

Benchmarking of Pay Components in CEO Compensation Design

Finance Working Paper N° 768/2021

August 2022

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Abstract

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Keywords: Benchmarking, CEO compensation, peer group, pay mix, pay components

JEL Classifications: G34, G38, J31, J33, M12, M52

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Extant literature presumes benchmarking of total compensation, whereas eighty-nine percent of S&P500 companies highlight the benchmarking of CEO pay components. Analyzing a panel of CEO compensation data entailing 1,451 S&P 1500 firms during 2006-2019, we find that: 1) Component-of-pay benchmarking more effectively explains CEO compensation than does total compensation benchmarking; 2) Most pay components exhibit similar benchmarking behavior; the only exception is the milder adjustment of salary to its benchmark; 3) Benchmarking of the weight of each component in total compensation is also apparent; and 4) Benchmarking intensity varies with CEO characteristics, Board attributes, and compensation consultants' salience.

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1. Introduction

In recent decades, senior executives' compensation has drawn intense academic and professional scrutiny. A central issue in these debates is the methodology employed by boards of directors and compensation committees to determine chief executive officer (CEO) pay.

In this study, we focus on the practice of compensation benchmarking, in which a given firm compares CEO compensation with the compensation packages of peer CEOs at comparable companies. Previous empirical research (Albuquerque et al., 2013; Bizjak et al., 2011; Bizjak et al., 2008; Faulkender & Yang, 2010; Laschever, 2013) has established that peer pay and benchmarking play an important role in determining total CEO compensation.

We extend the benchmarking research by analyzing the benchmarking of the components of CEO pay. Motivated by the description of benchmarking practices in compensation committee reports, we examine the following questions: Is each pay component benchmarked separately and differently than other pay components? Is the structure of compensation (weight of each pay component in total pay) benchmarked as well? Is pay component benchmarking a better description of benchmarking practices in US public firms than total pay benchmarking? And, which factors affect firm's benchmarking intensity?

We employ two research strategies (and samples) to answer our research questions, and focus primarily on the benchmarking of three major pay components: Salary, equity-based compensation (the sum of option awards and stock awards), and non-equity performance pay (the bonus and non-equity incentive plan compensation). First, we read the compensation-committee reports (Form DEF 14A) of S&P 500 firms

for fiscal year 2013, and document any statement referring to benchmarking CEO pay components. We find that approximately 89% of firms explicitly state that they benchmark at least one pay component. Further, about 75% of firms declare that they benchmark all three major pay components. These figures indicate that these firms examine separately the distribution of salary, equity-based compensation, and non-equity-based compensation among peers to determine the level of each pay component to their CEO. We also examine whether companies target CEO compensation structure (weight of each pay component in total CEO compensation), and find that approximately 30% of firms explicitly declare in their proxy statement that they benchmark the compensation mix.

Our second empirical strategy employs detailed compensation data to examine the effectiveness of component benchmarking in explaining the cross-sectional and time-series variation in the reported compensation of CEOs. We analyze a relatively large CEO compensation database of 8,128 firm-year observations and 153,862 peer-year observations on 1,451 unique firms included in the S&P Composite 1500 during 2006–2019, and we consequently make several important observations.

First, we find that component benchmarking describes the data, i.e., describes actual pay practices, more effectively than does total compensation benchmarking. Second, when benchmarking pay components, the adjustment of CEO's salary to that of selected peers is significantly weaker than the adjustments of the two other major pay components, non-equity performance pay and equity pay. Third, we present evidence supporting the contention that benchmarking is used not only when

determining CEO pay component levels, but also when designing the structure of CEO pay, i.e. the proportions of the various pay components in total pay.¹

Our findings regarding the benchmarking of CEO pay components are somewhat unexpected. According to economic theory, total pay benchmarking helps firms provide competitive CEO pay packages that serve to retain valuable human capital (Holmstrom & Kaplan 2003). Competitive pay packages do not explicitly mandate benchmarking each pay component separately or benchmarking the mix of compensation components.

We discuss potential motivations for pay component benchmarking. Several of these motivations are in line with optimal compensation design. For example, boards may rely on other firms' compensation design, as these designs provide information regarding the optimal compensation structure. Further, boards might have a difficult time setting competitive pay to their CEOs if the compensation structure deviates from the compensation structure of other firms, since each pay component has a different certainty equivalence. For example, the certainty equivalence of a stock option is lower than that of cash salary. Granting the CEO a similar pay structure (weight of each pay component in total pay) as that of her peers, alleviates concerns that the CEO compensation is not competitive. We also note that benchmarking of pay components may inefficiently arise from external players' (regulators, compensation consultants, and proxy advisors) involvement in the process of CEO compensation determination.

Finally, we propose four factors that might affect benchmarking intensity: CEO mobility, Board directors' reputational concerns, Board acquaintance with CEO's

¹ We note that benchmarking each pay component does not necessarily imply that the mix of pay components is also benchmarked. For most statistical distributions, benchmarking each component to peers' median does not generate benchmarking of the proportion of each component to the median proportion at firm's peers.

preferences, and compensation committee salience. Consistent with our propositions, we find that benchmarking coefficients are higher for: 1) CEOs with general managerial skills (mobile CEOs); 2) newly appointed CEOs and non-founder CEOs, whose preferences are less known to the Board; and 3) firms with more uncertain or reputationally concerned directors, such as firms with a higher proportion of external directors, firms with a fully independent compensation committee, and firms with less experienced directors. There is also some evidence that benchmarking coefficients increase when the firm employs a market-leader compensation consultant.

The rest of the paper is organized as follows. Section 2 presents the literature review and our hypotheses. Section 3 describes the data and the sample construction. Section 4 presents our empirical results, and Section 5 concludes.

2. The Benchmarking Practice

2.1. Background

A common practice in the CEO pay-setting process is comparing pay with that of peer groups. In a given case, the set of peer firms is selected by the directors and the compensation committee members, who often engage external compensation consultants. Outside the firm, proxy advisors also use peer compensation as their benchmark when evaluating senior executive pay plans. According to the benchmarking method, CEO's compensation is compared to that of a peer group of CEOs at similar firms, where "similarity" is typically determined based on identical industry, similar firm size, and a common management talent reservoir (identified by past sources and destinations of the firm's executives). In such analyses, pay below the median is usually considered as "below market."

In 2006, to facilitate transparency, the Securities and Exchange Commission (SEC) adopted new proxy disclosure rules that require firms to report all companies in the peer group or survey when the use of peer groups has a material impact on executive compensation. The disclosure must include the names of the individual companies and a detailed explanation for the selection of these companies as peers. The SEC's 2006 disclosure requirements enable researchers to examine the impact of actual peer group pay on the level of CEO compensation.

Existing studies have shown that the median CEO total pay in the peer group helps explain CEO pay. Further, the impact of median peer CEO pay on firm CEO pay exceeds the impact of stock market performance on pay (e.g., Faulkender & Yang, 2010; Bizjak et al., 2011; Albuquerque et al., 2013)². Thus, benchmarking is a key determinant of CEO pay.

2.2. The Debate over the Virtue of Benchmarking

The purpose of the benchmarking method is to adjust executive compensation to a competitive level. A senior executive who is compensated improperly may potentially resign from the company or neglect her duties. In order to retain valuable human capital, the company should follow the market compensation standards. The benchmarking of CEO compensation is a practical and efficient mechanism to gauge the market wage (Holmstrom & Kaplan, 2003). Benchmarking may be important also because it facilitates setting a fair reward to firm executives. Any perceived unfairness

² A growing strand of literature provides evidence for the role and the effect of peer firms beyond compensation benchmarking. Peer selection also affects relative performance awards (RPE)—see, e.g., Bizjak et al. (2022); De Angelis & Grinstein (2020); and Ma et al. (2021). Peer groups also play an important role in other corporate policies such as corporate investment, corporate capital structure and financial policies (e.g., Foucault & Fresard, 2014; Leary & Roberts, 2014).

of CEO's compensation package may undermine her intrinsic motivation and damage her reputational incentives (Edmans et al., 2022).

The main concern regarding benchmarking is that it may be used to justify pay raises unrelated to CEO or firm performance. Critics of the use of peer group benchmarking argue that powerful CEOs persuade compensation committees to select peer firms in a way that inflates CEO pay (O'Reilly et al., 1988; Main et al., 1995; Newman & Mozes, 1999). Indeed, there is evidence that boards select peers from larger companies and peers that are highly paid (Faulkender & Yang, 2010; Bizjak et al., 2011 and Laschever, 2013).

However, the debate about the manipulation of benchmarking is ongoing and unresolved. Cadman & Carter (2014) do not find evidence for opportunistic selection of peers, Larcker et al. (2020) assess that only in a third of their firm-year observations peers were selected opportunistically, and Albuquerque et al. (2013) estimate that the CEO talent component of pay (approximated based on past abnormal performance, the size of the firms the CEO has managed in the past, and media coverage) dominates the self-serving component of pay. Further, Francis et al. (2016) find that firms with relatively high peer quality in terms of managerial skills exhibit performance superior to firms with relatively poor peer quality. Choosing a more skilled peer group can improve firm performance by motivating CEOs to increase their own work efforts and adopt some successful new policies of their peers (in order to resemble these distinguished peers). Benchmarking is also less common in industries where external successions are rare (Cremers & Grinstein, 2014).

The current wave of benchmarking critics (Jochem et al., 2021) argues that reciprocal benchmarking, i.e. firms including each other in the set of peers, has increased over time and has decreased the cross-sectional variance of CEO pay and firm

stock returns. This indicates that benchmarking may be overused to a point where it becomes sub-optimal. Cabezón (2021) also identifies an increase in the similarity of pay across CEOs, show that it dampens firm valuations (Tobin's Q). However, Cabezón (2021) is careful not to blame benchmarking for it.

2.3. The Basic Benchmarking Hypotheses

2.3.1. Benchmarking pay components

Previous studies have focused on the benchmarking of CEO's total pay. However, when we review DEF 14A forms, we find that most firms state that they benchmark each component of total pay. For example, in its 2013 proxy Kellogg states that "All components of our executive compensation package are targeted at the 50th percentile of our compensation peer group to ensure that our executives are appropriately compensated, and we are able to recruit and retain the right talent for the organization".

We propose that each of the CEO pay components has its unique character, purpose, and behavior. Consequently, each of the main pay components may be benchmarked separately and potentially differently. CEO compensation packages comprise six main components of pay: (i) base salary; (ii) bonus; (iii) non-equity incentive plan compensation; (iv) option grants; (v) restricted stock grants; and (vi) other pay. However, our central empirical tests divide total compensation into the three components we consider most significant: (i) salary; (ii) non-equity performance pay (i.e., bonuses and non-equity incentive plan compensation); and (iii) equity pay (i.e., restricted stock and option grants). This division of compensation enables us to differentiate between performance-based components and fixed pay as well as between cash incentives and equity-based components.

Our primary hypothesis is as follows

Hypothesis 1: Each CEO pay component is adjusted towards its median level at peer firms.

Hypothesis 1 examines the previously untested prediction that pay components are benchmarked on their own. In addition, we will examine whether benchmarking of pay components describes common practice better than benchmarking of total pay, and whether all pay components are benchmarked to the same extent, i.e., employ the same adjustment parameters.

2.3.2. Benchmarking the pay mix

We notice in DEF 14 forms that many firms also mention benchmarking peer compensation structure (mix of pay components). For example, Northeast Utilities declares in its 2013 proxy statement that "We target the mix of compensation for our Chief Executive Officer and the other Named Executive Officers so that the percentages of each compensation element are approximately equal to the competitive median market mix." Also, a recent survey by Edmans et al. (2022) reports that 49% of the directors surveyed follow market practice to determine the mix between variable and fixed pay.

Motivated by these observations, we posit that benchmarking is implemented with regards to the structure of CEO pay as well. Pay structure is important because it determines the relative magnitude of the various incentives aligned to the different components of total pay. To illustrate, equity pay may incentivize a given CEO's attention to firm stock price, while non-equity performance pay may incentivize the CEO's efforts in other directions including accounting profitability, long-term efficiency, survival, or executive suite coordination (e.g., Guay et al., 2019). Hence, the

balance between equity and non-equity performance pay in the compensation plan signals to the CEO the relative importance of pursuing a high stock price. Boards and compensation consultants are likely to seek an optimal balance between the different pay components, and one solution is to follow the pay structure at peer firms. In this context we posit:

Hypothesis 2: CEO's pay structure is benchmarked as well; CEOs whose share of pay component X in total compensation is below (above) the peer group median in year t-1, will receive an upward (downward) adjustment in the level of pay component X in year t.

2.4. Potential Motivations for Pay Component and Pay Structure Benchmarking

Explanations for benchmarking in the extant literature have focused on the role of total pay benchmarking in retaining valuable human capital (e.g., Holmstrom & Kaplan 2003). However, these explanations do not predict benchmarking of each pay component or benchmarking of the mix of pay components. Below we offer some potential non-mutually-exclusive motivations for benchmarking pay components, and draw some testable hypotheses regarding some of them.

2.4.1. Extensions of the Economic Theory of Retaining CEOs

Studies such as Oyer (2005) propose that performance-based compensation can be used as a commitment device to retain employees. Vesting requirements provide incentives for employees to remain in the firm and benefit from the expected increase in the stock price. Certain components of CEO compensation such as long-term incentive plans or restricted stock grants may have a stronger commitment role than salary or bonuses. Therefore, compensation elements and structure are important for incentivizing CEOs to stay in the firm, and adjusting CEO's pay to the pay of peer

CEOs, i.e., benchmarking, should involve pay component and pay structure adjustments as well.

Recent literature distinguishes between generalist and non-generalist CEOs; Generalist CEOs have general managerial skills, whereas non-generalist CEOs possess firm-specific skills (Custodio et al., 2013). Since general managerial skills are more portable, generalist CEOs can more easily move between firms, and retaining them is more difficult and probably requires a greater degree of benchmarking. Similarly, Cremers & Grinstein (2014) distinguish between industries with more and less inside CEO successions and find that benchmarking is more common in industries with a relatively high proportion of outside successions. Consistent with these "CEO mobility" arguments and findings, we propose:

Hypothesis 3: Benchmarking intensity is stronger for generalist CEOs and for CEOs in industries with a relatively high proportion of outside appointments.

2.4.2 Unobserved CEO Preferences and Characteristics

To a risk averse CEO, performance-based compensation is worth less than its cost to the shareholders. The discount that CEOs apply to options or stock compensation relative to their cost to the shareholders may vary considerably depending on CEO risk aversion (Hall & Murphy, 2002). To the extent that firms cannot fully evaluate the unique risk preferences of their CEOs, they might gravitate to a policy that provides a standard compensation mix structure, similar to the ones in other firms. Copying the pay structure of similar firms guarantees that firm's pay for managerial talent is competitive relative that of their competitors, i.e. that the certainty equivalence of firm's pay to its CEO does not differ from the certainty equivalence of the median peer firms' pay to their CEOs.

The concern that CEO's compensation package does not fit CEO's personality and risk preferences is more pronounced when boards consider the pay of newly hired CEOs. Hence, boards may rely relatively heavily on benchmarking when determining CEO's pay in the first years of CEO employment in the firm. With time, the preferences and character of the CEO are revealed, and the reliance on benchmarking lessens. The same logic dictates that the pay of a founder CEO relies less on benchmarking. Based on the ability of boards to observe CEO personality and preferences, we advance:

Hypothesis 4: Benchmarking intensity is stronger for CEOs in their first years in office, and weaker for founder CEOs.

2.4.3. Directors' Reputation Concerns

Studies have shown that directors are often markedly concerned with their reputation (e.g., Jiang et al., 2016). These concerns may lead directors to hedge potential risks of legal and social liabilities. To the extent that directors are worried that particular components of executive compensation may be inordinate and potentially ignite a negative response in the media or social networks, they may tend to align all pay components with the standard levels and proportions at comparable firms. Further, this hedging attitude may be more prevalent among "outside" directors that are expected to be more impartial, and among less-veteran directors who are less familiar with firm business and CEO skills. Hence:

Hypothesis 5: Boards of Directors with a higher proportion of outside directors and with a fully independent compensation committees benchmark more aggressively. In contrast, a higher proportion of veteran directors mitigates benchmarking.

2.4.4. The Effect of Compensation Consultants

Principal-agent theories (e.g., Holmstrom, 1979) assume that the principal knows the correlation between compensation design and managerial effort and, therefore, the principal tailors the optimal compensation structure to incentivize CEO actions. However, if the principal does not know the correlation between effort, pay, and outcome, then external guidance is required. Compensation consultants usually provide such a guidance, and they typically employ and rely on detailed data on compensation practices in similar firms.

We propose that Board of Directors feel more confident with the compensation recommendations of reputable consultants. Kalpathy et al. (2021) show that reputable compensation consultants assist firms to select appropriate peers. Thus, we expect board's trust and reliance on the recommendation of reputable consultants to be relatively high, leading to an higher benchmarking propensity when the compensation consultant is reputable. In addition, boards that intend to benchmark more aggressively probably hire more reputable consultants. Hence, we invoke:

Hypothesis 6: CEO compensation benchmarking is stronger in firms hiring a reputable compensation consultant.

2.4.5. Other Potential Drivers of Pay Component Benchmarking

In the U.S., as well as in many other countries, shareholders are asked to ratify CEO compensation structure in their annual meetings, a procedure called "Say on Pay". Institutional investors typically employ proxy advisory firm recommendations when casting their votes (Larcker et al., 2015). These proxy advisory firms rely, at least partly, on extensive comparisons with peer-firm compensation data when evaluating whether

a CEO compensation package is adequate. By these means, pay component benchmarking emerges.

Another possible driver of pay component benchmarking is the legal and regulatory system. Murphy (2013) contends that disclosure rules, tax rules, accounting rules, and other regulations all push firms and directors to adopt certain compensation practices and to abandon others. A notable example is the 1994 tax rule allowing firms to deduct only up to \$1 million of CEO's salary for tax purposes. This ruling was shown to lead firms to keep the salary levels close to the \$1 million benchmark while increasing the tax-deductible performance-based compensation.

Rules such as the 1994 tax rule also push firms towards separate treatments of different CEO pay components. In addition, Regulation S-K Item 402(b)(2)(xiv) of the SEC states that the compensation committee should address in its compensation discussion and analysis section "...whether the company engaged in any benchmarking of total compensation or any material element of compensation..." This regulation refers explicitly to the "element" (i.e., component) of pay, leading firms to believe that they should show the regulator some benchmarking of pay components as well.

3. Samples and Data

We construct two data sets. The first includes proxy statements (DEF 14A forms) of all S&P 500 firms for fiscal year 2013, about the middle of our sample period. These statements include the annual compensation committee reports, which describe firms' formal policies regarding pay component benchmarking. The second data set is the standard data set in compensation studies. It comprises detailed CEO compensation data for all S&P Composite 1500 firms and their compensation peers in the years 2006–2019. These data afford examination of the actual benchmarking of CEO pay. For

brevity we denote the first sample as the “policy sample” and the second sample as the “CEO pay sample.”

3.1. The Policy Sample

We review DEF 14A forms of S&P 500 firms for fiscal year 2013 to find statements on benchmarking of CEO pay components, benchmarking of CEO total compensation, and benchmarking of CEO compensation structure (mix of pay components). Our analysis focuses on three main pay components: salary; non-equity performance pay; and equity pay.

First, we search the Compensation Discussion and Analysis (CD&A) section of the DEF 14A forms for information on benchmarking CEO total pay and the pay components. Such information can be found in the chapters describing the executive compensation philosophy and objectives, the pay setting process, components of pay, and peer groups. We use the following keywords: median; 50th; mid-point; percentile; component; element; peer; benchmark; comparator; competitive; and market practice.

Second, we search the DEF 14A forms for explicit statements indicating that firms employ peer group data to determine the mix of CEO pay components. This information can be found in the CD&A chapters describing executive compensation philosophy and objectives, peer groups, and the pay mix. We use the following keywords: mix; structure; proportion; and weight.

Before proceeding, we note that for 24 of the 505 firms in our policy sample, we do not find any DEF 14A forms. In addition, four firms use vague statements regarding benchmarking, e.g., a statement that they may consult national compensation surveys; hence, we include them in the missing information total count.

Table 1 summarizes our findings. About 75% of firms state that they benchmark all three pay components, and an additional 14% explicitly mention that they benchmark one or two of our three main pay components. Thus, in summary, 449 out of the 505 firms—89% —use some form of pay component benchmarking.

[Insert Table 1 about here]

Regarding benchmarking CEO total compensation, 66.5% (336) of the firms report benchmarking total CEO pay in addition to benchmarking pay components; an additional 4.8% (24) state they target total compensation only. Interestingly, the fraction of firms declaring total compensation benchmarking, 71%, is lower than the fraction declaring pay component benchmarking, 89%.

Finally, in 154 (30.5%) of the 505 firms, we find statements that the firm also employs the peer group to determine the mix between the various components of CEO pay. This explicit reference to the structure of pay benchmarking supports our novel Hypothesis 2, which posits that CEO pay structure is also benchmarked.

3.2. The CEO Pay Sample

The initial CEO actual pay sample comprises 23,646 firm-year observations on S&P Composite 1500 index firms during 2006–2019. The S&P Composite 1500 combines three indices: the S&P 500, the S&P MidCap 400, and the S&P SmallCap 600. On December 2006 the SEC introduced new amendments requiring firms to disclose their peer group when the use of peer groups is material in the pay setting process. Accordingly, peer group data have become available in definitive proxy statements (DEF 14A) for fiscal year 2006.

We focus on executives classified as CEOs by Standard & Poor's ExecuComp database from which we collect CEO compensation data. We exclude 505 firm-year

observations with no available compensation data for the current and/or previous year, and 97 observations of zero values for total compensation. Pay component observations with negative values are defined as missing values. We further drop 4,899 firm-year observations of CEOs who were replaced or appointed during the current or previous year to exclude partial compensation or exceptional high payments (e.g., golden parachutes, severance pay, golden handshakes, and sign-on bonuses). This reduces sample size to 18,145 firm-year observations.

For each of the 18,145 firm-years, we find the disclosed list of compensation peers. We assemble this information from three sources. Peer information for 2006 through 2008 is based on manually collected data from the Compensation Discussion and Analysis (CD&A) section of the proxy statements.³ These data are described in Albuquerque et al. (2013). We construct peer lists for 2,293 firm-year observations based on Albuquerque et al. (2013)'s dataset.

Our peer data for 2009–2013 come from the Executive Compensation Analytics (ECA) database, provided by Institutional Shareholder Services (ISS).⁴ We construct peer lists for 4,959 firm-year observations using the ECA database. Finally, peer data for 2014–2019 are collected from ISS Incentive Lab database. We find peer lists for 3,954 firm-year observations using the ISS Incentive Lab database. In total, we amass an explicit list of peers for 11,206 firm-years, which is 47% of our initial list. The remaining 53% firm-year observations are firms that are missing on ISS databases.

Next, given our list of peer CEOs, we seek current and prior year compensation data for 283,816 peer firm-year observations (peer-year observations, in short). Thus,

³ We are grateful to Ana Albuquerque and her coauthors for providing us with these data.

⁴ The ECA database starts in 2008; however, we preferred to rely mainly on the dataset of Albuquerque et al. (2013) for ECA's first year (2008).

there are on average more than 25 peers for each CEO. We find compensation data on the ExecuComp and ISS datasets for 216,816 peer-year observations because among the peers there are foreign and private firms that are not included in the ExecuComp or ISS databases.

Given available peer and peer compensation data, we exclude 46 disclosing firm-years that report only one or two peers. In addition, we exclude 895 firm-years with missing compensation data for 50% or more of their chosen peers.⁵ Finally, we exclude 54 observations of co-CEOs and 2,083 observations of firms in the more regulated financial services industry (industries 45–48 in the Fama-French industry classification). Table 2 summarizes the exclusion process. The final sample comprises 8,128 firm-year observations (and 153,862 peer-year observations) on 1,451 unique disclosing firms.

[Insert Table 2 about here]

We assume that the target pay level for each pay component equals the median pay among firm peers. Thus, for each disclosing firm and compensation component, we calculate the respective peer group median pay component level. Non-median targets are relatively scarce - Table 1 documents that about 13% of the S&P 500 firms employ a non-median target for at least one of the pay components. Hence, we believe the distortion generated by using peer median as target pay is tolerable. Likewise, regarding the structure of compensation, we assume that the benchmark for the weight of pay component X in total compensation is its median proportion among the peers.

We use two procedures to mitigate the potential effect of outliers in the highly skewed compensation data. First, as common in the compensation literature, all

⁵ Peer CEO pay is marked as missing also in years when the peer CEO was replaced or appointed.

compensation data are winsorized at the 2.5% and 97.5% levels within each year. Changes in pay are also winsorized at these percentages. Second, we use the logarithm of the pay measures and the logarithmic change of pay. The logarithmic transformation is common, and it facilitates comparison with previous studies.

Stock return data are from the Center for Research in Security Prices (CRSP) database. Data on other financial variables (sales, ROA, market-to-book ratio, and financial leverage) that have been found in prior research to explain variations in CEO pay, are extracted from Standard & Poor's Compustat database. Data on the CEO's name, age, and possible dual role as CEO and Chairman of the board are collected from the Execucomp database.

In our cross-sectional analysis of benchmarking intensity, we employ data on compensation consultants from the ISS Incentive Lab database, board attributes' data and information on CEO ownership from the MSCI (formerly KLD and GMI) database, and data on generalist CEOs (the General Ability Index) from Professor Custodio.

3.3. Descriptive Statistics of CEO Pay

Our final pay data sample comprises 8,128 firm-year CEO pay observations in S&P 1500 firms during 2006–2019. These observations are distributed almost uniformly across the sample years. Every firm-year observation also includes information concerning the peers. The average (median) peer group for our sample firms comprises about 25 (20) firms. However, given missing peer compensation data, the mean (median) number of peers with available compensation data per sample firm decreases to 19 (16). These mean and median number of peers are slightly higher than those reported in prior studies (e.g.; Faulkender & Yang, 2012; Albuquerque et al., 2013).

Table 3 offers extensive descriptive statistics of the annual CEO pay in our sample firms, compared to peer firm CEOs. Panel A of Table 3 describes the pay levels at our disclosing firms (for brevity, denoted hereafter as firms) and at their peers. Peer pay statistics resemble those of the firm. For example, the average total compensation of our firm CEOs is 8.16 million dollars, while the average of the corresponding peer firms' median total compensation is 8.09 million dollars.

[Insert Table 3 about here]

Panel B of Table 3 presents descriptive statistics on the compensation structure. On average, nearly 19% of total CEO compensation is in salary, 3.5% is in discretionary bonuses, 20% is in non-equity incentive compensation, 35% is in stock awards, and 18% is in option awards. These statistics show that U.S. CEOs receive most of their pay in the form of performance-sensitive compensation. The compensation structure of the sample firms is similar to that of the peer firms, consistent with Hypothesis 2.

4. Evidence on Benchmarking in the Level and Structure of CEO Pay

4.1. Univariate Evidence on Benchmarking in CEO Compensation

The benchmarking hypothesis (Hypothesis 1) predicts that CEOs with below-median pay in year $t-1$ receive a pay raise in year t that is higher than the respective pay raise of CEOs who earn above-median pay in year $t-1$. Consistent with Hypothesis 1, Panel A of Table 4 documents that the mean and median logarithmic changes in total pay and its components for CEOs paid below the peer median in the previous year are higher than the respective changes in pay for CEOs paid above the peer median in the previous year.

Both parametric and nonparametric tests indicate that the pay raise gaps between the below- and above-median CEO groups are statistically different from zero

at the 1% level for all compensation components. Note also that the number of observations in the 'below median' groups is generally larger than the number of observations in the 'above median' groups. This difference indicates firms' tendency to select highly paid CEOs as their peers (Faulkender & Yang, 2010; Bizjak et al., 2011).

Among pay components, salary exhibits not only the lowest year-to-year change, but also the lowest difference between the 'below median' and 'above median' groups. CEOs who earn above the peer group in the previous year receive a pay cut in the following year with the salary component the only exception. These pay cuts in the 'above median' group appear to challenge the popular view of powerful CEOs determining their own pay.

[Insert Table 4 about here]

We next examine whether benchmarking is also employed in determining the structure of CEO pay. Because each component of pay may encourage the CEO towards a different effort scheme, an optimal pay mix is essential. Our Hypothesis 2 contends that boards turn to comparable firms to gauge the optimal composition of CEO pay.

In order to examine Hypothesis 2, we compute the average year-by-year changes in the weight of various pay components in total compensation for two groups: (i) CEOs whose previous-year weight of pay component X in total compensation is above the previous year peer group median; and (ii) CEOs whose previous-year weight of pay component X in total compensation is below the peer group median in the previous year.

Table 4 Panel B documents the results. The mean change in the weight of each pay measure in total compensation is positive for the "below median" group and negative for the "above median" group. Thus, as predicted by Hypothesis 2, on average,

the weight of pay component X in firm i is corrected towards the peer group median weight of component X. Further, *t*-tests indicate that for all pay components, the difference between the mean weight change of above- and below-median firms is statistically significant at the 1% level. These results provide preliminary evidence that firms benchmark not only CEO pay levels but also CEO pay structure.

4.2. Benchmarking Effects on CEO Pay

The conventional model of CEO total compensation (Albuquerque et al., 2013; Bizjak et al., 2008; Faulkender & Yang, 2012, 2010; Laschever, 2013) is

$$\begin{aligned}
 (1) \quad \text{Ln}(\text{CEO compensation}_{i,t}) = & \alpha_0 + \alpha_1 \text{Ln}(\text{Sales}_{i,t-1}) + \\
 & \alpha_2 (\text{Stock return}_{i,t}) + \alpha_3 (\text{Stock return}_{i,t-1}) + \alpha_4 (\text{ROA}_{i,t}) + \\
 & \alpha_5 (\text{ROA}_{i,t-1}) + \alpha_6 \text{Ln}(\text{Risk}_{i,t-1}) + \alpha_7 (\text{MTB}_{i,t-1}) + \alpha_8 (\text{Leverage}_{i,t-1}) + \\
 & \alpha_9 (\text{CEO Age}_{i,t}) + \alpha_{10} (\text{CEO Duality Dum}_{i,t}) + \\
 & \alpha_{11} (\text{IndustryDum}_{i,t}) \times (\text{YearDum}_t) + e_{i,t},
 \end{aligned}$$

where *i* indexes firms and *t* indexes year. The explanatory variables comprise the following firm and CEO characteristics: (i) the natural logarithm of sales in the previous year (a measure of firm size); (ii) stock returns and returns on assets (ROA) in years *t* and *t*-1 (firm's performance indicators); (iii) the natural logarithm of the standard deviation of the monthly stock return in the 36 months preceding the end of the previous fiscal year (represents firm's risk); (iv) lagged market-to-book (MTB) ratio (a proxy for growth opportunities); (v) lagged leverage; (vi) CEO age; and (vii) CEO duality (a dummy variable that equals 1 when the CEO also serves as Chairman). We further include dummy variables for each unique combination of industry and year, using the 49 Fama and French (1997) industries. Last, e_{it} is a firm-year specific error term.

Benchmarking has implications on year-to-year changes in CEO pay. For this reason, we start by differencing the pay component version of our baseline CEO pay model in Equation 1 and obtain:

$$(2) \quad \Delta \text{Ln}(\text{CEO compensation component } X_{i,t}) = \beta_0 + \beta_1 \Delta \text{Ln}(\text{Sales}_{i,t-1}) + \beta_2 \Delta(\text{Stock return}_{i,t}) + \beta_3 \Delta(\text{Stock return}_{i,t-1}) + \beta_4 \Delta(\text{ROA}_{i,t}) + \beta_5 \Delta(\text{ROA}_{i,t-1}) + \beta_6 \Delta \text{Ln}(\text{Risk}_{i,t-1}) + \beta_7 \Delta(\text{MTB}_{i,t-1}) + \beta_8 \Delta(\text{Leverage}_{i,t-1}) + \beta_9 (\text{IndustryDum}_{i,t}) \times (\text{YearDum}_t) + \varepsilon_{i,t},$$

Next, we add to the above equation our benchmarking measures. Bizjak et al. (2011) focus on total CEO pay and define the benchmarking explanatory variable as the natural logarithm of the peer CEO-based pay divided by firm CEO pay level, both at year $t-1$. The implicit assumption is that compensation committees and board members try to correct the previous year distortions (relative to peers) in their total CEO pay. We use an analogous definition for each pay component. Therefore, our first benchmarking explanatory variable for pay component X is the ratio of the peer-based target for pay component X (for example, the median of pay component X among the peers) to the actual level of firm CEO pay component X , both at the previous year.

The second benchmarking variable is novel in the literature and relates to pay-structure benchmarking (our Hypothesis 2). Benchmarking pay structure necessarily affects the level of the pay components. For example, if the weight of pay component X in total compensation is below the peer group median, its adjustment towards the median peer weight requires an increase in the level of pay component X that is separate and supplementary to the other required adjustments of the level of X . The benchmarking variable representing the pay structure gap is the difference between the

median weight of pay component X in total compensation among the chosen peers and the corresponding weight for a sample firm CEO.

Including both benchmarking of the pay component level and benchmarking of the pay structure, the resulting pay component model becomes:

$$\begin{aligned}
 (3) \quad \Delta \text{Ln}(\text{CEO compensation component } X_{i,t}) = & \beta_0 + \\
 & \beta_1 \text{Ln}(\text{Relative compensation component } X_{i,t-1}) + \\
 & \beta_2 \left[\left(\frac{\text{peer pay component } X}{\text{peer total compensation}} \right)_{i,t-1} - \left(\frac{\text{pay component } X}{\text{CEO total compensation}} \right)_{i,t-1} \right] + \\
 & \beta_3 \Delta \text{Ln}(\text{Sales}_{i,t-1}) + \beta_4 \Delta(\text{Stock return}_{i,t}) + \beta_5 \Delta(\text{Stock return}_{i,t-1}) + \\
 & \beta_6 \Delta(\text{ROA}_{i,t}) + \beta_7 \Delta(\text{ROA}_{i,t-1}) + \beta_8 \Delta \text{Ln}(\text{Risk}_{i,t-1}) + \beta_9 \Delta(\text{MTB}_{i,t-1}) + \\
 & \beta_{10} \Delta(\text{Leverage}_{i,t-1}) + \beta_{11} (\text{IndustryDum}_{i,t}) \times (\text{YearDum}_t) + \varepsilon_{i,t} ,
 \end{aligned}$$

where i indexes firms, X indexes the compensation components, t indexes years, and other explanatory variables are as previously defined (see the Appendix for variable definitions).

Table 5 presents the results of fitting the integrated benchmarking model to the data. The first three columns show the results of fitting Equation 3 to the data. For brevity, only statistically significant coefficients at the 10% level or higher are shown. The estimated coefficients of *Ln(relative compensation component X)* are positive and highly statistically significant for all pay components. The magnitude of the coefficients ranges from approximately 0.08 for salary to 0.31 for equity pay. Thus, a CEO with an equity pay 1% below (above) the median peer equity pay in year t-1 receives, ceteris paribus, an equity pay increase in year t that is 0.31% larger (smaller) than that of a CEO whose year t-1 equity pay equals the median peer equity pay. The adjustment coefficients of the compensation components in Table 5 tend to be slightly lower than

the adjustment coefficient of 0.31 estimated by Bizjak et al. (2011) for total pay using data for 2006. However, the clear conclusion remains that the gap in CEO pay component X relative to peers triggers a significant revision (i.e., correction towards the peers) in the next year. The results also document that boards only partially adjust CEO pay, which indicates that boards use benchmarking cautiously.

The coefficients of our pay structure benchmarking variable, (the distance from peer group median in the weight of pay component X in total compensation), are positive for all pay components. The coefficients are significant at 1%, 5% and 10% levels for equity pay, non-equity performance pay and salary, respectively. The coefficient estimates of the weight difference range from a low of 0.016 for salary to a high of 0.15 for equity pay. These coefficients imply, for example, that a CEO whose proportion of equity pay is 1% below (above) the peer group median receives, *ceteris paribus*, an increase in equity pay that is about 0.15% larger (smaller) than a CEO whose proportion of equity pay is similar to the peer group median. The coefficient on the distance from peer group median in the salary regression is the lowest across all pay components, implying an incremental increase (decrease) in salary pay of only 0.02% for a CEO whose proportion of salary in total pay is 1% below (above) the peer group median.

Columns 4-6 present the results from estimating Equation 3, using firm and year fixed effects instead of industry-year fixed effects. The coefficients of our two benchmarking measures substantially increase and are almost double the corresponding coefficient values in columns 1-3. The coefficients of the relative pay status of the CEO in year t-1 remain highly statistically significant, and the coefficients of the pay structure benchmarking variables become statistically significant at the 1% level. Evidently, the firm fixed effects formulation reinforces our findings and conclusions

about the economic significance of the benchmarking measures. However, since we are not familiar with previous studies that use firm fixed effects in regressions of the change of pay, we conservatively employ industry-year fixed effects for the rest of our analysis.

[Insert Table 5 about here]

In summary, the results in Table 5 uphold hypotheses 1 and 2 - CEO pay component levels are adjusted based on two benchmarking criteria: (i) the previous year ratio of the pay component at the focal firm to the median pay component at the peers; and (ii) the previous year difference between the pay component weight in total compensation in the focal firm and the median corresponding weight in the peer group.

It is interesting to examine the difference in the benchmarking coefficients across the main pay components. For this task we employ the seemingly unrelated regressions (SUR) methodology, because: (i) it achieves more efficient estimation⁶; and (ii) it affords testing restrictions on parameters from several pay component equations.

The equation system we use comprises the three major pay components: salary; non-equity incentive; and equity pay. For each component we use the model specified in Equation 3 above. For example, for salary we use:

$$(4) \quad \Delta \text{Ln}(\text{Salary}_{i,t}) = \beta_0 + \beta_1 \text{Ln}(\text{Relative salary}_{i,t-1}) + \beta_2 \left[\left(\frac{\text{peer's salary}}{\text{peer total compensation}} \right)_{i,t-1} - \left(\frac{\text{CEO's salary}}{\text{CEO total compensation}} \right)_{i,t-1} \right] + \sum_{m=3}^{10} \beta_m \text{Controls}_{m,i} + \beta_{11} (\text{IndustryDum}_{i,t}) \times (\text{YearDum}_t) + \varepsilon_{i,t}$$

The null hypothesis is that the coefficients describing benchmarking are equal across the three pay components' regressions. The alternative hypotheses propose

⁶ The residuals of the pay component regressions could be correlated, due to common unobserved factors that influence all pay components.

differences in the adjustment coefficients. For example, regarding β_1 , we examine two alternatives

H1a : $\beta_{1,Salary} \neq \beta_{1,non-equity\ performance\ pay} \neq \beta_{1,equity\ pay}$, and

H1b : $\beta_{1,non-equity\ performance\ pay} \neq \beta_{1,equity\ pay}$

The results of the SUR estimation are presented in Table 6 Panel A. The coefficients of the SUR estimation are slightly higher than those reported in Table 5. This difference is probably due to exclusion in the SUR analysis (Table 6) of firm-years without non-zero data for all three major pay components.

Table 6 Panel B summarizes the results of F-tests examining cross-components (i.e., cross-equations) differences in the benchmarking coefficients. We find a significant difference in the coefficients when all three pay components are compared. The source of this variation is the clearly weaker benchmarking of CEO's salary. We do not find significant differences between equity pay and non-equity performance pay.

One explanation for the less pronounced adjustment of the salary component is that the salary compensation is subject to the one million dollar tax deductibility rule. Thus, firms approaching the one million dollars' cap from below may find adjusting their CEO base salary at the same rate as other components of pay to be more costly. Consequently, pay adjustments of salary become less pronounced.

To further explore the one million dollar cap explanation, we generate a dummy variable that equals 1 when CEO's previous year base salary is below 900 thousand dollars, and zero otherwise. Presumably, CEOs with a salary below 900 thousand dollars are less restricted by the one million dollar salary cap regulation. This dummy variable is then interacted with the benchmarking measure, $\ln(\text{Relative salary}_{i,t-1})$. Adding this interaction term to the SUR system, we find that for CEOs who earn a

salary below 900 thousand dollars, the adjustment coefficient is 0.10. This coefficient is statistically significantly higher than the over 900 thousand dollars respective coefficient of 0.08. Thus, our findings are consistent with the conjecture that the one-million-dollar cap mitigates salary adjustments.

While the million-dollar salary cap can partially explain the difference in the adjustment coefficients between salary and other pay components, it cannot fully explain the differences. The amended adjustment coefficient for the subsample of below 900 thousand dollar salary, 0.104, is still markedly lower than the adjustment coefficient of about 0.3 estimated for the two other pay components (equity pay and non-equity performance pay). We conclude that the one million dollar cap cannot adequately explain the considerably lower magnitude of adjustment of the salary component documented in Table 6. It is possible that the fact that salary is a “sure” cash pay component causes boards to adjust it more conservatively than the two other uncertain and performance-related pay components.

[Insert Table 6 about here]

4.3. Are Pay Components Benchmarked Differently from Total Pay?

This study analyses each pay component separately. However, it is possible to argue that only total compensation is benchmarked, and the pay component levels are consequential, i.e., adjusted later according to their proportion in total pay. We can directly test the proposition that pay components are benchmarked independently from total compensation by fitting the following model:

$$(5) \quad \Delta \ln(\text{CEO compensation component } X_{i,t}) = \beta_0 + \beta_{1T} \ln(\text{Relative total compensation}_{i,t-1}) + \beta_{1X} \ln(\text{Relative compensation component } X_{i,t-1}) + \sum_{m=2}^9 \beta_m \text{Controls}_{m,i} + \beta_{10} (\text{IndustryDum}_{i,t}) \times (\text{YearDum}_t) + \varepsilon_{i,t}$$

Equation 5 allows both total pay and individual component benchmarking. It uses both previous-year relative total pay and previous-year relative pay component as explanatory variables. Under a conservative null hypothesis (benchmarking all pay components identically to total pay), the coefficient β_{1X} in Equation 5 should equal 0 for all pay components. This is because according to the null there is only one set of benchmarking criteria, those based on total pay, i.e., the component-specific benchmarking criteria is redundant.

Further, in practice, to avoid distortions due to the multicollinearity, we regress *Relative compensation component* $X_{i,t-1}$ on *Relative total compensation* $i,t-1$, and use the residual of this regression instead of *Relative compensation component* $X_{i,t-1}$ when fitting Equation 5. This pre-test orthogonalization process makes rejections of the null even more difficult.

Table 7 presents the results of fitting Equation 5 to the three key pay components data using the SUR (Seemingly Unrelated Regressions) methodology. First, as a baseline, we report results of a set of regressions with only the total pay benchmarking variable, and a set of regressions with only individual pay-component benchmarking. Then, we report results of regressions with both total pay and individual pay-component benchmarking variables.

In Table 7 regressions, the coefficients of both the total pay and pay component benchmarking variables are positive and statistically significant at the 1% level at least. However, the system-weighted R^2 of the formulation that includes pay component benchmarking alone, 0.3065, is remarkably higher than the system-weighted R^2 of the formulation with only total pay benchmarking, 0.2238. Further, when both pay component benchmarking and total pay benchmarking are used (in the third set of regressions reported in Table 7), the system weighted R^2 improves only slightly—from

0.3065 to 0.3069—relative to the set of regressions containing pay components alone. Pay component benchmarking alone seems to adequately explain the revision in pay component X, i.e., total pay benchmarking appears secondary in the pay component setting process.

[Insert Table 7 about here]

More formal tests of the importance of pay component benchmarking can be conducted. The null hypothesis proposes that in our system of three pay components regressions that includes both individual pay component and total pay benchmarking explanatory variables:

$$\beta_{1, \text{salary}} = \beta_{1, \text{non-equity performance pay}} = \beta_{1, \text{equity pay}} = 0.$$

These implications of the null are tested and rejected by the data at the 1% level. Clearly, each pay component receives special attention, i.e., benchmarking on its own.⁷

The last set of pay component regressions in Table 7 is copied from Table 6 for comparison convenience; it combines pay component benchmarking with pay structure benchmarking. Notably, its system weighted R², 0.3071, is the highest in Table 7, implying that benchmarking of individual pay components plus benchmarking of the pay mix are the most successful explanation for CEO compensation.⁸

The tests in this section supplement our main tests and reinforce our conclusion that separate benchmarking attention is devoted to each key CEO pay component.

⁷ We also run a set of regressions with total pay and pay structure benchmarking as explanatory variables. These regressions essentially replace the pay component benchmarking terms on the right-hand side of Equation 5 with our pay structure benchmarking variables, the deviations of the pay component weight from its peers' median weight. All benchmarking coefficients in these regressions are statistically significant, yet the system weighted R², 0.2785, is low relative to that of benchmarking pay components alone. Hence, the results are not reported in Table 7.

⁸ We also run a set of regressions with three benchmarking variables: total pay; pay component; and pay mix benchmarking. However, these regressions are plagued with severe multicollinearity problems that obstruct any inference regarding any single benchmarking variable.

Further, our evidence may also be interpreted to indicate that CEO compensation design is a bottom-up process, which builds from the individual pay components to total compensation.

4.4. Cross-Sectional Variations in the Intensity of Pay Component Benchmarking

Given the above evidence on the existence of pay component benchmarking, testing potential explanations for such benchmarking - our cross-sectional hypotheses (Hypotheses 3-6), becomes relevant. Practically, these tests are conducted by adding to our standard pay regression (Equation 3) an interaction term constructed by multiplying our level-of-pay-component benchmarking measure, *Relative compensation component* $X_{i,t-1}$, by a dummy variable that represents a factor suggested by one of our cross-sectional hypotheses. For example, we add the interaction between the relative pay component X and a dummy variable for Generalist CEOs. We have also attempted adding an interaction term between the structure-of-pay benchmarking variable and various cross-sectional dummy variables; however, these interaction terms scored statistically insignificant coefficients. Thus, pay structure interaction terms are omitted.

4.4.1. Tests of Hypothesis 3: CEO outside opportunities

We define a Generalist CEO, CEOs whose *General Ability Index* score is above the yearly median⁹. Generalist CEOs are presumably more mobile, hence retaining them is more difficult and requires more meticulous benchmarking. The first three columns of Table 8 Panel A document our Generalist CEO results. The coefficients of the interaction terms between relative pay and the Generalist CEO dummy variable are positive for all pay components and are statistically significant at the 5% and 1% levels

⁹ The *General Ability Index* is developed in Custodio et al. (2013), and it measures CEO's general managerial skills. We thank Prof. Custodio for providing *General Ability Index* data on most of our CEOs and up to 2016.

for salary and equity pay, respectively. Consistent with Hypothesis 3, a Generalist CEO with more outside opportunities receives tighter benchmarking.

We also attempted interacting *Relative compensation component* $X_{i,t-1}$ with a dummy variable equal to 1 for firms in industries with below median percentage of inside CEOs (identified based on Table III in Cremers & Grinstein, 2014). The coefficients of the interaction terms are positive and range from 0.024 for salary to 0.039 for non-equity performance pay. Yet, only in the salary regression, the interaction term coefficient is statistically significant at the 5% level. These findings are consistent with Hypothesis 3 and suggest that in industries with relatively common outside CEO appointments, benchmarking is stricter and stronger. For brevity, we do not report these results in the table.

(Insert Table 8 about here)

4.4.2. Tests of Hypothesis 4: Unobserved CEO Preferences and Characteristics

Hypothesis 4 proposes more aggressive benchmarking for CEOs in their first years in office and weaker benchmarking for founder CEOs. This is because acquaintance with the CEO and her preferences affords tailoring a pay contract that relies less on benchmarking. We define non-veteran CEOs as CEOs with below sample-median (below 6 years) of tenure within the firm.

Columns 4-6 of Table 8 Panel A show that benchmarking intensity is higher for CEOs in their first years of service. The estimated coefficients on the interaction terms with non-veteran CEOs are highly significant and hover around 0.08, for the equity and non-equity performance pay components. This evidence supports Hypothesis 4 and is also consistent with Edmans et al. (2022) finding that board members mention the peer

pay as a leading factor in setting the pay of a new CEO yet consider it a far less important determinant of incumbent CEO pay.

A similar logic applies to benchmarking the pay of founder CEOs. Founder CEOs are veteran CEOs within their firm. Further, the threat that a founder CEO would leave is relatively low, likely because she has developed firm-specific human capital. We interact *Relative compensation component* $X_{i,t-1}$ with a dummy variable equals 1 if the CEO is the founder of the firm and 0 otherwise. The regression results are reported in columns 7-9 of Panel A. Consistent with Hypothesis 4, the interaction terms coefficients are negative, indicating that benchmarking intensity is weaker for founder CEOs. Further, the coefficient on the interaction term in the equity pay regression is most negative, probably because founder CEOs need less equity pay incentives given their initial large equity stakes.

4.4.3. Tests of Hypothesis 5: Directors' Reputation Concerns

Hypothesis 5 proposes that directors with stronger reputational concerns prefer and lead the Board to a tighter benchmarking of CEO pay. We assume that outside directors are more concerned about reputation as their future careers depend on it. In columns 1-3 of Panel B we examine the effect of outside directors by adding an interaction term between *Relative compensation component* $X_{i,t-1}$ and a dummy variable that equals 1 for boards with above median percentage of outside directors (and equals 0 otherwise). Consistent with Hypothesis 5, the interaction term coefficients are positive and highly statistically significant in all pay components' s regressions.

We also examine the effect of a fully independent compensation committee. Presumably, in a compensation committee comprising only outside directors, the outside directors' concerns are more pronounced. Hence, such committees are expected to benchmark CEO pay more vigorously. Columns 4-6 of Panel B summarize the results

of adding an interaction term between the relative pay component and a fully independent compensation committee. Consistent with Hypothesis 5, the estimated coefficients of the interaction terms are positive and statistically significant at the 10% (1%) level in the equity (non-equity performance) pay regressions, respectively.

Last, we examine Hypothesis 5's prediction that a higher proportion of veteran directors mitigates benchmarking. We argue that veteran directors have established reputation; hence their reputational concerns may be muted to a point where they can afford milder benchmarking. We interact *Relative compensation component* $X_{i,t-1}$ with a dummy variable that equals 1 for firms with above median percentage of veteran directors (defined as directors with over 10 years tenure). Columns 7-9 of Panel B document the negative coefficients of the interaction term between veteran directors and relative pay component. Consistent with Hypothesis 5, it appears that a veteran director does not rely on peer pay data as much as her less veteran director does.

4.4.4. Tests of Hypothesis 6: The Effect of Compensation Consultants

Hypothesis 6 predicts stronger compensation benchmarking in firms retaining leading compensation consultants. This is because such market leaders probably provide higher quality benchmarking guidance or because firms who plan to benchmark more aggressively retain ex-ante the leading and more reputable compensation consulting firms. Panel C of Table 8 presents the results of estimating equation 3 with an interaction term between *Relative compensation component* $X_{i,t-1}$ and a dummy variable that equals 1 for firms hiring one of the top 5 consulting firms in terms of market share in year t . Consistent with Hypothesis 6, the coefficients of the interaction

terms are positive and significant at 5% level in the salary and non-equity performance pay regressions.

4.5. The Effect of Benchmarking on Firm Valuation

An emerging recent strand of literature contends that implementation of the 2006 SEC disclosure rule together with other regulatory changes (the Say on Pay reform, for example) decrease CEO pay dispersion, increase pay structure similarity, and lower firm performance and valuation (Cabezón, 2021; Jochem et al., 2021). Accordingly, we attempt to examine the effect of benchmarking intensity on firm's relative valuation, estimated as Tobin's Q. If benchmarking is detrimental to firm value, firms that benchmark aggressively would deteriorate their Tobin's Q, *ceteris paribus*.

Estimating panel regressions such as those of Cabezón (2021) and Jochem et al. (2021) requires an annual observation of benchmarking intensity for each firm. We propose the following measure of the annual benchmarking or adjustment intensity:

$$(6) \quad BI_{i,t} = \frac{\text{CEO compensation component } X_{i,t} - \text{CEO compensation component } X_{i,t-1}}{\text{Peer pay_Component_}X_{i,t-1} - \text{CEO compensation component } X_{i,t-1}}$$

Where $BI_{i,t}$ is the benchmarking intensity of firm i in year t , *CEO compensation component* $X_{i,t}$ is the level of pay component X at firm i in year t , and *Peer pay_component* $X_{i,t}$ is the median level of pay component X at firm i peers in year t . The benchmarking intensity, BI, measures the proportion of gap correction. The denominator is the previous year gap in the CEO's pay relative to the peers, and the numerator is the current year "correction" in CEO pay. Note that BI is positive if firms correct CEO's pay components towards the median of their peers. Indeed, we find that the mean and median BI are positive for all pay components.

To test the effect of benchmarking intensity on Tobin's Q, we run:

$$(7) \quad \text{Tobin's } Q_{i,t+1} = \beta_0 + \beta_1 BI_{i,t} + \beta_2 \ln(\text{Sales}_{i,t}) + \beta_3 \text{ROA}_{i,t} + \\ \beta_4 \text{CAPEX}_{i,t} + \beta_5 \text{Cash Balance}_{i,t} + \beta_6 \text{R\&D Expenses}_{i,t} + \\ \beta_7 \text{Leverage}_{i,t} + \beta_8 \text{PPE}_{i,t} + \beta_9 (\text{IndustryDum}_{i,t}) \times (\text{YearDum}_t) + \varepsilon_{i,t},$$

where *Tobin's* $Q_{i,t+1}$ is Tobin's Q of firm i at year end $t+1$. The explanatory variables comprise: (i) the benchmarking intensity; (ii) the natural logarithm of sales (a measure of firm size); (iii) return on assets (ROA); (iv) the ratio of capital expenditures to total assets; (v) the ratio of cash and short-term investments to total assets; (vi) the ratio of research and development expense to total assets; (viii) leverage ratio and (ix) the ratio of property, plant, and equipment to total assets. All these variables, but BI, are customary explanatory variables for Tobin's Q. Similarly to Cabezon (2021), all explanatory variables are measured in year t while Q is measured at $t+1$. We also include dummy variables for each unique combination of industry and year, using the 49 Fama and French (1997) industries. Last, the residual e_{it} is a firm-year specific error term that is assumed to be correlated within firms and heteroskedastic.

In unreported panel regression results we find statistically (and economically) insignificant effects of our benchmarking intensity measure on firm valuation (Tobin's Q). The coefficient of BI ranges from a low of -0.00082 for equity pay to a high of 0.0067 for salary. In further tests we considered only cases with a positive BI, and split the sample into cases with below peer median and above peer median CEO pay. None of the splits or subsamples we attempt yields statistically significant results.

Our unsuccessful attempts to identify any effect of benchmarking intensity on firm valuation may emanate from at least two reasons. First, our benchmarking intensity measure may be poor. It is possible that our data does not facilitate an accurate

estimation of annual benchmarking intensity. Second and perhaps more fundamental, benchmarking may not hurt firm valuation, on average. This is because on the one hand benchmarking encourages the CEO to increase her work efforts, affecting positively firm value, while on the other hand firms employing excessive emphasis on benchmarking may miss the optimal CEO compensation contract, destroying value. Hence, our failure to detect significant valuation effects of benchmarking may also indicate that on average the positive and negative valuation effects of benchmarking offset each other. In sum, however, the possible weakness of our annual benchmarking intensity measure prevents us from drawing any conclusions regarding the efficacy of benchmarking. It is noteworthy that Cabezon (2021) and Jochen et al. (2021) also do not blame benchmarking for value destruction. Cabezon (2021) emphasizes the negative impact of regulation, while Jochem et al. (2021) warn against the negative effects of reciprocal benchmarking.

4.6. Robustness Tests

We conduct several robustness tests on our reported results to alleviate concerns of spurious results and to assist with inference. One concern is that firms that do not use all available pay components when compensating their CEOs potentially introduce noise. When confining the sample to firm-years with non-zero values for all pay components, we find slightly higher coefficients for all our benchmarking variables in Table 5 regressions, suggesting that our results are not driven by firms that omit certain pay components..

Another concern is that in many cases the compensation component in year t is awarded based on a multiyear compensation plan. To monitor the effect of such multiyear grants we add the lagged (year $t-1$) level of the examined pay component to the list of explanatory variables in our industry-year fixed effects formulation of the

pay component change equation; this methodology is proposed in Bizjak et al. (2011). The estimated coefficients of our first benchmarking variable - *Relative compensation component* $X_{i,t-1}$ drop to 0.19 (0.26) in the non-equity performance (equity) pay regression of Table 5. However, all the coefficients of the benchmarking variables remain statistically significant. In the new pay component regressions, the coefficient of the lagged compensation variable is significantly negative, and adjusted R^2 s are higher than those reported in Table 5.

Further, we replicate the main tests using two-digit SIC codes instead of the Fama and French (1997) 49-industries and find similar results. Last, we re-estimate the regressions confining the sample to S&P 900 firms. The estimated coefficients on the benchmarking variables are slightly attenuated, suggesting somewhat stronger adjustments to peer pay in Small Cap companies.

6. Summary

Compensation benchmarking is an important and prevalent tool in setting CEO pay. Whereas previous studies focus on the benchmarking of total compensation, this study describes the benchmarking of CEO pay components. We base our investigation on two samples: one, the proxy statements of S&P 500 firms for fiscal year 2013, revealing company benchmarking policies; and two, a relatively large sample of CEO compensation data for S&P 1500 firms (and their peers) in 2006–2019, revealing company actual pay practices.

We contribute four valuable new observations. First, we show that pay component benchmarking describes company policies and actual pay practices better than total compensation practices. Second, we identify intra-pay-component differences - the adjustment of salary to that of selected peers is significantly less pronounced than the corresponding adjustments of non-equity performance pay and

equity pay. Third, we present some evidence that companies also adjust CEO's pay structure (mix of compensation components) towards that of its peer group. Fourth, we examine some potential explanations for benchmarking pay components, and find that benchmarking intensity varies with some CEO characteristics, Board of Directors attributes and compensation consultant salience measures.

A plausible interpretation of our evidence is that boards of directors recognize that each pay component has its own role in motivating the CEO for staying with the firm and for providing incentives to elicit effort. Consequently, it is essential to benchmark each pay component and balance among all pay components. The board looks at comparable successful firms as models for prudent compensation plans and employs these companies as compensation peers. Our new evidence on pay component benchmarking contributes to the economic understanding of the drivers of CEO's pay and its structure.

Appendix: Variables' Description

Variable	Description
<u>I. Benchmarking related variables:</u>	
Distance in the proportion of pay component X from peer group median	The difference between the median weight of pay component X in peer firms' total CEO compensation and the corresponding weight at a specific sample firm, both at year $t-1$.
Ln(relative total compensation)	A benchmark measure defined as the natural logarithm of the peer-group-based total compensation target divided by firm CEO total compensation, both at year $t-1$.
Ln(relative level of pay component X)	A benchmark measure defined as the natural logarithm of the peer-group-based target level of pay component X divided by firm CEO's level of pay component X, both at year $t-1$. Sometimes abbreviated as Ln(relative pay component X) or Ln(relative compensation component X)
$BI_{i,t}$	$BI_{i,t}$ is the benchmarking intensity of firm i in year t . $BI_{i,t}$ is defined as the dollar change in the level of pay component X from year $t-1$ to year t , divided by difference between the peer group median level of pay component X and the CEO's level of pay component X, both at year $t-1$.
<u>II. Compensation related variables:</u>	
All other compensation	Execucomp data item OTHCOMP, and ECA variable name OtherAnnualCompensation.
Bonus	Execucomp data item BONUS, and ECA variable name AnnualBonus.
Equity pay	The sum of option awards and stock awards.
Non-equity incentive plan compensation	Execucomp data item NONEQ_INCENT, and ECA variable name NonEquityIncentivePayout.
Non-equity performance pay	The sum of bonus and non-equity incentive plan compensation.
Option awards	Execucomp data item OPTION_AWARDS, and ECA variable name OptionAwards. For certain years (2006 in Execucomp and 2006-2008 in ECA) we use Execucomp data item OPTION_AWARDS_FV, and ECA variable name OptionGrantsISS. This facilitates consistent measurement and comparability along sample years.
Other pay	The sum of change in pension value and non-qualified deferred compensation earnings and all other compensation.
Performance pay	The sum of bonus, option awards, stock awards, and non-equity incentive plan compensation.
Salary	Execucomp data item SALARY, and ECA variable name DisclosedSalary.
Stock awards	Execucomp data item STOCK_AWARDS, and ECA variable name StockAwards. For certain years (2006 in Execucomp and 2006-2008 in ECA) we use Execucomp data item STOCK_AWARDS_FV, and ECA variable name StockDisclosedGrantDate. This facilitates consistent measurement and comparability along sample years.

Total compensation	Total compensation is the sum of salary, bonus, option awards, stock awards, non-equity incentive plan compensation, change in pension value and non-qualified deferred compensation earnings, and all other compensation. Salary, bonus, option awards, stock awards, non-equity incentive plan compensation, change in pension value, and non-qualified deferred compensation earnings, and all other compensation. These compensation components disclosed in the summary compensation table of each public firm since December 2006. Execucomp data item TOTAL_SEC, and ECA variable name DisclosedTotalCompensation.
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III. Control Variables

CAPEX	The ratio of capital expenditures (Compustat data item CAPX) to total assets (Compustat data item AT) at the end of year t.
Cash balance	The ratio of cash and short-term investments (Compustat data item CHE) to total assets (Compustat data item AT) at the end of year t.
CEO age	The age of the CEO in years.
CEO Duality	A dummy variable equal to 1 when the CEO is also the Chairman of the board (and 0 otherwise)
Leverage	Total liabilities (Compustat data item LT) divided by the sum of total liabilities and the market value of equity (Compustat data items LT+CSHO*PRCC_F) at year t end.
Ln(sales)	The natural logarithm of firm's sales revenue in millions of Dollars in year t (Compustat data item SALE).
Lagged Ln(monthly return standard deviation)	The natural logarithm of the standard deviation of the monthly stock returns in the thirty-six months preceding the end of the previous fiscal year.
Lagged market-to-book value	The ratio of market value of equity to the book value of equity at year t-1 end (Compustat data items [CSHO*PRCC_F+TL+PSTKL-TXDITC]/AT).
PPE	The ratio of property, plant, and equipment (Compustat data item PPE) to total assets (Compustat data item AT) at the end of year t.
R&D expenses	The ratio of research and development expense (Compustat data item XRD) to total assets (Compustat data item AT) at the end of year t. The variable is set to zero when research and development expense is missing.
ROA	Return on assets calculated as the ratio of income before extraordinary items (Compustat data item IB) to total assets (Compustat data item AT) in year t.
Stock return	The stock returns including dividends (Compustat data item RET) for the current fiscal year (year t).

IV. Firm valuation related variable

Tonin's $Q_{i,t+1}$	Tobin's Q of firm i at year end t+1 defined as the ratio of the book value of assets (Compustat data item AT) plus the market value of common stock (i.e. number of shares outstanding (Compustat data item CSHO) times share price (Compustat data item PRCC-F)) less the book value of common stock (Compustat data item CEQ) and deferred taxes (Compustat data item TXDB) to book value of assets (Compustat data item AT).
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Table 1: Company Policy Statements on Benchmarking CEO Pay

The table summarizes S&P 500 firms' compensation benchmarking policies, as disclosed in their proxy statements (DEF 14A) for fiscal year 2013. The overall sample comprises 505 firms.

Panel A: Benchmarking statements

The benchmarking statements in company proxy regard					
At least one pay component	All three pay components	Only two pay components	Only one pay component	Total compensation	Missing or vague statements
449	378	38	33	336	28
88.9%	74.9%	7.5%	6.5%	66.5%	5.5%

Panel B: Other relevant benchmarking information

Benchmarking of			
The structure of compensation	Pay components using non-median targets	Only total compensation	Only pay components
154	66	24	113
30.5%	13.1%	4.8%	22.4%

Table 2: Exclusion Report

We start with all CEOs of S&P 1500 firms in 2006-2019.

Exclusion criteria	Number of firm-year observations
Initial sample	23,646
missing compensation data	505
zero values for total compensation	97
CEOs are in their first or last year of service	4,899
The company did not specify peers/data are not available	6,939
peer group comprises only 1-2 firms	46
missing compensation data for 50% or more of the disclosed peers	895
Co-CEOs	54
firms in the financial services industry	2,083
Final sample	8,128

Table 3: Descriptive Statistics of CEO Pay and Its Components.

The sample comprises CEOs of S&P 1500 firms in 2006–2019. Panel A reports descriptive statistics for CEO actual pay and peer median pay. All compensation figures are in thousands of dollars. Panel B reports descriptive statistics for the weight of various compensation components in total compensation at the focal firms, as well as the respective weights based on peer compensation data in the previous year. All compensation figures are winsorized at the 2.5th and 97.5th percentiles. Definition of and details on all variables are provided in the Appendix.

Panel A: Annual pay levels of CEOs (in thousands of dollars)

	Mean	Std. dev.	Median	N	Mean	Std. dev.	Median	N
	Pay level among focal firms				Median peers' compensation			
Total compensation	8,158	6,106	6,563	7,848	8,090	4,664	7,182	7,848
Salary	958	338	945	7,884	974	270	974	7,884
Bonus	97	351	0	7,884	12	103	0	7,884
Option awards	1,348	1,822	661	7,883	1,130	1,160	831	7,883
Stock awards	3,265	3,304	2,280	7,879	3,046	2,381	2,493	7,879
Non-equity incentive plan compensation	1,558	1,615	1,125	7,882	1,388	962	1,235	7,882
Change in pension value and nonqualified deferred compensation earnings	555	1,141	0	7,855	338	707	0	7,855
All other compensation	209	301	96	7,881	148	129	116	7,881
<u>Aggregate pay components</u>								
Equity pay	4,728	4,152	3,626	7,879	4,661	3,072	4,026	7,879
Non-equity performance pay	1,693	1,670	1,233	7,882	1,558	1,058	1,348	7,882

Panel B: CEO compensation structure

	Mean	Std. dev.	Median	N	Mean	Std. dev.	Median	N
	Compensation structure at focal firms				Compensation structure at chosen peers			
Salary/Total compensation	0.19	0.13	0.15	8,099	0.15	0.069	0.14	8,099
Bonus/Total compensation	0.035	0.10	0.00	8,099	0.014	0.051	0.00	8,099
Option awards/Total compensation	0.18	0.22	0.14	8,099	0.15	0.118	0.15	8,099
Stock awards/Total compensation	0.35	0.31	0.33	8,099	0.325	0.182	0.33	8,099
Non-equity incentive plan compensation/Total compensation	0.20	0.15	0.18	8,098	0.17	0.067	0.18	8,098
<u>Aggregate pay components</u>								
Equity pay/Total compensation	0.54	0.36	0.55	8,099	0.54	0.15	0.56	8,099
Non-equity performance pay/Total compensation	0.23	0.15	0.20	8,098	0.20	0.07	0.19	8,098

Table 4: Preliminary Evidence on Benchmarking in CEO Compensation and Its Components.

The sample comprises CEOs of S&P 1500 firms in 2006–2019. Panel A reports changes in CEO pay from year t-1 to year t. It shows the mean and the median logarithmic changes in pay for CEOs who are paid above the peer group median pay and CEOs who are paid below the peer group median in the previous year. The analysis reviews five CEO pay and pay component measures: total compensation, total compensation excluding the change in pension value, salary, non-equity performance pay and equity pay. The Wilcoxon signed rank-sum test and t-test are used to assess statistical significance for differences in the median and mean, respectively, between the above- and below-the-median groups. Panel B focuses on the changes in the weight of various pay components in total compensation from year t-1 to year t. It compares two subsamples: 1) CEOs whose pay component weight in total compensation was above the peer group median in the previous year; and 2) CEOs whose pay component weight in total compensation was below the peer group median in the previous year. Definitions and details for all variables are provided in the Appendix.

Panel A: Mean and median changes in Ln(pay) for CEOs above and below their peers' median pay

Pay measure	Group	Number of observations	Mean change in Ln (pay)	Median change in Ln (pay)	<i>p</i> -Values for difference	
					<i>t</i> -Test	Wilcoxon test
Total compensation	Above median	3,390	-0.086	-0.032	<.0001	<.0001
	Below median	4,672	0.21	0.15		
Total compensation (excluding the pension deduction)	Above median	3,453	-0.090	-0.016	<.0001	<.0001
	Below median	4,675	0.20	0.14		
Salary	Above median	3,463	0.025	0.019	<.0001	<.0001
	Below median	4,603	0.051	0.037		
Non-equity performance pay	Above median	3,660	-0.10	-0.029	<.0001	<.0001
	Below median	3,309	0.21	0.16		
Equity pay	Above median	3,431	-0.067	0.00041	<.0001	<.0001
	Below median	3,884	0.23	0.14		

Table 4- Continued

Panel B: Preliminary evidence on the benchmarking of the structure of CEO pay

Pay measure	Group	Number of observations	Mean weight of pay component in total compensation in year t-1	Mean change in the weight of the pay component	Median change in the weight of the pay component	<i>p</i> -value of the change (based on a <i>t</i> - test)
Salary	Above median	4,503	0.24	-0.037	-0.018	<.0001
	Below median	3,559	0.12	0.025	0.006	
Non-equity performance pay	Above median	4,235	0.32	-0.068	-0.048	<.0001
	Below median	3,825	0.12	0.054	0.020	
Equity pay	Above median	3,926	0.71	-0.074	-0.029	<.0001
	Below median	4,136	0.37	0.11	0.046	

Table 5: The Effect of Benchmarking on the Yearly Revision in CEO Pay Components.

The table presents the results of fitting Equation 3. The sample comprises CEOs of S&P 1500 firms in 2006-2019. Definition of and details on all variables are provided in the Appendix. Year \times Industry FE are dummy variables for each unique combination of industry and year, using the 49- industry classification of Fama and French (1997). Note that for each of our three main pay components, we fit an individual parsimonious model that is restricted to include only explanatory variables that are significant at the 1% level at least in our basic pay components regressions (see the Online Appendix 1). Further, statistically insignificant coefficients are omitted from the table. Standard errors, reported in parentheses, are clustered at the firm level. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

	Change in Ln (CEO compensation component X)					
	Industry \times Year fixed effects			Firm and year fixed effects		
	(1)	(2)	(3)	(4)	(5)	(6)
	Salary	Non-equity performance pay	Equity pay	Salary	Non-equity performance pay	Equity pay
Intercept	0.081** (0.037)	0.080 (0.12)	0.16*** (0.025)	0.055*** (0.0038)	0.37*** (0.038)	0.32*** (0.042)
Ln(relative level of pay component X)	0.079*** (0.006)	0.28*** (0.015)	0.31*** (0.015)	0.15*** (0.010)	0.48*** (0.024)	0.53*** (0.019)
Distance in the proportion of pay component X from its peer group median	0.016* (0.0081)	0.15** (0.06)	0.10*** (0.030)	0.034*** (0.011)	0.30*** (0.088)	0.16*** (0.034)
Change in lagged Ln(sales)	0.050*** (0.0055)	-0.18*** (0.054)	0.19* (0.047)	0.022*** (0.0054)	-0.23*** (0.064)	
Change in stock return		0.35*** (0.021)	0.039*** (0.017)		0.30*** (0.022)	
Change in one-year lagged stock return		0.20*** (0.018)			0.21*** (0.019)	0.042*** (0.016)
Change in ROA		1.73*** (0.17)			1.84*** (0.19)	
Change in lagged ROA				0.029** (0.013)		
Change in lagged market-to-book value			0.055*** (0.021)			
Change in lagged leverage			-0.49*** (0.13)			-0.46*** (0.11)

Table 5- Continued

	Change in Ln (CEO compensation component X)					
	Industry × Year fixed effects			Firm and year fixed effects		
	(1)	(2)	(3)	(4)	(5)	(6)
	Salary	Non-equity performance pay	Equity pay	Salary	Non-equity performance pay	Equity pay
Year × Industry FE	Yes	Yes	Yes	No	No	No
Firm FE	No	No	No	Yes	Yes	Yes
Year FE	No	No	No	Yes	Yes	Yes
Observations	7,967	6,767	6,469	7,967	6,767	7,097
Adjusted R ²	0.182	0.290	0.223	0.289	0.310	0.300

Table 6: Variation in Benchmarking Across the Three Main Pay Components.

Panel A presents the results of fitting Equation 3 on a system of three key pay components (salary, non-equity performance pay, and equity pay) using seemingly unrelated regressions. Panel B reports F-tests of the differences in benchmarking coefficients across our three pay components. The sample comprises CEOs of S&P 1500 firms in 2006-2019. Definition of and details on all variables are provided in the Appendix. Year \times Industry FE are dummy variables for each unique combination of industry and year based on the 49-industry classification of Fama and French (1997). Note that for each pay component, we employ an individual parsimonious model that is restricted to include only explanatory variables that are significant at the 1% level at least in our basic pay components regressions (see Online Appendix 1). Standard errors are reported in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Results from fitting Equation 3 using seemingly unrelated regressions.

	Change in Ln (CEO compensation component X)		
	(1) Salary	(2) Non-equity performance pay	(3) Equity pay
Intercept	0.052*** (0.0028)	0.21*** (0.030)	0.033 (0.026)
Ln(relative level of pay component X)	0.10*** (0.0037)	0.29*** (0.014)	0.32*** (0.011)
Distance of pay component X weight from peer group's median weight	0.016* (0.0093)	0.18** (0.074)	0.11*** (0.030)
Other explanatory variables as in Table 5	Yes	Yes	Yes
Year \times Industry FE	Yes	Yes	Yes
Observations	5,623	5,623	5,623
System Weighted R ²		0.3071	

Panel B: Examining differences in benchmarking across pay components.

H0: The coefficients of Ln(relative level of pay component X) are equal in the equations of	F- statistic	p-value
Salary, non-equity performance pay and equity pay	249.31	0.0001
Non-equity performance pay and equity pay	3.46	0.063
H0: The coefficients of Distance from peer group's median weight are equal in the equations of	F- statistic	p-value
Salary, non-equity performance pay and equity pay	6.47	0.0016
Non-equity performance pay and equity pay	0.97	0.33

Table 7: Tests of the Difference in Benchmarking Between Total Compensation and Pay Components.

The table examines various benchmarking combinations in a system of the three main pay components (salary, non-equity performance pay, and equity pay) using seemingly unrelated regressions. The sample comprises CEOs of S&P 1500 firms in 2006–2019. Definition of and details on all variables are provided in the Appendix. Year \times Industry FE are dummy variables for each unique combination of industry and year based on the 49-industry classification of Fama and French (1997). Note that for each pay component, we employ an individual parsimonious model that is restricted to include only explanatory variables that are significant at the 1% level at least in our basic pay components regressions (see Online Appendix 1). To overcome multicollinearity between relative total compensation and relative pay component X, we first regress each relative pay component X on relative total compensation. Then, we use the residuals of these regressions instead of the relative pay components in the regressions. Standard errors are reported in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

	Change in Ln (CEO compensation component X)					
	(1) Salary	(2) Non-equity performance pay	(3) Equity pay	(4) Salary	(5) Non-equity performance pay	(6) Equity pay
Intercept	0.055*** (0.0030)	0.22*** (0.032)	0.041 (0.027)	0.052*** (0.0028)	0.20*** (0.030)	0.033 (0.026)
Ln(relative total compensation)	0.014*** (0.0015)	0.18*** (0.017)	0.33*** (0.014)			
Ln(relative level of pay component X)				0.095*** (0.0036)	0.31*** (0.011)	0.34*** (0.010)
Other explanatory variables as in Table 5	Yes	Yes	Yes	Yes	Yes	Yes
Year \times Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5,667	5,667	5,667	5,642	5,642	5,642
System Weighted R ²		0.2238			0.3065	

Table 7- Continued

	Change in Ln (CEO compensation component X)					
	(7) Salary	(8) Non-equity performance pay	(9) Equity pay	(10) Salary	(11) Non-equity performance pay	(12) Equity pay
Intercept	0.055*** (0.003)	0.18*** (0.030)	0.032 (0.026)	0.052*** (0.0028)	0.21*** (0.030)	0.033 (0.026)
Ln(relative total compensation)	0.012*** (0.0015)	0.16*** (0.016)	0.34*** (0.013)			
Ln(relative level of pay component X)	0.10*** (0.004)	0.33*** (0.012)	0.34*** (0.014)	0.10*** (0.0037)	0.29*** (0.014)	0.32*** (0.011)
Distance of pay component X weight from peer group's median weight				0.016* (0.0093)	0.18** (0.074)	0.11*** (0.030)
Other explanatory variables as in Table 6	Yes	Yes	Yes	Yes	Yes	Yes
Year × Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5,623	5,623	5,623	5,623	5,623	5,623
System Weighted R ²		0.3069			0.3071	

Table 8: Cross-Sectional Factors Affecting the Aggressiveness of Pay Component Benchmarking.

Panels A, B, and C examine the effects of CEO characteristics, Board of Directors' attributes and compensation consultant choice on benchmarking aggressiveness, respectively. The sample comprises CEOs of S&P 1500 firms in 2006-2019, and we replicate the regressions in Table 5 with an additional explanatory variable: the interaction between relative pay component and a dummy variable for above or below the median of a certain cross-sectional factor. Standard errors are reported in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Panel A: CEO characteristics

	Change in Ln (CEO compensation component X)								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Salary	Non-equity performance pay	Equity pay	Salary	Non-equity performance pay	Equity pay	Salary	Non-equity performance pay	Equity pay
Intercept	0.080** (0.039)	0.067 (0.12)	-0.0047 (0.28)	0.11** (0.052)	0.23*** (0.030)	0.16*** (0.021)	0.080** (0.037)	0.073 (0.12)	0.29 (0.19)
Ln(relative level of pay component X)	0.065*** (0.0091)	0.28*** (0.023)	0.25*** (0.023)	0.041*** (0.0070)	0.27*** (0.019)	0.27*** (0.022)	0.086*** (0.0061)	0.29*** (0.017)	0.32*** (0.017)
Ln(relative level of pay component X)×Dummy for generalist CEO	0.028** (0.013)	0.012 (0.029)	0.12*** (0.031)						
Ln(relative level of pay component X)×Dummy for CEOs with tenure equal or below the median of 6 years				0.078*** (0.0093)	0.026 (0.024)	0.082*** (0.027)			
Ln(relative level of pay component X)×Dummy for founder firm							-0.050*** (0.018)	-0.067 (0.044)	-0.12*** (0.044)
Distance in the proportion of pay component X from its peer group median	0.017* (0.0092)	0.15* (0.080)	0.21*** (0.060)	0.014* (0.0077)	0.13** (0.065)	0.10*** (0.029)	0.016* (0.0085)	0.14** (0.071)	0.13*** (0.033)
Other explanatory variables as in Table 6	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year × Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5,979	5,024	4,763	7,794	6,632	6,350	7,157	6,068	5,793
Adjusted R ²	0.192	0.294	0.240	0.199	0.290	0.226	0.189	0.296	0.231

Table 8- Continued

Panel B: Board of directors' attributes

	Change in Ln (CEO compensation component X)								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Salary	Non-equity performance pay	Equity pay	Salary	Non-equity performance pay	Equity pay	Salary	Non-equity performance pay	Equity pay
Intercept	0.083** (0.038)	0.07 (0.12)	0.27 (0.18)	0.076** (0.036)	0.073 (0.11)	0.28 (0.18)	0.078** (0.037)	0.069 (0.12)	0.27 (0.19)
Ln(relative level of pay component X)	0.064*** (0.0076)	0.24*** (0.020)	0.27*** (0.020)	0.11*** (0.0089)	0.32*** (0.022)	0.37*** (0.022)	0.084*** (0.012)	0.22*** (0.030)	0.27*** (0.033)
Ln(relative level of pay component X)×Dummy for above median percentage of outside directors	0.040** (0.011)	0.10*** (0.026)	0.10*** (0.027)						
Ln(relative level of pay component X)×Dummy for above median percentage of directors with over 10Y tenure				-0.043*** (0.011)	-0.059** (0.026)	-0.10*** (0.029)			
Ln(relative level of pay component X)×Dummy for fully independent compensation committee							-0.0042 (0.013)	0.088*** (0.033)	0.063* (0.037)
Distance in the proportion of pay component X from its peer group median	0.015* (0.0085)	0.13* (0.071)	0.13*** (0.033)	0.016* (0.0084)	0.14** (0.071)	0.14*** (0.033)	0.010 (0.0094)	0.11 (0.073)	0.12*** (0.033)
Other explanatory variables as in Table 6	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year × Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	7,116	6,036	5,760	7,116	6,036	5,760	6,428	5,523	5,219
Adjusted R ²	0.190	0.297	0.233	0.191	0.360	0.233	0.189	0.280	0.231

Table 8- Continued

Panel C: Compensation consultants

	Change in Ln (CEO compensation component X)		
	(1)	(2)	(3)
	Salary	Non-equity performance pay	Equity pay
Intercept	0.031*** (0.0013)	-0.066*** (0.015)	0.15*** (0.023)
Ln(relative level of pay component X)	0.064*** (0.0098)	0.25*** (0.026)	0.38*** (0.026)
Ln(relative level of pay component X)×Dummy for Top 5 consultants	0.027** (0.013)	0.067** (0.030)	-0.033 (0.034)
Distance in the proportion of pay component X from its peer group median	0.0038 (0.011)	0.094 (0.073)	0.062** (0.031)
Other explanatory variables as in Table 6	Yes	Yes	Yes
Year × Industry FE	Yes	Yes	Yes
Observations	5,695	4,989	4,677
Adjusted R ²	0.179	0.291	0.272

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