score is on average 1,4 with a maximum of three. However, the control variables stock ownership and equity based compensation show interesting maximum values. The maximum value of 0.9980 suggests that a CEO owns all the firms' outstanding shares, which is highly unlikely. The same applies for the maximum value of equity based compensation. In theory it could be possible that a CEO only receives equity based compensation, it is still unlikely. However, as already explained in the Research design section, this paper uses different calculations for the variables stock ownership and equity based compensation and therefore it is possible to obtain such high maximum values.

Panel B of Table VI presents the results of the OLS regressions based on robust standard errors clustered at the two-digit SIC industry code. Column (1) shows the OLS regression results of the CEO dominance index variable on discretionary accruals. The findings in column (1) present that higher values of CEO dominance are highly significant and positive associated with the use of accrual based earnings management. The coefficient of CEO dominance has now become highly significant at the 0.01 level, whereas this coefficient was only significant at the 0.05 level with the inclusion of stock ownership and equity based compensation. Therefore, this significantly positive coefficient suggests that CEOs still use their dominance to increase the value of discretionary accruals. Furthermore, the control variable stock ownership shows a significantly negative coefficient at the 0.10 level. The negative coefficient suggests that a higher fraction of total outstanding shares held by the CEO will lead to a decrease in discretionary accruals. Therefore, these results provide conflicting evidence on the association between stock ownership and discretionary accruals. On the other hand, the coefficient of equity based compensation is not significant and can therefore not be interpreted. Similar to the other OLS regression results, the control variables $Firm\ size_{it}$, $Leverage_{it}$, $MV\ equity_{it}$ and $Sales_{it}$ are still significant at the 0.05 and 0.01 level.

Table VI. A different CEO dominance index

This table presents the descriptive statistics and OLS regression of the different CEO dominance index for the additional analysis. Panel A reports the descriptive statistics. **Stock ownership** is defined as the amount of stock ownership held by the CEO based on their fraction of shares hold divided by the sum of the variables total shares owned exclusive options and total amount of shares outstanding. **Equity based compensation** is defined as the amount of equity based compensation by the CEO based on their fraction divided by their total compensation. **CEO dominance index** is the sum of the three CEO dominance variables CEO duality, centrality and expertise. **Column (1)** of Panel B presents the OLS regression for the CEO dominance index and discretionary accruals with control variables. **Column (2)** of Panel B shows the OLS regression for the CEO dominance index groups and discretionary accruals with t-statistics based on robust standard errors and are clustered by the two-digit SIC industry code. Both regressions include year dummy variables (not shown) and the CEO dominance_low group is used as reference. The t-Statistic are in brackets.

Variables	Mean	SD	Minimum	Median	Maximum
Panel A. Firm characteristics and CEO dominance index					
Stock ownership	0.1579	0.2071	0	0.0779	0.9980
Equity based compensation	0.2000	0.0374	0	0.1983	1
CEO dominance index	1.4078	0.9364	0	1	3
Variables			**(DA)**		
Panel B. OLS regression					
		(1)		**(2)**	
CEO dominance index		0.0228***			
		(3.14)			
CEO dominance_middle				0.0329	
				(1.21)	
CEO dominance_high				0.0582**	
				(2.58)	
Stock ownership		-0.0835*		-0.0820*	
		(-1.89)		(-1.97)	
Equity based compensation		-0.1522		-0.1372	
		(-0.78)		(-0.70)	
CEO gender		-0.0277		-0.0288	
		(-0.38)		(-0.39)	
Firm size		-0.0679**		-0.0680**	
		(-2.45)		(-2.44)	
Leverage		0.3316***		0.3312***	
		2.72		(2.69)	
M/B		-0.0098		-0.0098	
		(-1.21)		(-1.19)	
MV Equity		0.0567**		0.0569**	
		(2.14)		(2.13)	

R&D	0.6980	0.6918
	(0.60)	(0.60)
R&D Missing	0.0726	0.0726
	(0.78)	(0.77)
Industry Tobin's q	0.0080	0.0084
	(0.04)	(0.04)
Negative Earnings	-0.0044	-0.0044
	(-0.40)	(-0.39)
Operating CF	-0.6170	-0.6131
	(-0.72)	(-0.72)
Sales	0.6257**	0.6249**
	(2.07)	(2.07)
Operating Cycle	0.0031	0.0031
	(0.10)	(0.10)
Constant	-0.0067	0.0022
	(-0.01)	(0.00)
Number of observations	8,609	8,609
R-squared	0.090	0.090
Firm fixed effects	NO	NO
Year dummies	YES	YES

*Significant at the 0.10 level

**Significant at the 0.05 level

***Significant at the 0.01 level

Column (2) presents the OLS regression results of the three CEO dominance index groups, with CEO dominance_low as reference variable. The variable CEO dominance_low will equal one if the CEO dominance index value is zero or one and zero otherwise. The variable CEO dominance_middle will equal one if the CEO dominance index value is two and zero otherwise. The variable CEO dominance_high will equal one if the CEO dominance index value is three and zero otherwise. The findings in column (2) show that the coefficient of CEO dominance_middle is positive but not significant and therefore cannot be interpreted. On the other hand, the coefficient of CEO dominance_high is significantly positive at the 0.05 level and therefore indicates that CEOs that have an index score of three will increase the amount of discretionary accruals with 0.0582 compared to CEOs that only have an index score of zero or one. Therefore, this significantly positive coefficient suggests that relatively more dominant CEOs are associated with higher values of discretionary accruals compared to less dominant CEOs. Hence, provide further evidence

that also without the variables stock ownership and equity based compensation as dominance measures, relatively more dominant CEOs are more likely to participate in earnings management than relatively less dominant CEOs. Similar to the findings of column (1), the control variables stock ownership, $Firm\ size_{it}$, $Leverage_{it}$, $MV\ equity_{it}$ and $Sales_{it}$ having significant values.

In conclusion, the findings in Table VI show that the main findings of this paper are robust when the variables stock ownership and equity based compensation are excluded from the CEO dominance index. The CEO dominance index coefficient becomes even more significant and the control variable stock ownership shows significant power.

6.1.3 Relative Total Pay instead of CPS

As already described, this paper uses the CPS ratio introduced by Bebchuk et al. (2012) to proxy for CEO dominance. Various studies have used this proxy and is therefore widely accepted in the literature (Baker et al., 2019). However, Zagonov & Salganik-Shoshan (2018) have questioned the use of CPS as a reliable measure for CEO dominance and argue that CPS suffers from a fundamental flaw. Namely, the calculation of CPS makes restrictive assumptions about the distributional structure of compensation among the top five executives. As a result, researchers are exposed to the risk of drawing misleading conclusions. In summary, Zagonov & Salganik-Shoshan (2018) found that CEOs with identical CPS ratios could substantially differ in dominance level and therefore frequently under- or overestimate the dominance level of the CEO. Therefore, Zagonov & Salganik-Shoshan (2018) came up with other proxies to measure CEO dominance. Namely, Relative Total Pay (RTP). RTP is measured as the total amount of CEO compensation relative to the other four top executives. Therefore, the difference between CPS and RTP is that the CEOs' total compensation is not included in the denominator and thus not bounded from above. Theoretically, RTP should be a better measure for CEO dominance as a small increase in RTP -when RTP is already large- represents a greater increase in CEO dominance compared to such an increase in CPS. As a result, this paper will use the RTP ratio instead of CPS as a measure of CEO centrality to investigate whether CPS indeed suffers from a fundamental flaw.

Panel A of Table VII in the appendix shows the descriptive statistics of the new variables. Compared to the mean of the industry-adjusted CPS (0.4142), the mean of the industry-adjusted RTP is substantial higher (0.7151). As described above, this increase in

ratio is expected and consistent with the findings of Zagonov & Salganik-Shoshan (2018). However, the descriptive statistics of the variables CEO centrality and CEO dominance index do not substantial differ from Table I. Column (1) of Panel B in Table VII contains the OLS regression results for the five specific characteristics a CEO on discretionary accruals with several control variables. Compared to the results with CPS as the measure of CEO centrality, this regression also finds no significant coefficient for CEO centrality. The findings of column (1) do not suggests that a CEO is more likely to participate in earnings management if he or she receives a higher RTP than the yearly industry median. Column (2) shows that the variable of interest CEO dominance is significantly positive associated with discretionary accruals. However, the coefficient of CEO dominance is only significantly positive at the 0.10 level with the use of RTP, whereas the coefficient with CPS in Table II is positive and significant at the 0.05 percent level. Similar to the other OLS regression results, the control variables $Firm\ size_{it}$, $Leverage_{it}$, $MV\ equity_{it}$ and $Sales_{it}$ are still significant at the 0.05 and 0.01 level. Therefore, the findings of Table V in the appendix do not suggest that CPS suffers from distributional problems as claimed by Zagonov & Salganik-Shoshan (2018). On the other hand, the RTP ratio is substantial higher compared to the findings of CPS, but do not affect the findings of this paper.

In conclusion, the findings in Table VII show that the RTP does not have to be a superior measure for CEO centrality.

6.2 Real Earnings Management

The main focus of this paper is on accrual based earnings management, measured by the amount of discretionary accruals. As the amount of discretionary accruals are widely used in previous research as the measure of earnings management. However, more recent studies have examined REM as an alternative proxy in research on earnings management (Enomoto, Kimura & Yamaguchi, 2015). Prior research has found that the costs of REM are generally lower than accrual based earnings management because neither auditors nor regulators can restrain firms from engaging in REM. Therefore, Enomoto et al. (2015) found that executives choose the most cost-effective earnings management methods depending on the level of scrutiny by regulators and auditors. Supporting the findings of the substitutability of the two types of earnings management, Baker et al. (2019) found that after the introduction of the Sarbanes-Oxley Act (SOX) the effect of relative CEO power on accrual based earnings management subsides towards REM.

Therefore, this paper will construct a second data sample with REM as the measure for earnings management. REM is calculated as the residual of the model (3) and is defined as the abnormal discretionary expenditures (DE). Following Baker et al. (2019) and Ali & Zhang (2015), this model (3) is estimated for each two-digit SIC with at least twenty observations per year. Furthermore, this paper uses the same data selection and restrictions for this additional analysis as described in section Data selection and descriptive statistics. However, compared to the regression of model (2), the control variables R&D expense and R&D missing are excluded because of the fact that amounts of R&D expense are included in DE.

$$\frac{DE_{it}}{A_{it-1}} = \mu_1 \left[\frac{1}{A_{it-1}}\right] + \mu_2 \left[\frac{Sales_{it-1}}{A_{it-1}}\right] + \varepsilon_{i,t}(DE) \tag{3}$$

DE_{it} is the sum of R&D expense, advertising expense and selling, general and administration expense and is defined as the amount of DE of firm i in year t. A_{it-1} is the total asset of firm i at the beginning of year t. $Sales_{it-1}$ is the amount of net sales of firm i from year t-1 to year t. The residual from DE is the estimate of abnormal discretionary expenditures of firm i in year t. Accordingly, negative values of DE_{it} indicate lower values of abnormal discretionary expenditures in order to increase current earnings and could suggest potential real earnings management

Table VIII in the appendix reports the firm and CEO characteristics for the additional analysis. The mean (median) variable of DE is 0.0478 (-0.0089). This suggests that the abnormal discretionary expenditures are on average 4,78% of total assets. The CEO dominance variables are identical to the descriptive statistics of Table I.

Column (1) of Table IX shows the OLS regression findings for the five specific characteristics a CEO is able to be dominant along with the amount of abnormal discretionary expenditures. Compared to the findings of Table II, this regression finds significant coefficients for the variables $CEO\ duality_{it}$, $CEO\ centrality_{it}$ and $CEO\ expertise_{it}$. The significantly negative coefficients of $CEO\ duality_{it}$ and $CEO\ centrality_{it}$ suggest that when a CEO is also the chairman of the board of directors and/or receives more total compensation than the yearly industry median, the CEO is more likely to decrease the amount of DE to improve the current earnings. The positive coefficient of $CEO\ expertise_{it}$ is significant at the 0.05 level and suggests that CEOs that have a tenure longer than the yearly industry median are less likely to be active in real earnings

management as they do not decrease DE to improve current earnings. The coefficients of $CEO\ ownership_{it}$ and $CEO\ equity\ compensation_{it}$ are not significant and therefore cannot be interpreted.

Column (2) of Table IX presents the OLS regression results of the $CEO\ dominance\_index_{it}$ variable on abnormal discretionary expenditures. The findings in column (2) show that higher values of CEO dominance are not significantly associated with the amount of abnormal discretionary expenditures. Therefore, this insignificant coefficient suggests that dominant CEOs are not more likely to participate in real earnings management. Column (3) of Table IX presents the firm fixed effects regression of CEO dominance index on abnormal discretionary expenditures based on robust standard errors. Similar to the results in column (2), column (3) does not show a significant coefficient for $CEO\ dominance\_index_{it}$ and therefore cannot be interpreted. Column (4) of Table IX shows the firm fixed effects regression of CEO dominance index groups, with CEO dominance_low as reference variable. The findings in column (4) show that the coefficients of CEO dominance_middle and dominance_high are both not significant and therefore cannot be interpreted. In all four regressions the control variables $Firm\ size_{it}$, $Leverage_{it}$, MB_{it}, $MV\ equity_{it}$, $Industry\ CPS_{it}$, $Negative\ earnings_{it}$, $Operating\ CF_{it}$, $Sales_{it}$ and $Operating\ Cycle_{it}$ tend to be significant at the 10%, 5% or 1% level.

In conclusion, the results in column (1) show that a CEO is more likely to decrease the amount of abnormal discretionary expenditures to improve current earnings when he or she is also the chairman of the board of directors and/or receives more compensation than the yearly industry median. Next to this, the findings suggest that CEOs that have a tenure longer than the yearly industry median are less likely to be active in real earnings management. The results in column (2), (3) and (4) show that a dominant CEO is not more likely to decrease the amount of abnormal discretionary expenditures to improve current earnings.

Table IX. CEO dominance and abnormal discretionary expenditures

Table II presents the ordinary least squares (OLS) regressions in Columns (1) and (2) and the firm fixed effects regression in Column (3) and (4). The sample period if from 2010 to 2019 and exists of 8,646 cross sectional observations. All four models include year dummy variables (not shown) and are clustered by the two-digit SIC industry code. **Column (1)** shows the OLS regression for the five individual CEO dominance dimensions and abnormal discretionary expenditures with several control variables. **Column (2)** presents the OLS regression for the CEO dominance index and abnormal discretionary expenditures with control variables. **Column (3)** presents the firm fixed effects regression for the CEO dominance index and abnormal discretionary expenditures with t-statistics based on robust standard errors. **Column (4)** shows the firm fixed effects regression for the CEO dominance index groups and abnormal discretionary expenditures. See **Table I** for additional variable description. The t-Statistic are in brackets.

Variables	DE			
	(1)	(2)	(3)	(4)
CEO duality	-0.0170*			
	(-1.69)			
CEO centrality	-0.0159*			
	(-1.68)			
CEO expertise	0.0207**			
	(2.16)			
CEO ownership	0.0028			
	(0.14)			
CEO equity compensation	0.0079			
	(0.46)			
CEO dominance index		-0.0019	-0.0032	
		(-0.50)	(-0.73)	
CEO dominance_middle				-0.0022
				(-0.20)
CEO dominance_high				-0.0085
				(-0.53)
CEO gender	0.0244	0.0270	0.0011	0.0010
	(0.70)	(0.76)	(0.05)	(0.04)
Firm size	-0.0400**	-0.0412**	-0.0410***	-0.0409***
	(-2.08)	(-2.01)	(-3.10)	(-3.09)
Leverage	-0.1141	-0.1196*	-0.1510***	-0.1517***
	(-1.53)	(-1.68)	(-3.47)	(-3.49)
M/B	0.0127***	0.0130***	0.0135***	0.0135***
	(2.72)	(2.79)	(3.84)	(3.84)
MV Equity	0.0339*	0.0331*	0.0335***	0.0334***
	(1.77)	(1.71)	(2.61)	(2.60)
Industry Tobin's q	-0.1178	-0.1197	-0.0543*	-0.0542*

	(-1.46)	(-1.50)	(-1.77)	(-1.77)
Negative Earnings	0.0441***	0.0434***	0.0419***	0.0421***
	(5.61)	(5.41)	(8.50)	(8.54)
Operating CF	1.0794*	1.1104*	0.5557**	0.5568**
	(1.81)	(1.83)	(2.14)	(2.14)
Sales	-0.2377**	-0.2402**	-0.2285***	-0.2287***
	(-2.17)	(-2.20)	(-4.27)	(-4.27)
Operating Cycle	0.0509***	0.0511***	0.0511***	0.0510***
	(3.06)	(3.07)	(7.87)	(7.86)
Constant	-0.1294	-0.1026	0.0045	-0.0031
	(-0.46)	(-0.36)	(0.03)	(-0.02)
Number of observations	8,646	8,646	8,646	8,646
R-squared	0.141	0.140	0.111	0.111
Firm fixed effects	NO	NO	YES	YES
Year dummies	YES	YES	YES	YES

*Significant at the 0.10 level

**Significant at the 0.05 level

***Significant at the 0.01 level

7. Conclusion and discussion

This paper investigates whether a dominant CEO is more likely to participate in accrual based earnings management. This paper hypothesizes that dominant CEOs are positive associated with discretionary accruals. Namely, when the CEO is also the chairman of the board of directors, receive more compensation relative to the other top four executive, have a tenure longer than the yearly industry median, owns a large fraction of the firms' total outstanding shares and receives more equity based compensation relative to the other top executives the CEO is able to become too dominant. For the sample of 2010-2019, this paper shows that a dominant CEO is significantly positive related with the amount of discretionary accruals. However, the five individual aspects as well as the CEO dominance coefficient from the firm fixed effects regression do not show significant results. Furthermore, this paper hypothesizes that the relationship between CEO dominance and earnings management suffers from selection bias. Namely, firms/executives sometimes purposefully choose their type of governance structure/firms based on favorable firm characteristics. Therefore, the sample of firms with dominant CEOs in this paper may not be random. However, these findings of this paper reject the second hypothesis and therefore suggest that the sample of firms does not per se suffer from selection bias.

In addition, the findings of this paper are robust to using different CEO dominance and earnings management measures. Firstly, this paper shows that relative more dominant CEOs are significantly positive associated with the amount of discretionary accruals compared to relative less dominant CEOs. Secondly, this paper demonstrates that the coefficient of CEO dominance becomes even more significant when the variables stock ownership and equity based compensations are excluded from the CEO dominance index. Next to this, the control variable stock ownership shows a significantly negative coefficient. Thirdly, this paper does not support the beliefs of Zagonov & Salganik-Shoshan (2018) that RTP is superior to CPS. Lastly, this paper shows that a dominant CEO is not more likely to participate in real earnings management. On the other hand, the variables duality, centrality and expertise are all significantly related to the amount of abnormal discretionary expenditures.

Overall, the findings of this paper show that a dominant CEO is more likely to participate in accrual based earnings management, that relatively more dominant CEOs are more likely to increase the amount of discretionary accruals compared to relatively less dominant CEOs and does not suffer from a potential selection bias.

This paper concludes with three implication and suggestions for future research. Firstly, this paper has made specific assumptions for the variables stock ownership and equity based compensations. Compared to prior research, the descriptive statistics of this paper are relatively high. However, the findings of this paper demonstrate that the coefficient of CEO dominance index is significantly positive in both scenarios. Secondly, literature and prior research have shown that several inside and outside monitors are related to earnings management and therefore restricts CEOs to become too dominant. This paper has not implemented such control variables in the OLS regression because of data limitations. Most control variables are firm characteristics and the results of this paper suggest that these control variables are more appropriate for the real earnings management regressions as almost all variables are significant. Therefore, the missing internal and external monitor explanatory variables can explain the relatively low R2 value of the OLS and firm fixed effects regressions. Thirdly, to meet the exclusive restriction discussed by Certo et al. (2016) this paper has implemented the variables' total amount of shares held by the CEO relative to the other top executives and the ratio of equity based compensation in Heckman's first stage probit model. However, the variable of interest CEO dominance already captures both dimensions as the index increases in value if the CEO holds relatively more shares outstanding than the other top executives as well as receives more equity based compensation compared to the other top executives. Therefore, it is possible that the exclusion restriction is at risk. Fourthly, more recent literature questions whether a combination of characteristics makes the CEO too dominant. However, the five individual variables measure all different dimensions the CEO is able to become too dominant, it is not clear whether a combination empowers the CEO. Therefore, the CEO dominance index is more a relative proxy for CEO dominance than an absolute measure.

Subsequently, future research could investigate whether firms with relatively more inside ownership, analysts following and other internal/external monitors are able to restrict too dominant CEOs in the use of earnings management. Therefore, future research could come up with an index that controls for several internal and external governance mechanisms that restricts too dominant CEOs to participate in accrual based earnings management as this paper only sheds light on how the various executives characteristics affect the amount of discretionary accruals.

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B. Appendix

Table III. Descriptive statistics between high/low

This table presents the descriptive statistics for the two groups of firms. **Table III** reports the firm characteristics between firms with dominant CEOs (3,566 observations) and without dominant CEOs (5,043 observations). **High** indicates that the CEO of firm i in year t has a CEO dominance index score of four or five. **Low** indicates that the CEO of firm i in year t has a CEO dominance index score below four. The definitions of all firm characteristics can be found in **Table I**. All continuous variables are winsorized at the 5th and 95th percentiles.

Variables	Mean		SD		Minimum		Median		Maximum	
	High	**Low**	**High**	**Low**	**High**	**Low**	**High**	**Low**	**High**	**Low**
DA	0.215	0.194	1.014	0.973	-1.210	-1.210	-0.003	-0.006	3.562	3.562
Firm Size	8.208	7.860	1.498	1.503	5.485	5.485	8.145	7.743	10.854	10.854
Leverage	0.549	0.523	0.184	0.191	0.178	0.178	0.564	0.533	0.850	0.850
M/B	3.372	3.152	2.465	2.399	0.864	0.864	2.497	2.349	10.260	10.260
MV Equity	8.268	7.886	1.453	1.480	5.573	5.573	8.178	7.739	10.864	10.864
R&D	0.025	0.032	0.040	0.047	0	0	0.003	0.006	0.155	0.155
R&D Missing	0.633	0.666	0.482	0.472	0	0	1	1	1	1
Industry Tobins'q	1.648	1.667	0.370	0.363	1.069	1.069	1.683	1.690	2.230	2.230
Industry CPS	0.415	0.414	0.024	0.024	0.366	0.366	0.418	0.416	0.454	0.454
Negative Earnings	0.572	0.922	1.040	1.313	0	0	0	0	5	5
Operating CF	0.032	0.037	0.022	0.025	0.008	0.008	0.026	0.031	0.097	0.097
Sales	0.131	0.143	0.109	0.115	0.019	0.019	0.098	0.107	0.440	0.440
Operating Cycle	3.870	3.857	1.016	1.135	1.226	1.226	4.092	4.154	5.339	5.339
Gender	0.966	0.946	0.180	0.225	0	0	1	1	1	1

Table V. CEO dominance groups and discretionary accruals

This table presents the distribution between the three CEO dominance groups and the OLS regression for the additional analysis. **Panel A** reports the distribution of the different CEO dominance groups over the sample period. **N** shows the individual amount of CEO dominance group observations. **Panel B** shows the OLS regression for the CEO dominance index groups and discretionary accruals with t-statistics based on robust standard errors and are clustered by the two-digit SIC industry code. The regression includes year dummy variables (not shown) and the CEO dominance_low group is used as reference. The t-Statistic are in brackets.

CEO dominance group	N
Panel A. CEO dominance groups	
CEO dominance_low	2,062
CEO dominance_middle	5,414
CEO dominance_high	1,133
Total amount of CEO observations	8,609

Variables	Coefficient
Panel B. OLS regression	
CEO dominance_middle	0.0078
	(0.32)
CEO dominance_high	0.0384*
	(1.70)
CEO gender	-0.0290
	(-0.40)
Firm size	-0.0652**
	(-2.36)
Leverage	0.3338***
	(2.71)
M/B	-0.0097
	(-1.20)
MV Equity	0.0590**
	(2.17)
R&D	0.6996
	(0.60)
R&D Missing	0.0730
	(0.78)
Industry Tobin's q	0.0069
	(0.03)
Negative Earnings	-0.0046
	(-0.41)
Operating CF	-0.6288
	(-0.73)

Sales	0.6133**
	(2.04)
Operating Cycle	0.0032
	(0.10)
Constant	-0.0916
	(-0.20)
Number of observations	8,609
R-squared	0.089
Firm fixed effects	NO
Year dummies	YES

*Significant at the 0.10 level

**Significant at the 0.05 level

***Significant at the 0.01 level

Table VII. Relative Total Pay (RTP)

This table presents the descriptive statistics and OLS regression of the CEO dominance index for the additional analysis. Panel A reports the descriptive statistics. **Industry RTP** is defined as the median RTP in the two-digit SIC group of firm i in year t and calculated as the total amount of CEOs' compensation divided by the other four top executives total compensation. **CEO Centrality** captures a value of 1 if the CEOs' RTP ratio is higher than the yearly industry median. **CEO dominance index** is the sum of the five CEO dominance variables CEO duality, centrality, expertise, ownership and equity compensation. **Column (1)** of Panel B shows the OLS regression for the five individual CEO dominance dimensions and discretionary accruals with control variables. **Column (2)** of Panel B presents the OLS regression for the CEO dominance index and discretionary accruals with t-statistics based on robust standard errors and are clustered by the two-digit SIC industry code. Both regressions include year dummy variables (not shown). The t-Statistic are in brackets.

Variables	Mean	SD	Minimum	Median	Maximum
		Panel A. RTP characteristics			
Industry RTP	0.7151	0.0795	0.3627	0.7176	1.0169
CEO centrality	0.5133	0.4999	0	1	1
CEO dominance index	3.2365	1.0862	0	3	5
Variables			**(DA)**		
		Panel B. OLS regression			
		(1)		**(2)**	
CEO duality		0.0304			
		(1.57)			
CEO centrality		-0.0097			
		(-0.64)			
CEO expertise		0.0064			
		(0.36)			
CEO ownership		-0.0028			
		(-0.07)			
CEO equity compensation		0.0543			
		(1.23)			
CEO dominance index				0.0128*	
				(1.87)	
CEO gender		-0.0294		-0.0297	
		(-0.40)		(-0.40)	
Firm size		-0.0659**		-0.0648**	
		(-2.38)		(-2.37)	
Leverage		0.3346***		0.3316***	
		(2.65)		(2.70)	
M/B		-0.0099		-0.0097	

	(-1.24)	(-1.20)
MV Equity	0.0583**	0.0586**
	(2.19)	(2.19)
R&D	0.6959	0.7014
	(0.60)	(0.60)
R&D Missing	0.0736	0.0739
	(0.79)	(0.79)
Industry Tobin's q	0.0095	0.0073
	(0.05)	(0.04)
Negative Earnings	-0.0041	-0.0042
	(-0.36)	(-0.38)
Operating CF	-0.6381	-0.6283
	(-0.75)	(-0.74)
Sales	0.6171**	0.6132**
	(2.06)	(2.03)
Operating Cycle	0.0026	0.0029
	(0.08)	(0.09)
Constant	-0.1299	-0.1217
	(-0.27)	(-0.26)
Number of observations	8,609	8,609
R-squared	0.090	0.089
Firm fixed effects	NO	NO
Year dummies	YES	YES

*Significant at the 0.10 level

**Significant at the 0.05 level

***Significant at the 0.01 level

Table VIII. Descriptive Statistics REM

This table presents the descriptive statistics for the key variables in this additional analysis. In **Panel A** the firm characteristics are reported. DA is defined as the amount of abnormal discretionary expenditures of firm i in year t. **Panel B** reports components of CEO dominance. In **Panel C**, CEO dominance index is the sum of the five CEO dominance variables from Panel C. All continuous variables are winsorized at the 5th and 95th percentiles. Recall **Table I** for further variable clarification.

Variables	Mean	SD	Minimum	Median	Maximum
Panel A. Firm characteristics (Total 43,230 firm-year observations)					
DE	0.0478	0.4738	-0.9300	-0.0089	1.3418
Firm Size	8.0039	1.5084	5.4885	7.9121	10.8523
Leverage	0.5334	0.1885	0.1782	0.5464	0.8498
M/B	3.2386	2.4284	0.8627	2.4145	10.2597
MV Equity	8.0428	1.4794	5.5728	7.9103	10.8549
Industry Tobins'q	1.6573	0.3678	1.0688	1.6896	2.2957
Industry CPS	0.4141	0.0241	0.3660	0.4172	0.4541
Negative Earnings	0.7775	1.2208	0	0	5
Operating CF	0.0351	0.0237	0.0080	0.0286	0.0968
Sales	0.1381	0.1124	0.0186	0.1033	0.4404
Operating Cycle	3.8666	1.0862	1.2353	4.1253	5.3470
Gender	0.9079	0.2892	0	1	1
Variables	**Mean**	**SD**	**Minimum**	**Median**	**Maximum**
Panel B. CEO dominance components (Total 8,646 CEOs)					
CEO duality	0.4203	0.4936	0	0	1
CEO centrality	0.5226	0.4995	0	1	1
CEO expertise	0.4653	0.4988	0	0	1
CEO ownership	0.9347	0.2472	0	1	1
CEO equity compensation	0.9026	0.2965	0	1	1
Variables	**Mean**	**SD**	**Minimum**	**Median**	**Maximum**
Panel C. CEO dominance measure					
CEO dominance index	3.2454	1.0873	0	3	5