Routledge
Taylor & Francis Group

Accounting and Business Research

ISSN: (Print) (Online) Journal homepage: https://www.tandfonline.com/loi/rabr20

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To cite this article: Mahmoud Gad, Trang Nguyen & Mariano Scapin (2023) The effect of pay disparities within top management on conservative reporting, Accounting and Business Research, 53:4, 478-504, DOI: 10.1080/00014788.2022.2056119

To link to this article: https://doi.org/10.1080/00014788.2022.2056119

Published online: 27 May 2022.

Accounting and Business Research, 2023
Vol. 53, No. 4, 478–504, https://doi.org/10.1080/00014788.2022.2056119

The effect of pay disparities within top management on conservative reporting

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We study the effect of the pay gap between the chief executive officer (CEO) and the next layer of executives in the top management team (TMT)—a proxy for promotion-based tournament incentives—on conditional conservatism in financial reporting. We find that higher levels of tournament incentives are associated with less conservative financial reports. Our results hold in an instrumental variable (IV) analysis and regressions using alternative measures of both pay gap and accounting conservatism. Furthermore, we find that senior executives' engagement in tournaments for promotion is affected by their perceived probability of success. Specifically, the negative relationship between the pay gap and conservatism is stronger (weaker) when the CEO is more (less) likely to be replaced. Overall, our results indicate that pay disparities within the TMT play an important role in financial reporting.

Keywords: conservatism; financial reporting; pay gap; tournament incentives; promotion; senior management; executive compensation; corporate governance

JEL classification: G30; J31; M41; M51; M52

1. Introduction

We examine the relationship between the promotion incentives of members of the top management team (TMT) and accounting properties. Lazear and Rosen (1981) argue that unlike a chief executive officer (CEO), the next layer of executives not only serves a current operating function but also competes in a tournament for promotion and the associated increase in compensation. More specifically, these senior executives have, in addition to performance-based incentives (i.e. bonus and stock options), promotion-based incentives, such as reaching higher levels in the corporate hierarchy (i.e. becoming CEOs). Although these tournament incentives are likely to enhance firm value (Kale et al. 2009), they may also lead to the window dressing of reported individual performance (Conrads et al. 2014). In this paper, we argue that senior executives' incentives to produce more optimistic assessments of their performance when facing tournament incentives affect the properties

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Paper accepted by Edward Lee

of accounting information. Specifically, we hypothesise and find evidence that tournament incentives within the TMT reduce the degree of conditional conservatism in financial reporting.

Tournament incentives have been proposed as a mechanism of eliciting participants' efforts to achieve specific goals in which senior executives are expected to increase their efforts to improve their chances of promotion (Lazear and Rosen 1981, Prendergast 1999). Becoming the CEO of the firm after a tournament is a credible prize, as the probability of internal succession in US firms between 1993 and 2005 was 71%, with very limited variability among industries (Cremers and Grinstein 2014). Consistent with these findings, the extant papers use the pay gap between the CEO and the rest of the TMT as a measure of tournament incentives and document increased effort (Bognanno 2001, Kale et al. 2009, Ridge et al. 2015; Shen and Zhang, 2018).

However, tournament incentives may result in prioritising individual over firm goals (Becker and Huselid 1992). To increase their chances of promotion when facing tournament incentives, executives are likely to take greater levels of risk (Goel and Thakor 2008, Kini and Williams 2012). There is also evidence that tournament incentives lead to the misreporting of performance (Conrads et al. 2014) and reduced cooperation among participants (Drago and Garvey 1998). Similarly, tournament incentives are associated with higher levels of operations manipulation (Park 2017), more aggressive corporate tax reporting (Kubick and Masli 2016), corporate fraud (Haß et al. 2015), a higher probability of shareholders filing a securities class action suit against the company (Shi et al. 2016) and worse acquisition performance (Hasan et al. 2020).

We build on the existing research by studying the effect of tournament incentives on the properties of financial reporting, specifically conditional conservatism. Accounting conservatism is the asymmetric verification threshold for gains versus losses in which the former is higher (Basu 1997, Khan and Watts 2009). Therefore, conservatism is interpreted as an asymmetry in the way that information about the firm is reported. According to this concept, good news (e.g. revenue) should be recorded only when it is verifiable, but bad news (e.g. write-offs) does not require this level of verification. As the speed of the recognition of bad relative to good news increases, conservatism in reporting increases.

In this study, we hypothesise that tournament incentives are negatively associated with conservative reporting. Tournament participants have lower incentives to recognise bad news more quickly than good news because the faster recognition of bad news decreases their chances of tournament success. As senior executives directly impact corporate decisions such as the allocation of investments, research and development (R&D), production and other activities (Graham et al. 2015), the withholding of bad news is expected to lead to less conservative financial reports. This expectation is consistent with the arguments of Bagwell and Zechner (1993) and Ozbas (2005) that senior executives have incentives to inflate the perception of their relative contributions to the firm. Similarly, recent studies have shown that financial reporting does not necessarily follow a top-down process in which CEOs and chief financial officers (CFOs) make financial reporting decisions in isolation, but it is a team effort, where the TMT plays an important role through its impact on the firm's daily operations (Zhang 2019). Anecdotal evidence seems to support these arguments. Reports by the Committee of Sponsoring Organisations (COSO) of the Treadway Commission (2010) and KPMG (2013) indicate that senior executives are implicated in many cases of financial statement manipulation, with reasons ranging from trying to make the company look better to rivalry among colleagues and the desire to hide bad news.

We investigate this question using data from 1994 to 2019 for a sample of US firms. To measure tournament incentives, we follow prior papers and use the distance between the CEO's total compensation and the median compensation of the rest of the TMT (Bognanno 2001, Kale et al. 2009, Kini and Williams 2012). Our proxy for accounting conservatism is Khan and Watts's (2009) measure of incremental bad news timeliness, i.e. the *C-Score*, which

captures variations in conservatism at the firm level.[1] The empirical results are consistent with our predictions, as we find a negative and statistically significant relationship between tournament incentives and conservatism.

Our results are robust to a battery of tests. A possible argument against our results is that financial reporting decisions and compensation structures are simultaneously determined. We address these endogeneity concerns by using the lagged pay gap and executive compensation variables in all our specifications and perform an alternative test using an instrumental variable (IV) approach. We still find a negative and significant relationship between tournament incentives and conservatism. Moreover, we conduct several robustness checks to mitigate concerns about alternative explanations driving our results, such as CEO incentives, power and entrenchment.

In additional analyses, we explore how the relationship between tournament incentives and conservatism in financial reporting is affected by changes in the perceived probability of tournament success. Lazear and Rosen (1981) and Prendergast (1999) argue that an agent's effort increases with the size of the promotion prize, conditional on the probability of success being equal. Therefore, if tournament incentives are negatively related to accounting conservatism, this association is expected to be less pronounced when a succession contest is less likely to occur, such as when a new CEO joins a firm. We find evidence in support of this argument. Similarly, we find that the negative relationship between tournament incentives and accounting conservatism is particularly pronounced during periods with a high probability of CEO turnover (i.e. firms with high CEO tenures). Finally, we follow Shen and Zhang (2018) and assume that senior executives' ex ante expectations in terms of the probability of promotion are, on average, correct. We find that during the period prior to CEO turnover (i.e. two years before the appointment of a new CEO), the negative relationship between tournament incentives and accounting conservatism is particularly more pronounced when an insider will eventually be appointed as a new CEO.

Our results assume that all senior executives participate in the tournament and affect conservatism in financial reporting. As CFOs have a substantial amount of control over their firms' reported financial results (Geiger and North 2006), we replicate our primary test and focus separately on the tournament incentives of CFO and non-CFO executives to address whether CFO incentives drive our results. After excluding the CFO, we still find a negative and significant relationship between the pay gap of the rest of the TMT and conservative reporting. Taken together, these results support our argument that the incentives of the next layer of executives in the TMT, apart from CEOs and CFOs, influence the properties of financial reports.

Our study contributes to the literature in several dimensions. First, we contribute to the literature investigating the effect of pay disparities among firm executives on corporate outcomes by highlighting a consequence in financial reporting properties associated with the pay gap in the TMT. Several studies have found a positive relationship between tournament incentives and firm outcomes (Kale et al. 2009, Chen et al. 2011, Ridge et al. 2015, Shen and Zhang 2018). However, other studies have shown that tournament incentives can have negative consequences (Becker and Huselid 1992, Conrads et al. 2014). Our results contribute to this literature by showing that tournament incentives affect certain properties of financial reporting, specifically the ability of firms to report bad news in a timely manner. This finding is particularly relevant, as a lower degree of conservatism in financial reporting could harm both lenders and shareholders (Ahmed et al. 2002, Ball and Shivakumar 2005, Zhang 2008).

In a related study, Haß et al. (2015) find evidence that the TMT pay gap encourages corporate fraud, including accounting fraud. However, given the small number of fraud types analysed by these authors, it cannot be inferred whether tournament incentives affect accounting choices

[1]We use alterative measures of tournament incentives and conservatism in our robustness tests (see Section 6).

more broadly. Similarly, Park (2017) documents that the TMT pay gap promotes real activities manipulation. Our paper differs from this study, as we focus on how the tournament incentives of senior executives affect certain properties of financial reporting that are relevant to stakeholders. Overall, our paper provides evidence that tournament incentives affect financial reporting in a more subtle (and general) way than fraud and that senior executives' actions are not limited to real activities manipulation but lead to less bad news timeliness. Therefore, our results challenge the view that internal tournaments would not directly affect financial reporting except through real activities or fraud, complementing the findings of Haß et al. (2015) and Park (2017).

Our paper also contributes to understanding the role of the TMT in the financial reporting process. Prior literature has primarily focused on the effect of CEO performance-based incentives on conservatism (e.g. Ahmed and Dullman 2013). However, studies focusing only on CEOs or CFOs provide a limited understanding of the incentives affecting firm outcomes, as the characteristics and incentives of other TMT executives can also predict organisational outcomes (Hambrick et al. 1996, Abernethy and Wallis 2019; Davidson 2021). In this sense, we provide new evidence showing that the promotion-based incentives of the TMT lead to less conservative reporting. Our findings are in line with the evidence from Zhang (2019), who documents that the personal characteristics of TMT members other than CEOs affect accounting choices. More recently, Davidson (2021) provides evidence that the equity incentives of all members of the TMT may better identify fraudulent firms than may measures focusing on only the firm's CEO or CFO. Therefore, our paper provides evidence consistent with the idea that financial reporting should be viewed as a team decision-making process rather than the product of individual agents' decisions.

Finally, our paper relates to the debate regarding the factors driving conservatism versus optimism in financial reporting. Conservatism is beneficial in financial reporting (Watts 2003, Zhang 2008, Francis and Martin 2010). In addition, policy makers are interested in understanding the drivers of conservatism in financial reporting.[2] Similarly, the Financial Reporting Council's (FRC) Sharman Inquiry stressed the importance of prudence (FRC, Sharman Report 2012), which might explain why the International Accounting Standards Board (IASB) Conceptual Framework reintroduced prudence (IASB 2018, para. 2.16). Our paper could inform this debate by showing an important channel affecting the degree of conservatism in financial reporting.

Overall, our results could enhance the understanding of the financial reporting consequences of pay gaps between the CEO and the rest of the TMT, as regulators believe that the structure of executive compensation is linked to risks of material misstatement in firms' financial statements (PCAOB AS 2110, 2010) and are vocal regarding the mitigation of such disparities in compensation. Some companies' behaviours reflect these trends. For example, Cerner Corporation imposes a cap on the CEO's total cash compensation equal to three times that of the subsequent executive officer. Similarly, DuPont limits the CEO's total compensation with respect to other senior executives.[3]

2. Prior research and hypothesis development

2.1. *Literature review*

The disparity among the CEO's compensation and that of the rest of the firm's TMT has drawn extensive attention from regulators and scholars because these pay gaps are interpreted as tournament incentives in which senior executives are considered contestants competing for the prize of promotion, i.e. becoming the CEO (Lazear and Rosen 1981, Bognanno 2001). Therefore, as

[2]See, for example, '*A return to prudence*', Financial Times, August 29, 2018.
[3]Cerner Corporation's form DEF 14A (2019); DuPont's form DEF 14A (2017).

the pay gap increases between other members of the TMT and the CEO, the reward for succeeding in the tournament increases. Larger prizes for tournaments are associated with higher levels of effort and reduced shirking (Green and Stokey 1983, Becker and Huselid 1992, Main et al. 1993). In line with these arguments, several studies provide evidence that this pay gap is positively related to firm performance (Eriksson 1999, Kale et al. 2009, Ridge et al. 2015). However, other scholars provide evidence of the negative effect of tournament incentives. Higher pay gaps are likely to reduce the commitment to organisational objectives and affect intrafirm collaboration and coordination, as tournament participants are likely to prioritise individual goals over firm goals (Becker and Huselid 1992). Similarly, promotion-based incentives are likely to be associated with lower product quality and lower performance in technology-intensive industries (Cowherd and Levine 1992, Siegel and Hambrick 2005). Additionally, executives are likely to engage in risker projects to increase their likelihood of promotion (Goel and Thakor 2008, Kini and Williams 2012). In line with this, Jia (2018) documents that larger pay gaps between the CEO and the rest of the TMT are significantly and positively associated with the firm's risk of experiencing future stock price crashes. In addition, tournament incentives affect firm operations. Tournament incentives have been shown to be associated with higher levels of real activities management (Park 2017), higher propensity to commit fraud (Haß et al. 2015), and higher chances of facing securities class action lawsuits (Shi et al. 2016). Auditors seem to perceive higher levels of firm risk due to tournament incentives, as they charge higher audit fees to companies with higher tournament-related risks (Jia 2017).

Prior literature has shown that the CEO's compensation structure affects financial reporting decisions (e.g. Healy 1985, Bergstresser and Philippon 2006, Armstrong et al. 2013); however, focusing only on the CEO provides an incomplete view of managerial incentives (Finkelstein 1992, Aggarwal and Samwick 2003, Zhang 2019). In line with this argument, recent studies have provided evidence that the incentives of senior executives, apart from those of the CEO, influence firms' financial reporting properties (Hopkins et al. 2015, Davidson 2021). For example, Jiang et al. (2010) provide evidence that firms' accruals and the likelihood of beating analysts' forecasts are sensitive to CFO equity incentives. We extend this line of research by focusing on the promotion incentives of the subsequent layer of executives, including but not limited to the CFO, and examine their roles in firms' financial reporting.

Senior executives have direct control and influence over the daily operations of the organisation, such as R&D, sales, production and other activities involving the allocation of resources within the organisation (Cheng et al. 2016). Graham et al. (2015) show that only 15% of a sample of surveyed CEOs and CFOs indicate that the chief executive is the sole decision-maker in their firms, indicating that most firms delegate important corporate decisions (including mergers and acquisitions, capital allocation and investments) to the rest of the TMT. However, Watts (2003) argues that senior executives have asymmetric payoffs and limited liability; therefore, they can have rent-seeking tendencies, as they may derive private benefits from the resources they control. In this sense, empirical and theoretical works in economics and finance show that the ability of senior executives to provide vital information for decision-making creates an opportunity for them to influence the discretionary decisions of the top management (Bagwell and Zechner 1993, Stein 2002). This situation leads to rent-seeking problems in which executives may try to exaggerate the perceptions of their relative contributions to their firms (Ozbas 2005, Graham et al. 2015) or efforts (den Nieuwenboer et al. 2017).

Given the concerns about the potential negative effects of tournament incentives derived from the incentives to bias reported executives' performance, we study the links between pay disparities within the TMT and conservatism in financial reporting. Conservatism in financial reporting requires an extra degree of verification when reporting good news relative to bad news (Basu 1997). Conservatism is considered a mechanism for curbing excessive risk-taking

by firm executives and a characteristic of high-quality earnings because conservatism constrains executives' overoptimistic assessments of firm assets, affecting a firm's liquidation value for creditors (Watts 2003). Extensive evidence suggests that conservatism in financial reporting is favoured by creditors, as it reduces the cost of debt (Ahmed et al. 2002) and provides a timely signalling of default risk as manifested by accelerated covenant violations (Zhang 2008). Similarly, shareholders might benefit from conservative reporting. García Lara et al. (2011) find a negative association between conditional conservatism and the cost of equity capital. Francis and Martin (2010) provide evidence that firms with a timelier recognition of economic losses make more profitable acquisitions and liquidate underperforming investments more quickly. Similarly, Bushman et al. (2011) provide evidence that a firm's investment decisions are affected by the application of conservative accounting, especially in contexts of declining investment opportunities.

2.2. *Hypothesis development*

We argue that tournament incentives are likely to reduce the degree of conservatism (i.e. less of a willingness to recognise bad news quickly) in financial reporting. Tournament incentives increase the subject's propensity to be overoptimistic when reporting his or her performance to manipulate how others perceive their skills (Cheng 2011, Charness et al. 2014, Conrads et al. 2014). This evidence provides a foundation for our assumption that senior executives engaging in tournaments for promotion are likely to exert discretion in the timing of the disclosure of information affecting their reported performance and chances of success in the tournament. These actions then impact financial reporting systems, as firms might produce financial reports relying on overoptimistic assumptions (or a less timely disclosure of bad news) made throughout the firm (McNichols and Stubben 2008). A potential argument against this assumption is that financial reporting decisions are the sole domain of the CEO and the CFO. However, although CEOs have the formal authority to make decisions related to operations, senior executives can exert control due to their information advantage (Aghion and Tirole 1997). For example, executives in charge of innovation or production can have more information regarding the value-in-use of intangible assets, the supply of materials and the demand for products. Therefore, these executives play central roles in activities such as inventory valuation or the assessment of investment projects. As management is a shared effort in which the TMT collectively shapes organisational outcomes (Finkelstein 1992), the CEO should consider the preferences of the next layer of executives, thereby affecting financial reporting decisions (Acharya et al. 2011, Cheng et al. 2016). This argument is consistent with evidence from Zhang (2019) that firms' financial reporting is not only a top-down process; the personal characteristics of the non-CEO members of the TMT shape the internal environments and decision-making processes of firms, affecting their accounting quality. In a similar vein, Davidson (2021) documents that the equity incentives of the TMT as a group have better predictive power regarding accounting outcomes than do the incentives of individual executives.

In line with these arguments, anecdotal evidence indicates that senior executives play an important role in the financial reporting process, highlighted by their participation in cases of accounting misstatements. Karpoff et al. (2008) document that a significant proportion of employees culpable in fraud cases on a sample of enforcement actions by the Security and Exchange Commission (SEC) are senior executives. A COSO report on the SEC's Accounting and Auditing Enforcement Releases showed that the chief operating officer and other vice presidents were implicated in approximately 48% of financial statement manipulation cases (COSO 2010). This study concluded that the motivation underlying manipulation was to '*meet internally*

set financial targets or make the company look better'.[4] Similarly, KPMG's (2013) Global Profiles of the Fraudster finds that the typical fraudster is '*mostly employed in an executive, finance, operations or sales/marketing function*' (pp. 2). '*[W]anting to hide bad news*', an '*aggressive sales environment*' and '*internal corporate competition*' were considered fundamental factors affecting the propensity to commit fraud.

Overall, this evidence supports our main hypothesis, which is as follows:

H: Tournament incentives are negatively associated with conservative reporting.

3. Data and variables

The data used in this paper are from three sources. Data on securities returns are obtained from the Centre for Research in Security Prices (CRSP). Firms' financial information is from Compustat, and the executive compensation variable data are from Execucomp. Our sample consists of firm-year observations for US companies that have no missing information for the variables included in the main model. Following prior research on conservatism and financial reporting in general, we exclude companies in the utilities and financial industries (Standard Industry Classification (SIC) 4900–5000 and 6000–6999). All continuous variables are winsorized at the 1st and 99th percentiles. Following the changes in the reporting of executives' compensation due to the passage of Financial Accounting Standard (FAS) 123R in December 2004, the value of executives' total compensation is re-estimated to be comparable across the sample, as in Kini and Williams (2012). Hence, the executive compensation for the 2006–2019 period reported in Execucomp is recalculated to be comparable across the full sample.[5] After these adjustments, our final sample comprises 21,374 observations from the 1994–2019 period.

3.1. *Tournament incentives*

Following previous studies, the main measure we use to capture tournament incentives is the difference, or pay gap, between the CEO's total compensation and the median salary of the rest of the TMT excluding the CEO (*Total Gap)* (Kale et al. 2009, Kini and Williams 2012, Haß et al. 2015, Ridge et al. 2015, Park 2017).

This variable captures the increase in the median senior executive's salary if he or she wins the promotion tournament. The company's CEO is identified in Execucomp using the identifier provided (CEOANN = CEO). Consistent with previous studies (Kini and Williams 2012, Park 2017), we do not include the remuneration of CEOs who remain on the TMT after resigning when estimating the median senior manager compensation and firms for which the pay gap is

[4]Our reading of several SEC Accounting and Auditing Enforcement Releases indicates that senior executives designated as named defendants in Litigation Releases engage in several different activities that are likely aimed at inflating the reported performance. Senior executives are named for the reclassification of expenses as prepaid assets and/or inventories, the accelerated recognition of allowances, the recording of fictitious sales, and the reduction in the cost of sales by improperly recognizing cost savings among other activities. Outside the setting of fraud or accounting misstatements, McNichols and Stubben (2008) cited the case of Oracle Inc., whose aggressive culture and sales force incentives led to an unintendedly aggressive revenue recognition by the firm in the early 1990s.

[5]In Appendix C, we provide a detailed description of the estimation of these variables. The correlation between compensation from 1993–2005 and the recalculated executive compensation for the same time is 96%, ensuring the consistency of the re-estimated data for the 2006–2019 period.

negative.[6] We use all available firms regardless of team size; however, our results are consistent if we limit our sample to organisations in which the compensation of five or more executives is reported.

3.2. *Conservatism*

As a proxy for firm-level conditional conservatism, we use the Khan and Watts (2009) *C-Score* measure. The *C-Score* draws from the Basu (1997) model to estimate a proxy for the differential timeliness of bad over good news. The Khan and Watts (2009) conservatism measure links firm-reported performance with market reactions to available information, including reported performance. If the firm is asymmetric in the recognition of bad relative to good news, accounting earnings should have a more positive association with market returns in bad than in good times. Namely, accounting information should incorporate bad news more quickly (which is also captured by the market if it is semistrongly efficient) than good news.

We provide a detailed discussion of Khan and Watts' (2009) model in Appendix B. We measure conservatism using the *C-Score* in year *t*, following Ettredge et al. (2012) and Jayaraman (2012), who provide evidence that the Khan and Watts (2009) measure captures variation in conservatism at the firm level. Nevertheless, in Section 6, we explore alternative measures of conditional conservatism.

3.3. *Association between tournament incentives and conservatism*

To examine the effect of tournament incentives on financial reporting conservatism, we estimate the following model:

$$Conservatism_{j,t} = \beta_1 Tournament_{j,t-1} + \beta_2 Controls_{j,t} + \varepsilon_t \quad (1)$$

In Equation (1), conservatism is our main firm-level measure of conditional conservatism—the incremental timeliness of bad news over good news C-score from Khan and Watts (2009). *Tournament* is our proxy for tournament incentives (natural log of one plus *Total Gap*), as defined in Section 3.1. Our coefficient of interest is β_1, where a negative and significant coefficient implies that tournament incentives are negatively associated with conditional conservatism. The *Controls* variable in Equation (1) includes variables known to affect conservatism, such as the *MTB* ratio, which captures growth opportunities; *Leverage* (ratio of total debt to total assets), as higher levels of debtholder/shareholder conflicts are likely to increase the demand for conservatism; and *Size* (natural log of sales), as larger firms have lower asymmetric earnings timelines (Khan and Watts 2009). As additional controls, we add the performance measure *ROA* (the ratio of net income to assets) and controls for firm risk, such as *CapEx* (capital expenditure) and *VOL24* (volatility of security returns over the previous 24 months). To control for CEO characteristics, we include the natural logs of CEO age and tenure. In addition, we include the CEOs' and senior executives' delta and vega values as measures for alignment and risk-taking

[6]Kini and Williams (2012) state that in some firms, CEOs who remain senior executives after retiring from their positions as CEOs may continue to receive higher compensation than the current CEOs. Moreover, negative gaps are associated with firms where the CEOs are founders and receive nominal or no compensation. On a set of unreported results, we find evidence that firms with negative total pay gaps exhibit high levels of conservatism in financial reporting. Our results remain qualitatively unchanged if we add these firms to our main tests.

incentives, respectively (Aggarwal and Samwick 2003).[7] We also control for the power of the CEO within the organisation, which is measured as the aggregate distance between the CEO and each senior executive's stock ownership (Ridge et al. 2015). Finally, we include a dummy that indicates whether the firm belongs to an industry with higher levels of litigation, as in Francis et al. (1994). To alleviate endogeneity concerns, the pay gap and other executive compensation controls are lagged one period with respect to the conservatism measure (Kini and Williams 2012, Park 2017). All specifications include industry and year fixed effects (FEs), and errors are clustered at the firm level. A detailed description of the variables used in the paper is provided in Appendix A.

3.4. *Descriptive statistics*

Table 1 presents the descriptive statistics for the variable of interest. All compensation variables are in line with previous studies on the topic. The difference between CEO total compensation and median compensation for the rest of the TMT is approximately USD 4.1 million, which is consistent with the existence of tournament incentives (see Kini and Williams 2012). Regarding firm characteristics, the average (median) firm in our sample has a natural log size of 7.5 (7.4) with an ROA of 4.5% (5.3%) and an MTB ratio of 3.5 (2.4). Return volatility has a mean (median) value of 0.015 (0.010). Additionally, the *C-Score* measure of conservatism has a mean of 0.026, similar to the results reported by Khan and Watts (2009).

4. Main results

4.1. *Multivariate approach*

Table 2 presents our main results. Consistent with our prediction that compensation structures that replicate tournaments have negative consequences on the timeliness of bad news reporting, we document a negative and significant relationship between the pay gap and conditional conservatism. In column 1, we report our first specification without controlling for CEO incentives. The coefficient of interest β_1 in Equation (1) is negative and significant (-0.009, $t = -9.78$). When we add controls for CEO equity incentives, our results remain significant (-0.006, $t = -6.36$). In economic terms, a 1-standard-deviation increase in the pay gap results, on average, in a 9.01% reduction in conservatism relative to the sample mean. The signs of the controls are in line with previous studies, especially those of CEO incentives (e.g. Ahmed and Duellman 2013) and firm characteristics (Khan and Watts 2009). Finally, in column 3, we repeat our analysis after controlling for the median equity incentives of the rest of the TMT.

In unreported analyses, we add a set of controls to test the robustness of our results.[8] Following Khan and Watts (2009), we include controls for firm age, investment cycle, the bid-ask spread and the probability of informed trading. Our results are robust to the inclusion of these extra controls in all specifications. Second, evidence suggests that good corporate governance should increase the demand for accounting conservatism (García Lara et al. 2009). We address this issue by including controls for corporate governance in our models. Specifically, we add the anti-takeover index (the *G-index*) by Gompers et al. (2003) and the entrenchment index (the *E-index*)

[7]Details about the calculation of executives' delta and vega values are provided in Appendix C.
[8]The unreported tests are available upon request from the authors.

Table 1. Descriptive statistics.

Variable	N	Mean	S.D.	Lower Quartile	Median	Upper Quartile
Conservatism Measures						
C-Score	21,374	0.026	0.146	−0.045	0.041	0.122
Managerial Compensation ($000)						
Total Gap	21,374	3,440.449	3,917.221	965.163	2,134.867	4,357.930
CEO Total Comp.	21,374	5,034.602	5,078.356	1,709.012	3,348.683	6,390.986
Other Managerial Incentives						
Total Ratio	21,374	3.179	1.736	2.149	2.784	3.604
Total Slice	21,374	0.406	0.104	0.337	0.397	0.462
CEO Delta	21,374	5.327	1.445	4.389	5.328	6.289
CEO Vega	21,374	3.297	2.121	1.656	3.744	4.927
Control Variables						
Size	21,374	7.474	1.526	6.413	7.411	8.489
MTB	21,374	3.515	3.865	1.559	2.407	3.871
Leverage	21,374	0.225	0.167	0.081	0.219	0.338
ROA	21,374	0.045	0.088	0.021	0.053	0.088
Volatility	21,374	0.015	0.018	0.005	0.010	0.018
CapEx	21,374	0.052	0.050	0.020	0.037	0.066
CEO Age (Years)	21,374	55.946	6.796	51.000	56.000	60.000
CEO Tenure (Years)	21,374	8.282	6.772	3.000	6.000	11.000
CEO Power	21,374	0.976	2.640	0.079	0.211	0.616

Notes for Table 1: S.D. means standard deviation. *C-Score* is a firm-specific measure of the incremental timeliness of bad news proposed by Khan and Watts (2009); *Total Gap* is the difference between the CEO's total compensation and the median compensation of the rest of the firm's senior executives; CEO Total Comp. is the CEO's total compensation; *Total Ratio* is the ratio of the CEO's total compensation to the median total compensation of other senior executives; *Total Slice* is the fraction of the aggregate total compensation of the senior executives paid to the CEO; *CEO Delta* is the natural log of one plus the sum of the delta of the CEO's stock options and holdings; *CEO Vega* is the natural log of one plus the vega of the CEO's option holdings; *Size* is the natural log of total sales; *MTB* is the market value of a firm's equity divided by its book value; *Leverage* is the total firm debt divided by its total assets; *ROA* is the firm's earnings before interest and taxes divided by its total assets; *Volatility* is the volatility of the firm's stock over the previous 24 months; *CapEx* is the firm's capital expenditures divided by its total assets; *CEO Age* is the CEO's age; *CEO Tenure* is the CEO's tenure; and *CEO Power* is the aggregate distance between the CEO and each senior manager in terms of ownership, computed as the square root of the average squared difference between the CEO's ownership and that of each executive, divided by 1,000, where ownership includes all shares owned, excluding options (Ridge et al., 2015).

by Bebchuk et al. (2009) to our tests. The results are robust to the inclusion of these controls for corporate governance.[9]

4.2. *Endogeneity*

While it is unlikely that a firm determines its pay gap as a direct function of its financial reporting conservatism, a potential concern about our results is that conservatism and compensation structures could be determined simultaneously; therefore, it is challenging to establish a causal relationship between managerial incentives and financial reporting decisions. We have attempted to address these concerns in our baseline specification by using lagged tournament and executive

[9]We also study the role of audit fees, as Jia (2017) documents that tournaments are likely to increase them. We include audit fees as an extra control in our main specification and analyse their moderating effects on the relationship between tournaments and conservatism. We do not find evidence that audit fees affect our baseline results.

Table 2. Tournament incentives and conditional conservatism Dependent variable: C-Score

	(1) C-Score	(2) C-Score	(3) C-Score
Total Gap	−0.009***	−0.006***	−0.006***
	(−9.78)	(−6.36)	(−5.97)
CEO Delta		−0.012***	−0.008***
		(−13.18)	(−7.62)
CEO Vega		0.000	0.001
		(0.84)	(1.02)
SM Delta			−0.009***
			(−7.42)
SM Vega			0.000
			(0.28)
Size	−0.040***	−0.037***	−0.035***
	(−44.92)	(−40.08)	(−36.87)
MTB	−0.008***	−0.007***	−0.007***
	(−20.26)	(−19.35)	(−18.68)
Leverage	0.054***	0.049***	0.047***
	(8.01)	(7.47)	(7.13)
ROA	−0.071***	−0.054***	−0.047***
	(−5.57)	(−4.32)	(−3.83)
Volatility	0.166***	0.086	0.081
	(2.82)	(1.49)	(1.41)
CapEx	−0.036*	−0.011	−0.001
	(−1.72)	(−0.54)	(−0.05)
CEO Age	0.030***	0.027***	0.024***
	(3.80)	(3.56)	(3.21)
CEO Tenure	−0.003***	0.003**	0.002*
	(−2.65)	(2.23)	(1.86)
CEO Power	−0.000	0.002***	0.001***
	(−1.20)	(4.55)	(3.19)
Litigation	0.001	0.002	0.003
	(0.21)	(0.51)	(0.64)
Industry FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Observations	21,374	21,374	21,374
Adjusted R^2	0.593	0.599	0.601

Notes for Table 2: The dependent variable is *C-Score*, which is a firm-specific measure of the incremental timeliness of bad news, as proposed by Khan and Watts (2009); *Total Gap* is the natural log of one plus the difference between the CEO's total compensation and the median compensation of the rest of the firm's senior executives; *CEO Delta* is the natural log of one plus the sum of the delta of the CEO's stock options and holdings; *CEO Vega* is the natural log of one plus the vega of the CEO's option holdings; *SM Delta* is the natural log of one plus the sum of the delta of the median senior manager's stock options and holdings; *SM Vega* is the natural log of one plus the vega of the median senior manager's option holdings; *Size* is the natural log of total sales; *MTB* is the market value of a firm's equity divided by its book value; *Leverage* is the total firm debt divided by its total assets; *ROA* is the firm's earnings before interest and taxes divided by its total assets; *Volatility* is the volatility of the firm's stock over the previous 24 months; *CapEx* is the firm's capital expenditures divided by its total assets; *CEO Age* is the natural log of the CEO's age; *CEO Tenure* is the natural log of the CEO's tenure; *CEO Power* is the aggregate distance between the CEO and each senior manager in terms of ownership, computed as the square root of the average squared difference between the CEO's ownership and that of each executive, divided by 1,000, where ownership includes all shares owned, excluding options (Ridge et al., 2015); and *Litigation* is a dummy variable equal to one if the firm belongs to an industry with high litigation levels (Francis et al. 1994). Errors are clustered at the firm level, and the t-statistics are reported beneath the coefficients in parentheses. Significance is denoted as *** $p < 0.01$, ** $p < 0.05$, and * $p < 0.1$.

compensation variables and including FEs that control for the time-series and the cross-sectional invariant characteristics of the industries in our sample.

We further address these issues using an IV approach. Following previous studies, we use as instruments the industry median value for the tournament gap and the industry standard deviation of the total gap (Kubick and Masli 2016, Jia 2017, Park 2017) since the level and structure of managerial compensation vary by industry (Murphy 1999). At the same time, it is unlikely that these industry compensation variables influence firm-level reporting decisions. Therefore, our exclusion restriction is that industry-wide compensation practices shape firm-level executive compensation but are unlikely to affect the decision to apply conditional conservatism to financial reporting at the firm level. We also include as an instrument the number of senior executives in the firm, as Kale et al. (2009) show that the size of the compensation gap is positively associated with the number of participants, as the tournament must compensate for the lower probability of success given the higher number of tournament participants. However, the number of senior executives is unlikely to affect financial reporting decisions. Finally, we consider the case in which all the incentive variables, including the CEO delta and vega, are endogenous and instrument these variables with their industry median counterparts, as in Kini and Williams (2012).

Table 3 presents the results of estimating the two-stage least squares (2SLS) specification with the log of tournament incentives as a dependent variable in the first stage. In the first column of panel A, we report the results of the baseline model in which we instrument only for the pay gap. In column 3 of panel A, we include controls for executive compensation. Finally, in panel B of Table 3, we assume that all the compensation variables are endogenous, and we instrument them at the first stage. The relationship between our proxy for tournament incentives—the pay gap—and conservatism, which is reported in the first column of panel B, remains negative and significant across all specifications. We interpret these results as further evidence that tournament incentives drive the decision to report less conservatively. However, we cannot entirely rule out endogeneity concerns, irrespective of whether our instruments are individually relevant, and our model specification is adequate.[10] Readers should exercise caution when interpreting our results from the IV approach, as our instruments rely on the assumption that firm financial reporting characteristics are orthogonal to those of the industry. This issue is common in accounting research (Ittner and Larcker 2001, Larcker and Rusticus 2010) and cannot be fully ruled out.

5. Cross-sectional analysis

Our analyses in the previous sections are silent on the perceived probability of success in the tournament and how it might affect the relation between tournament incentives and conservatism in financial reporting. The intuition is that the effect of the pay gap on conditional conservatism is expected to be accentuated (attenuated) by mechanisms that increase (reduce) the probability of success. We explore three scenarios in which tournament participants may perceive changes in the probability of success, making them likely to modify their behaviour in relation to our variables of interest.

In the first scenario, the CEO is newly appointed; that is, it is a test of whether *ex post* tournament incentives are still in place after a new CEO is appointed. In this context, we assume that

[10]The significance and signs of our instruments are consistent with our arguments, and the Hansen J-statistic indicates that the instruments are valid, although weakly for column one. Similarly, the F statistics of each endogenous variable, the Anderson-Rubin F statistics and the differences in the Hausman test are significant, implying that our instruments and model specification are statistically adequate

Table 3. Tournament incentives and conditional conservatism IV approach.

Panel A: Estimation type using IV (2SLS)

	(1) C-Score	(2) *First Stage* Total Gap	(3) C-Score	(4) *First Stage* Total Gap
Total Gap	−0.018***		−0.012**	
	(−3.54)		(−2.22)	
CEO Delta			−0.011***	0.151***
			(−8.71)	(13.66)
CEO Vega			0.001	0.025***
			(1.09)	(4.04)
Industry Total Gap		0.493***		0.442***
		(18.30)		(16.75)
#Senior Executives		0.078***		0.078***
		(6.66)		(7.04)
Size	−0.036***	0.444***	−0.034***	0.364***
	(−14.48)	(50.03)	(−15.36)	(37.34)
MTB	−0.007***	0.019***	−0.007***	0.013***
	(−19.43)	(7.98)	(−19.02)	(5.38)
Leverage	0.055***	0.079	0.050***	0.139*
	(8.10)	(1.07)	(7.49)	(1.95)
ROA	−0.072***	−0.196*	−0.056***	−0.365***
	(−5.71)	(−1.81)	(−4.46)	(−3.53)
Volatility	0.188***	1.628***	0.110*	2.973***
	(3.13)	(2.80)	(1.78)	(5.35)
CapEx	−0.035*	0.110	−0.013	−0.173
	(−1.71)	(0.43)	(−0.61)	(−0.70)
CEO Age	0.030***	−0.017	0.028***	0.031
	(3.82)	(−0.16)	(3.62)	(0.31)
CEO Tenure	−0.003**	0.041***	0.002**	−0.033**
	(−2.30)	(3.04)	(1.96)	(−2.52)
CEO Power	−0.000	−0.004	0.002***	−0.030***
	(−1.27)	(−0.86)	(3.77)	(−5.62)
Litigation	0.002	0.121**	0.003	0.092
	(0.45)	(2.01)	(0.64)	(1.58)
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	21,374	21,374	21,374	21,374
Adjusted R^2	0.372	0.475	0.385	0.499
Hansen J-Statistic	0.69		0.03	
P Value	(0.407)		(0.853)	
Anderson-Rubin Wald F-Statistics	6.85***		2.53*	
P Value	(0.001)		(0.080)	
Hausman Exogeneity Test	3.06*		1.28	
P Value	(0.080)		(0.258)	
First-Stage F-Statistics		187.47***		162.37***
Prob > F		(0.000)		(0.000)

(Continued)

Table 3. Continued

Panel B: Estimation type using IV (2SLS)

	(1) C-Score	(2) *First Stage* Total Gap	(3) *First Stage* CEO Delta	(4) *First Stage* CEO Vega
Total Gap	−0.012**			
	(−2.13)			
CEO Delta	−0.013**			
	(−2.53)			
CEO Vega	0.002			
	(0.69)			
Industry Total Gap		0.513***	0.058	−0.021
		(18.47)	(1.51)	(−0.30)
#Senior Executives		0.077***	−0.010	0.068***
		(6.64)	(−0.68)	(2.77)
Industry CEO Delta		−0.015	0.434***	−0.091*
		(−0.68)	(14.61)	(−1.65)
Industry CEO Vega		−0.021**	0.030**	0.444***
		(−1.97)	(2.05)	(14.69)
Size	−0.035***	0.444***	0.424***	0.569***
	(−11.89)	(50.05)	(38.25)	(29.05)
MTB	−0.007***	0.019***	0.039***	0.009
	(−17.02)	(7.98)	(10.87)	(1.40)
Leverage	0.049***	0.084	−0.409***	−0.055
	(6.91)	(1.13)	(−4.50)	(−0.31)
ROA	−0.053***	−0.193*	1.202***	−0.828***
	(−3.72)	(−1.78)	(8.33)	(−3.86)
Volatility	0.120	1.555***	−6.107***	−12.235***
	(1.49)	(2.67)	(−8.77)	(−11.18)
CapEx	−0.008	0.106	1.945***	−0.791
	(−0.34)	(0.41)	(6.31)	(−1.51)
CEO Age	0.028***	−0.020	−0.203*	−0.531**
	(3.58)	(−0.19)	(−1.70)	(−2.55)
CEO Tenure	0.003	0.042***	0.447***	0.240***
	(1.03)	(3.07)	(28.37)	(9.12)
CEO Power	0.002*	−0.004	0.173***	−0.018
	(1.95)	(−0.87)	(27.52)	(−1.61)
Litigation	0.002	0.119**	0.169***	0.288**
	(0.57)	(1.99)	(2.79)	(2.28)
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	21,374	21,374	21,374	21,374
Adjusted R^2	0.384	0.475	0.541	0.330

(Continued)

Table 3. Continued

Panel B: Estimation type using IV (2SLS)

	(1) C-Score	(2) *First Stage* Total Gap	(3) *First Stage* CEO Delta	(4) *First Stage* CEO Vega
Hansen J-Statistic	0.002			
P Value	(0.967)			
Anderson Rubin Wald F Statistics	4.87***			
P Value	(0.001)			
Hausman Exogeneity Test	1.705			
P Value	(0.6359)			
First-Stage F-Statistics		100.48***	79.02***	57.17***
Prob > F		(0.000)	(0.000)	(0.000)

Notes for Table 3: Panel A presents the IV estimations in which the total pay gap is assumed to be an endogenous regressor; Panel B presents the IV estimations assuming that the total pay gap, delta and vega are endogenous. The dependent variable is *C-Score,* which is a firm-specific measure of the incremental timeliness of bad news, as proposed by Khan and Watts (2009); *Total Gap* is the natural log of one plus the difference between the CEO's total compensation and the median compensation of the rest of the firm's senior executives; *CEO Delta* is the natural log of one plus the sum of the delta of the CEO's stock options and holdings; *CEO Vega* is the natural log of one plus the vega of the CEO's option holdings; *Industry Total Gap* is the median industry gap, measured yearly at the two-digit SIC level; *#Senior Executives* is the number of the firm's senior executives, excluding the CEO; and *Industry CEO Delta* and *Vega* are the yearly median values of the CEO's delta and vega, respectively, measured at the two-digit SIC level. The following controls are included: *Size* is the natural log of total sales; *MTB* is the market value of a firm's equity divided by its book value; *Leverage* is the total firm debt divided by its total assets; *ROA* is the firm's earnings before interest and taxes divided by its total assets; *Volatility* is the volatility of the firm's stock over the previous 24 months; *CapEx* is the firm's capital expenditures divided by its total assets; *CEO Age* is the natural log of the CEO's age; *CEO Tenure* is the natural log of the CEO's tenure; *CEO Power* is the aggregate distance between the CEO and each executive and each senior manager in terms of ownership, computed as the square root of the average squared difference between the CEO's ownership and the each executive's ownership, divided by 1,000, where ownership includes all shares owned, excluding options (Ridge et al., 2015); and *Litigation* is a dummy variable equal to one if the firm belongs to an industry with high litigation levels (Francis et al. 1994). The significance of the instruments is with respect to the variables that they instrument on in the first-stage estimation. Errors are clustered at the firm level, and the t-statistics are reported beneath the coefficients in parentheses. Significance is denoted as *** $p < 0.01$, ** $p < 0.05$, and * $p < 0.1$.

incentives to engage in the new tournament are *reduced* because the turnover of the recently hired CEO is unlikely. Our second scenario explores a situation in which the perception of the probability of success is *increased* due to the closeness to CEO turnover. In particular, we explore the effect of CEO tenure on the relationship between tournament incentives and accounting conservatism. We expect that as the tenure of the CEO increases, the probability of replacing the CEO is higher, leading to a stronger effect of the tournament incentives on the firm's conservative reporting. Although CEO tenure has been shown to affect the properties of financial reporting (Cassell et al. 2013, Ali and Zhang 2015), our focus is on the incremental effect of senior executives' promotion incentives on conservatism when a CEO is close to retirement. Therefore, our variable of interest is the *interaction* between the pay gap and CEO tenure.

In our third scenario, we analyse whether the negative relationship between tournament incentives and accounting conservatism varies with the *ex ante* expectation of senior executives about the outcome of the tournament. Namely, if the other TMT executives expect that the board and major shareholders are likely to appoint an outside CEO, then this expectation will have a negative effect on the perceived probability of promotion; therefore, tournament incentives should become weaker. Following Shen and Zhang (2018), we assume that the TMT's ex ante expectations regarding CEO succession are, on average, correct. We hand-collect information

Table 4. Tournament incentives and conditional conservatism Cross-sectional analysis.

	(1) C-Score	(2) C-Score	(3) C-Score	(4) C-Score
Total Gap	−0.007***	−0.002	−0.001	−0.015***
	(−6.71)	(−1.36)	(−0.40)	(−3.64)
New CEO	−0.027**			
	(−2.26)			
Total Gap × New CEO	0.004**			
	(2.44)			
Total Gap × CEO Tenure		−0.002**		
		(−2.38)		
Appointing Insider			0.067**	−0.010
			(2.22)	(−0.37)
Total Gap × Appointing Insider			−0.010***	0.000
			(−2.58)	(0.10)
Appointing Outsider				−0.066***
				(−4.00)
Total Gap ×Appointing Outsider				0.009***
				(4.38)
CEO Tenure	0.003**	0.017***	0.005**	0.003**
	(2.15)	(2.78)	(2.00)	(2.43)
CEO Delta	−0.012***	−0.013***	−0.016***	−0.012***
	(−13.23)	(−13.28)	(−6.65)	(−13.22)
CEO Vega	0.001	0.001	0.001	0.000
	(0.94)	(0.95)	(0.63)	(0.90)
Size	−0.037***	−0.037***	−0.037***	−0.036***
	(−40.11)	(−40.17)	(−18.50)	(−39.55)
MTB	−0.007***	−0.007***	−0.007***	−0.007***
	(−19.36)	(−19.34)	(−8.46)	(−19.34)
Leverage	0.049***	0.049***	0.042***	0.048***
	(7.49)	(7.51)	(2.89)	(7.36)
ROA	−0.054***	−0.053***	−0.111***	−0.054***
	(−4.30)	(−4.29)	(−4.10)	(−4.36)
Volatility	0.088	0.086	0.149	0.087
	(1.51)	(1.48)	(0.96)	(1.49)
CapEx	−0.012	−0.011	0.038	−0.010
	(−0.57)	(−0.55)	(0.79)	(−0.48)
CEO Age	0.027***	0.028***	0.027	0.029***
	(3.54)	(3.58)	(1.50)	(3.64)
CEO Power	0.002***	0.002***	0.003***	0.002***
	(4.52)	(4.67)	(3.52)	(4.41)
Litigation	0.002	0.002	0.006	0.002
	(0.50)	(0.49)	(0.52)	(0.56)
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	21,374	21,374	3,636	21,374
Adjusted R^2	0.599	0.599	0.645	0.600

Notes for Table 4: The dependent variable is *C-Score,* which is a firm-specific measure of the incremental timeliness of bad news, as proposed by Khan and Watts (2009); *Total Gap* is the natural log of one plus the difference between the CEO's total compensation and the median compensation of the rest of the firm's senior executives; *New CEO* is a dummy variable equal to one if the CEO's tenure is less than 4 years; *CEO Tenure* is the natural log of the CEO's tenure; and *Appointing Insider (Outsider)* is a dummy variable that assumes a value of one if an inside (outside) CEO will be appointed in the subsequent three years, and zero otherwise. The following controls are included: *CEO Delta* is the natural log of one plus the sum of the delta of the CEO's stock options and holdings; *CEO Vega* is the natural log of one plus the vega of the CEO's option holdings; *Size* is the natural log of total sales; *MTB* is the market value of a firm's equity divided by its book value; *Leverage* is the total firm debt divided by its total assets; *ROA* is the firm's earnings before interest and taxes divided by its total assets; *Volatility* is the volatility of the firm's stock over the previous 24 months; *CapEx* is the firm's capital expenditures divided by its total assets; *CEO Age* is the natural log of the CEO's age; *CEO Power* is the aggregate distance between the CEO and each senior manager in terms of ownership, computed as the square root of the average squared difference between the CEO's ownership and that of each executive, divided by 1,000, where ownership includes all shares owned, excluding options (Ridge et al., 2015); and *Litigation* is a dummy variable equal to one if the firm belongs to an industry with high litigation levels (Francis et al. 1994). Errors are clustered at the firm level, and the t-statistics are reported beneath the coefficients in parentheses. Significance is denoted as *** $p < 0.01$, ** $p < 0.05$, and * $p < 0.1$.

about whether a newly appointed CEO will be an insider (*Appointing Insider*) or an outsider (*Appointing Outsider*). Then, for a given firm in year *t*, *Appointing Insider (Appointing Outsider)* is an indicator that equals one, showing whether an insider (outsider) will be appointed to the CEO position in year *t+1* or year *t+2* and is zero otherwise. We expect that if senior executives predict that the future CEO will be an insider (dummy variable *Appointing Insider* equals 1), then the effects of tournament incentives on conservatism should be more negative.

Our results for these different scenarios are presented in Table 4. The first column presents the scenario in which the likelihood of promotion is reduced, namely, a CEO is newly hired. We define a new CEO as a CEO with less than 4 years in the position. Consistent with our assumption that the probability of promotion has a complementary effect on the actions of senior executives, we document that the interaction term *Total Gap* × *New CEO* is positive and significant, which implies that the effect of tournament incentives on conservatism is lower when a new CEO is in office.[11] Conversely, when we study situations in which the perceived chances of promotion are higher, we document a significant reduction in the level of conservatism, conditional on the tournament incentives. Column 2 presents the interaction between tournament incentives and tenure. Consistent with the argument that an increase in CEO tenure increases the likelihood of CEO replacement, we document a negative and significant coefficient for the interaction between *CEO Tenure* × *Total Gap.*[12] Finally, columns 3 and 4 present the interactions between tournament incentives and senior executives' expectations that the future CEO will be appointed from outside or inside the company, as in Shen and Zhang (2018). Consistent with the argument that the TMT correctly assesses the likelihood of an internal CEO appointment, we find that the coefficient of *Appointing Insider* × *Total Gap* is negative and statistically significant. This result implies that the effect of tournament incentives on accounting conservatism is more pronounced when an inside CEO is likely to be appointed during the period prior to CEO turnover. Overall, these results provide evidence that both the size of the tournament and the perceived probability of tournament success affect financial reporting decisions. Similarly, we interpret these results as evidence in further support of our hypothesis that senior executives' promotion incentives influence financial reporting.

6. Robustness tests

6.1. *Alternative measures of conservatism*

To further test the robustness of our results, we re-estimate our main test using alternative measures of conditional conservatism. Our first alternative measure is the incremental timeliness of earnings to a bad news over good news coefficient from the Basu (1997) model. Basu (1997) uses stock returns as a proxy for how markets process firm news; therefore, the stock returns can be interpreted as the arrival of news, where positive (negative) returns are associated with good (bad) news. Under conservative reporting, firms should report earnings incorporating bad news faster than good news; therefore, the relationship between negative earnings and negative stock returns should be stronger for conservative firms.[13] Under our hypothesis, firms with higher

[11]The average CEO tenure in our sample is 8 years, and approximately 25% of our sample has a tenure equal to or less than 4 years. In a set of unreported results, we document that the effect of a *New CEO* in reducing tournament incentives is partially mitigated if the *New CEO* is internally rather than externally hired.
[12]We also find a negative and statistically significant relationship between the tournament incentives interacted with a dummy variable capturing the two-year period before CEO turnover and conservatism. This test is available upon request.
[13]We provide a detailed discussion of Basu's (1997) model in Appendix B.

Table 5. Alternative measures of conservatism Basu's (1997) model.

	(1)	(2)
Ret	−0.037	−0.045
	(−1.17)	(−1.44)
Neg	−0.002	−0.009
	(−0.10)	(−0.47)
Ret × *Neg*	0.401***	0.405***
	(5.15)	(5.29)
Total Gap	0.007***	−0.003*
	(4.74)	(−1.71)
Ret × *Total Gap*	0.006	0.008**
	(1.44)	(2.00)
Neg × *Total Gap*	0.001	0.002
	(0.54)	(0.97)
Ret × *Neg* × *Total Gap*	−0.021**	−0.025**
	(−2.10)	(−2.52)
Controls	No	Yes
Industry FE	Yes	Yes
Year FE	Yes	Yes
Observations	21,374	21,374
Adjusted R^2	0.134	0.155

Notes for Table 5: The dependent variable is *firm earnings*, *Ret* is the monthly compounded return of the firm's stock over the fiscal year, *Neg* is a dummy variable equal to one if *Ret* is less than zero, and *Total Gap* is the natural log of one plus the difference between the CEO's total compensation and the median compensation of the rest of the firm's senior executives. The following controls are included: *Size* is the natural log of total sales; *MTB* is the market value of the firm's equity divided by its book value; and *Leverage* is the total firm debt divided by its total assets. Errors are clustered at the firm level, and the t-statistics are reported beneath the coefficients in parentheses. Significance is denoted as *** $p < 0.01$, ** $p < 0.05$, and * $p < 0.1$.

levels of tournament incentives should be less likely to report conservatively. Therefore, the coefficient capturing the interaction between Basu's measure of incremental timeliness for bad over good news and the pay gap *(Ret × Neg × PayGap)* should be negative and significant. Table 5 presents the results of our models using the baseline model—column 1—and the model including controls for size, MTB and leverage and their interactions with Basu's (1997) model variables *Ret*, *Neg* and *Ret* × *Neg*. Consistent with our previous results, firms with compensation structures for senior management that mimic tournament incentives are less likely to report conservatively.

In a second set of unreported analyses, we use different firm-level measures of conservatism. First, we re-estimate Khan and Watts' (2009) model by adjusting it for the bias from cash flow asymmetries, as in Collins et al. (2014). Specifically, we replace the C-Score estimation earnings for accruals, defined as earnings minus operating cash flows, as in Hsu et al. (2017). We define this variable as *Adj C-Score*. Second, we estimate a firm-level measure of conservatism following Callen et al. (2010), i.e. *CSH Cons*, which is defined as the ratio of current earnings shocks to earnings news. In this measure, earnings shocks and news are estimated based on a VAR model with three variables consisting of the log of stock returns, the log of 1 plus returns on equity and the log of the MTB ratio. Finally, we construct average deciles for firms on the three different firm-level measures (C-Score, Adj C-Score and CSH Cons), i.e. *Dec Cons*. The advantage of using the decile approach is that it provides a better assessment of the firm's

Table 6. Alternative measures of tournament incentives and conditional conservatism.

	(1) C-Score	(2) C-Score	(3) C-Score	(4) C-Score
Total Mean Gap	−0.007***			
	(−8.49)			
Total Gap (top 5)		−0.009***		
		(−9.33)		
Total Ratio			−0.001**	
			(−2.54)	
Total Slice				−0.014*
				(−1.87)
Size	−0.041***	−0.040***	−0.045***	−0.045***
	(−47.46)	(−44.32)	(−56.70)	(−56.84)
MTB	−0.008***	−0.008***	−0.008***	−0.008***
	(−20.39)	(−19.93)	(−20.62)	(−20.61)
Leverage	0.054***	0.056***	0.054***	0.054***
	(7.93)	(8.13)	(7.87)	(7.84)
ROA	−0.070***	−0.069***	−0.069***	−0.068***
	(−5.49)	(−5.26)	(−5.37)	(−5.34)
Volatility	0.161***	0.181***	0.146**	0.143**
	(2.71)	(3.02)	(2.44)	(2.39)
CapEx	−0.036*	−0.041*	−0.038*	−0.038*
	(−1.69)	(−1.91)	(−1.75)	(−1.75)
CEO Age	0.030***	0.030***	0.030***	0.030***
	(3.78)	(3.73)	(3.76)	(3.74)
CEO Tenure	−0.003***	−0.003**	−0.003***	−0.003***
	(−2.63)	(−2.53)	(−2.91)	(−2.82)
CEO Power	−0.000	−0.000	−0.000	−0.000
	(−1.20)	(−1.30)	(−1.07)	(−1.14)
Litigation	0.001	0.002	−0.000	−0.000
	(0.14)	(0.34)	(−0.02)	(−0.02)
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	21,374	20,761	21,374	21,374
Adjusted R^2	0.592	0.594	0.590	0.590

Notes for Table 6: The dependent variable is *C-Score,* which is a firm-specific measure of the incremental timeliness of bad news, as proposed by Khan and Watts (2009); *Total Ratio* is the ratio of the CEO's total compensation to the median total compensation of other senior executives; *Total Slice* is the fraction of the aggregate total compensation of the senior executives paid to the CEO; *CEO Delta* is the natural log of one plus the sum of the delta of the CEO's stock options and holdings; *CEO Vega* is the natural log of one plus the vega of the CEO's option holdings; *Size* is the natural log of total sales; *MTB* is the market value of equity divided by its book value; *Leverage* is the total firm debt divided by its total assets; *ROA* is the firm's earnings before interest and taxes divided by its total assets; *Volatility* is the volatility of the firm's stock over the previous 24 months; *CapEx* is the firm's capital expenditures divided by its total assets; *CEO Age* is the natural log of the CEO's age; *CEO Tenure* is the natural log of the CEO's tenure; *CEO Power* is the aggregate distance between the CEO and each senior manager in terms of ownership, computed as the square root of the average squared difference between the CEO's ownership and that of each executive, divided by 1,000, where ownership includes all shares owned, excluding options (Ridge et al., 2015); and *Litigation* is a dummy variable equal to one if the firm belongs to an industry with high litigation levels (Francis et al. 1994). Errors are clustered at the firm level, and the t-statistics are reported beneath the coefficients in parentheses. Significance is denoted as *** $p < 0.01$, ** $p < 0.05$, and * $p < 0.1$.

level of conservatism and reduces concern about measurement errors and nonlinearities (García Lara et al. 2016). Consistent with our previous results, the *Adj C-Score* and the *Dec Cons* measures are negative and significantly associated with our pay gap measure. We also find a negative relationship for the CSH Cons measure, although it is not significant at standard levels.

6.2. *Alternative measure of tournament incentives*

Our next set of robustness tests focuses on alternative proxies for tournament incentives. First, instead of focusing on the median executive, we use the difference in pay between the CEO and the mean of the senior executives' compensation. We find significant results for the gap between the CEO and the mean pay at the level of 1% in Table 6, column 1. Second, we focus on the top five executives and find a significant coefficient for the gap between the CEO and the rest of the TMT (Table 6, column 2).

A potential issue with the pay gap is that it is largely affected by firm size. In addition to controlling for firm size, we follow previous studies and employ two alternative measures for the gap that capture CEO compensation relative to that of other executives (Bebchuk et al. 2011, Burns et al. 2017). The first alternative proxy is the ratio of the CEO's compensation to the senior executives' median compensation (*Pay Ratio,* Table 6, column 3) (Kale et al. 2009, Park 2017). We find that *Pay Ratio* has a negative and significant coefficient of −0.001 (t stat −2.54). Second, we estimate the fraction of the aggregate compensation of the TMT paid to the CEO (*Pay Slice,* Table 6, column 4) (Bebchuk et al. 2011). This measure captures the portion of the total compensation paid to all members of the TMT that is paid to the CEO, and although it has been proposed as a mechanism to capture the relative importance of the CEO and his or her ability to extract rents, it also captures the potential benefits and perks that can be obtained by senior executives through promotion. Similar to our previous findings, *Pay Slice* has a negative and significant coefficient of −0.014 (t-stat −1.87). Although our proposed metrics arguably capture different dimensions of tournament incentives, all of them show a significant and negative relationship with conservatism in financial reporting. To the extent that some of these measures capture tournament incentives with some noise, they should work against us finding significant and consistent results.

6.3. *CEO Power*

A potential argument contradicting our hypothesis is that pay disparities among firms' senior executives capture other dimensions of corporate governance, such as CEO power. For example, Bebchuk et al. (2011) argue that a CEO's ability to capture a higher proportion of the total compensation paid to the whole management team (*Pay Slice*) is correlated with his or her importance and ability to extract rents from the firm. Therefore, we follow previous literature (Haß et al. 2015, Park 2017) and perform several tests to reduce the concern that this factor drives our main results. First, all our specifications include controls for CEO alignment and risk-taking incentives to mitigate concerns that the pay gap captures executives' different levels of risk exposure. Similarly, all our specifications include controls for CEO power measured as CEO share ownership. Second, in a set of unreported results, we use as alternative proxies for CEO power a CEO-chairman duality dummy and CEO entrenchment measured by the *E-index* (Bebchuk et al. 2009); our results remain qualitatively unchanged. Similarly, we find that our results are robust to the inclusion of CEO-firm FEs that capture the time-invariant characteristics of CEOs and their management styles. Finally, in the cross-sectional analyses, we focus on the effect of senior executives' perceived chances of tournament success. These results can partially mitigate concerns that our findings are driven by CEOs' preferences instead of tournament incentives, as conservatism seems to be affected only when the likelihood of promotion is high (or low). Overall, although our controls cannot perfectly capture CEO power or other CEO incentives, our results are robust to the different proxies commonly used in the literature to capture these phenomena.

Table 7. Tournament incentives for CFOs and other senior executives.

	(1) C-Score	(2) C-Score	(3) C-Score	(4) C-Score
Pay Gap CEO-CFO	−0.004*	−0.002	−0.001	−0.000
	(−1.73)	(−0.72)	(−0.33)	(−0.19)
Pay Gap CEO-non-CFO	−0.006**	−0.005**	−0.005**	−0.005***
	(−2.54)	(−2.21)	(−2.45)	(−2.61)
CEO Delta		−0.013***	−0.009***	−0.008***
		(−12.39)	(−7.89)	(−7.03)
CEO Vega		0.000	0.001*	0.001
		(0.58)	(1.69)	(1.16)
CFO Delta			−0.002***	
			(−3.07)	
CFO Vega			−0.000	
			(−0.43)	
Non-CFO Delta			−0.006***	
			(−5.92)	
Non-CFO Vega			0.000	
			(0.96)	
SM Delta				−0.010***
				(−7.27)
SM Vega				0.000
				(0.01)
Size	−0.042***	−0.038***	−0.037***	−0.036***
	(−43.14)	(−38.40)	(−35.87)	(−35.59)
MTB	−0.008***	−0.007***	−0.007***	−0.007***
	(−19.81)	(−18.90)	(−18.35)	(−18.25)
Leverage	0.053***	0.048***	0.046***	0.045***
	(7.18)	(6.67)	(6.45)	(6.31)
ROA	−0.064***	−0.048***	−0.041***	−0.040***
	(−4.68)	(−3.56)	(−3.12)	(−3.05)
Volatility	0.195***	0.105*	0.093	0.095
	(3.12)	(1.71)	(1.53)	(1.56)
CapEx	−0.037	−0.012	−0.004	−0.004
	(−1.62)	(−0.55)	(−0.18)	(−0.16)
CEO Age	0.024***	0.023***	0.020**	0.020**
	(2.84)	(2.71)	(2.42)	(2.43)
CEO Tenure	−0.002**	0.003***	0.003**	0.003**
	(−2.02)	(2.67)	(2.33)	(2.27)
CEO Power	−0.000	0.002***	0.001***	0.001***
	(−0.70)	(4.36)	(3.33)	(3.06)
Litigation	0.000	0.001	0.002	0.002
	(0.10)	(0.32)	(0.38)	(0.40)
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	18,845	18,845	18,845	18,845
Adjusted R^2	0.592	0.598	0.600	0.601

Notes for Table 7: The dependent variable is *C-Score*, which is a firm-specific measure of the incremental timeliness of bad news, as proposed by Khan and Watts (2009); *Pay Gap CEO-CFO* is the natural log of one plus the difference between the CEO's and CFO's total compensations; *Pay Gap CEO-Non-CFO* is the natural log of one plus the difference between the CEO's total compensation and the median compensation of the other non-CFO executives. *CEO Delta* is the natural log of one plus the sum of the delta of the CEO's stock options and holdings; *CEO Vega* is the natural log of one plus the vega of the CEO's option holdings; *CFO Delta* is the natural log of one plus the sum of the delta of the CFO's stock options and holdings; *CFO Vega* is the natural log of one plus the vega of the CFO's option holdings; *Non-CFO Delta* is the natural log of one plus the sum of the delta of the median non-CFO senior manager's stock options and holdings; *Non-CFO Vega* is the natural log of one plus the vega of the median non-CFO senior manager's option holdings; *Size* is the natural log of the total sales; *MTB* is the market value of the firm's equity divided by its book value; *Leverage* is the total firm debt divided by its total assets; *ROA* is the firm's earnings before interest and taxes divided by its total assets; *Volatility* is the volatility of the firm's stock over the previous 24 months; *CapEx* is the firm's capital expenditures divided by its total assets; *CEO Age* is the natural log of the CEO's age; *CEO Tenure* is the natural log of the CEO's tenure; *CEO Power* is the aggregate distance between the CEO and each senior manager in terms of ownership computed as the square root of the average squared difference between the CEO's ownership and that of each executive divided by 1,000, where ownership includes all shares owned, excluding options (Ridge et al., 2015); and *Litigation* is a dummy variable equal to one if the firm belongs to an industry with high litigation levels (Francis et al. 1994). Errors are clustered at the firm level, and the t-statistics are reported beneath the coefficients in parentheses. Significance is denoted as *** $p < 0.01$, ** $p < 0.05$, and * $p < 0.1$.

6.4. *The role of CFO incentives*

Thus far, we have examined the incentives of the subsequent layer of senior executives in its entirety without assessing the roles of individual executives. However, it could be argued that only the CEO and CFO play substantial roles in the financial reporting process, with the rest of the TMT having a muted effect on conservatism. This is the case, as CFOs are typically in charge of overseeing the financial reporting process (Geiger and North 2006). However, the rest of the senior executives have direct control and influence over the daily operations of the organisation, such as R&D, sales, production and other activities that imply resource allocation within the organisation (Graham et al. 2015, Cheng et al. 2016). Hence, a CFO facing tournament incentives might need to collude with the rest of the TMT members to be able to provide a more optimistic assessment of the firm's operations. Therefore, CFOs facing promotion incentives are likely to focus on areas where they exhibit significant control, such as corporate tax policy (Kubick and Masli 2016). Alternatively, CFOs can be reluctant to engage in overoptimistic reporting given the costs and reputational damage they would have to bear if such aggressive reporting practices were exposed (Karpoff et al. 2008). To test these arguments, we separately study the effect of the tournament incentives of the CFO and the rest of the TMT on conservative reporting.[14] In Table 7, we find evidence that the coefficients on the tournament incentives of the CFO (*Pay Gap CEO-CFO)* and on the tournament incentives on non-CFO executives (*Pay Gap CEO-non-CFO)* are negative and statistically significant when we do not control for the equity incentives of the CEO and senior executives. However, after controlling for the delta and vega values of the CEO and the rest of the TMT, only the promotion incentives of the subsequent layer of senior executives still have a negative and significant effect on conservatism. Columns 2–4 of Table 7 present these finding. We interpret these results as evidence that senior executives participate in tournament incentives by timing the disclosure of bad news, leading to less conservative financial reports.

7. Concluding remarks

We study the association between the pay gap between the CEO and the next layer of executives of the TMT, a proxy for tournament incentives, and conditional conservatism in financial reporting. Accounting researchers have become increasingly focused on the effect of the subsequent layer of senior executives' incentives, alongside those of the CEO and CFO, on financial reporting properties. Similarly, understanding the dynamics between senior executives' promotion incentives and conservatism in financial reporting is important considering the recent calls made by practitioners and regulators to include a degree of prudence in financial reporting and the decision of the International Financial Reporting Standards to reinstate prudence in its conceptual framework (2018).

Our results indicate that tournament incentives have a negative effect on the level of conservatism in financial reporting. These results are robust to a battery of robustness tests, including alternative metrics for both tournaments and conservatism. In addition, we show that our results are not driven by endogeneity or potential alternative explanations. Given the positive effect of tournament incentives on firm performance, our results provide evidence of an externality of this compensation structure on financial reporting, namely, financial reports that are less

[14]It can be argued that specific senior executives, apart from the CFO, are likely to exhibit different perceptions regarding tournament intensity. However, it is difficult to construct individual hypotheses for individual executives, as firms have different managerial structures, and apart from CFOs, it is difficult to find consistency in managerial titles. Therefore, we focus on providing evidence of whether CFO promotion incentives are likely to drive our results.

conservative. Overall, these findings are relevant due to the importance of conservatism for several stakeholders and the increasing concerns expressed by auditors and regulators regarding pay gaps between the TMT and the risk of material misstatements. Similarly, our evidence adds to the debate regarding the role that the incentives of senior executives play in shaping firms' financial reporting practices.

Acknowledgments

We are thankful to Edward Lee (the editor) and two anonymous referees for their insightful suggestions. We also appreciate comments and suggestions from Chris Chapman, Juan Manuel García Lara, Piotr Korczak, Beatriz García Osma, Nico Lehman, Gilad Livne, Giovanna Michelon, Fernando Penalva, Annelies Renders, Steve Young and seminar participants at the University of Wien, Annual Meeting of the European Accounting Symposium for Young Scholars (EASYS), the Annual Meeting of the European Accounting Association and the XII Workshop on Empirical Research in Financial Accounting (Exeter).

Disclosure statement

No potential conflict of interest was reported by the authors.

Funding

This work was supported by University of Bristol, School of Accounting and Finance: General Research Funds; University of Bristol, International Research Partnerships: Benjamin Meaker program.

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Appendix A—Variable definitions

- *C-Score:* The firm-specific measure of the incremental timeliness of bad news proposed by Khan and Watts (2009).
- *Total Gap*: The natural log of 1 plus the difference between the CEO's compensation and the median compensation of the rest of the firm's senior executives.
- *Total Ratio*: The ratio of the CEO's compensation to the median compensation of other senior executives.
- *Total Slice*: The fraction of the aggregate total compensation of the senior executives paid to the CEO.
- *CEO Delta*: The natural log of 1 plus the sum of the delta of the CEO's stock options and holdings, where delta is the dollar increase in the CEO's wealth given a 1% increase in the underlying stock price.
- *CEO Vega*: The natural log of 1 plus the vega of the CEO's option holdings, where vega is the dollar increase in the CEO's wealth, given a 1% increase in stock volatility.
- *SM Delta*: The natural log of 1 plus the sum of the delta of the median senior manager's stock options and holdings, where delta is the dollar increase in the senior manager's wealth, given a 1% increase in the underlying stock price.
- *SM Vega*: The natural log of 1 plus the vega of the median senior manager's option holdings, where vega is the dollar increase in the senior manager's wealth, given a 1% increase in stock volatility.
- *Size*: The natural log of total sales.
- *MTB*: The market value of a firm's equity divided by its book value.
- *Leverage*: The firm's total debt divided by its total assets.
- *ROA*: The firm's earnings before interest and taxes divided by its total assets.
- *Volatility*: The volatility of a firm's stock over the previous 24 months.
- *CapEx*: The firm's capital expenditures divided by its total assets.
- *CEO Age*: The natural log of the CEO's age.
- *CEO Tenure*: The natural log of the CEO's tenure.
- *CEO Power*: The aggregate distance between the CEO and each senior manager in terms of ownership, computed as the square root of the average squared difference between the CEO's ownership and the ownership of each executive, divided by 1000, where ownership includes all shares owned, excluding options (Ridge et al., 2015).
- *Litigation*: A dummy variable equal to one if the firm belongs to one of the following industries: biotechnology (SIC codes 2833–2836 and 8731–8734), computers (SIC codes 3570–3577 and 7370–7374), electronics (SIC codes 3600–3674), or retailing (SIC codes 5200–5961) (Francis, Philbrick and Schipper 1994).

Appendix B—Khan and Watts' (2009) conservatism model

Khan and Watts' (2009) measure is based on the cross-sectional specification of the Basu (1997) model, as follows:

$$Earn_j = \beta_0 + \beta_1 Neg_j + \beta_2 Ret_j + \beta_3 Neg_j Ret_j + e_j \quad (1)$$

where *j* indexes the firm, *Earn* is earnings, *Ret* is market returns and *Neg* is a dummy variable that equals 1 when *Ret* is negative. β_2 is the good news timeliness measure, and β_3 is the incremental timeliness of earnings to bad over good news. Hence, the total timeliness of bad news is $(\beta_2 + \beta_3)$. Khan and Watts (2009) modified this model to obtain a firm-level proxy of conservatism by adding an annual measure of the timeliness of earnings to good news (the G-Score) and a measure of the incremental timeliness of bad news with respect to good news (the C-Score), which they define as follows:

$$G - Score = \beta_2 = \mu_1 + \mu_2 Size_j + \mu_3 MTB_j + \mu_4 Leverage_j \quad (2)$$

$$C - Score = \beta 3 = \lambda_1 + \lambda_2 Size_j + \lambda_3 MTB_j + \lambda_4 Leverage_j \quad (3)$$

where μ_i and λ_i are estimated using annual cross-sectional regressions by substituting β_2 and β_3 into (1), which is constant across firms but varies over time. However, the G-score and C-score vary across firms through cross-sectional variation in firm characteristics (size, MTB and leverage). The annual cross-sectional model is as follows:

$$\begin{aligned} Earn_j = {} & \beta_0 + \beta_1 Neg_j + Ret_j(\mu_1 + \mu_2 Size_j + \mu_3 MTB_j + \mu_4 Leverage_j) + Neg_j Ret_j(\lambda_1 \\ & + \lambda_2 Size_j + \lambda_3 MTB_j + \lambda_4 Leverage_j) + (\delta_1 Size_j + \delta_2 MTB_j + \delta_3 Leverage_j \\ & + \delta_4 Neg_j Size_j + \delta_5 Neg_j MTB_j + \delta_6 Neg_j Leverage_j) + \varepsilon_j \end{aligned} \quad (4)$$

where $Earn_j$ is net income before extraordinary items, scaled by the lagged market value of equity; Ret_j is the annual stock rate of return of the firm, measured by compounding 12-month CRSP returns at fiscal year end; Neg_j is a dummy variable equal to 1 if Ret_j is less than zero; $Size_j$ is the log of the market value of equity; MTB_j is the market-to-book ratio; and $Leverage_j$ equals short-term plus long-term debt scaled by the market value of equity. As in Khan and Watts (2009), we winsorize all observations at the 1st and 99th percentiles and drop firms with stock prices below 1 USD and with negative or missing values for total assets or book value of equity.

Appendix C—Estimating executives' total compensation after the implementation of FAS 123R

We follow Kini and Williams (2012) and Coles et al. (2014) to address the inconsistency of the data on compensation in Execucomp post-2005, after the implementation of FAS 123R. In particular, we calculate the Black-Scholes values for each stock option grant and use these new values to estimate CEOs' and senior executives' delta, vega and adjusted total compensation values. We calculate the value of each stock option grant based on the Black-Scholes formula as in Core and Guay (2002), including the following inputs:

- The risk-free rate is the average Treasury bond yield over a time period and is obtained from the Federal Reserve website. We use Treasury securities for 1, 2, 3, 5, 7 and 10 years and interpolate the rates to determine the yield for 4, 6, 8 and 9 years.
- Estimated stock volatility is the annualised standard deviation of stock returns over the 60 months prior to the beginning of the fiscal period for which at least 12 months of return data are available. When no data are available, we use the mean volatility. We also winsorize this variable at the 5^{th} and 95^{th} percentiles.
- The estimated dividend yield is based on the average dividend yields over a three-year period. We also winsorize the estimated dividend yield at the 5^{th} and 95^{th} percentiles.
- For option maturity, we measure the maturity grant date based on the rounded difference between the exercise date and the assumed grant date, which is July 1st of the grant year. Following Execucomp, we also use a 70% haircut for grant maturity. The maturity of unvested options is set at the maturity of current year option grants minus one. If no information is available about the current year grant, the unvested options are set to 9. Additionally, the maturity of the vested options is assumed to be 3 years less than the maturity of the unvested options.