The Effects of CEO Type and Board Characteristics on the Benchmarking of CEO Compensation

by

Beni Lauterbach* and Revital Yosef**

January 2024

Abstract

We examine a panel of CEO compensation data on 1,440 S&P 1500 firms in 2006-2018 and find that: 1) Generalist CEOs' pay is more aggressively benchmarked; 2) Veteran and owner CEOs receive or resort to less benchmarking; and 3) Boards with more outside directors, more busy, and less veteran directors rely more on benchmarking. These findings support the contention that beyond retention purposes, benchmarking CEO compensation also serves the cautiousness and reputational concerns of directors and helps overcome some information gaps (resolved when the CEO and the Board are better acquainted).

* *Corresponding author*: School of Business Administration, Bar-Ilan University, Ramat Gan 52900, ISRAEL, and ECGI. E-mail: beni.lauterbach@biu.ac.il
** School of Economics, The College of Management Academic Studies, Elie Wiesel St 2, Rishon LeTsiyon, ISRAEL. E-mail: revitalyo@colman.ac.il

The Effects of CEO Type and Board Characteristics

on the Benchmarking of CEO Compensation

Abstract

We examine a panel of CEO compensation data on 1,440 S&P 1500 firms in 2006-2018 and find that: 1) Generalist CEOs' pay is more aggressively benchmarked; 2) Veteran and owner CEOs receive or resort to less benchmarking; and 3) Boards with more outside directors, more busy, and less veteran directors rely more on benchmarking. These findings support the contention that beyond retention purposes, benchmarking CEO compensation also serves the cautiousness and reputational concerns of directors and helps overcome some information gaps (resolved when the CEO and the Board are better acquainted).

1. Introduction

A common practice in CEO compensation design is benchmarking, in which a given firm compares its CEO compensation with the compensation of peer CEOs at similar companies. Previous empirical research has established that peer pay and benchmarking play an important role in determining CEO's total compensation (Albuquerque et al., 2013; Bizjak et al., 2011; Bizjak et al., 2008; Faulkender & Yang, 2010; and Laschever, 2013) and CEO's pay components and pay structure (Grinstein et al., 2022).

Several motives for benchmarking can be conceived. First and most fundamental is the need for human capital retention. A 'fair' pay relative to peers motivates the CEO to stay in the firm and exert efforts towards the firm's success (Holmstrom & Kaplan, 2003; Chaigneau et al., 2024).

Second, when a CEO's character, preferences and match with the firm are unknown or uncertain, setting CEO's pay based on the pay levels and pay structure of the median peer CEO may help the board to minimize deviations from an optimal compensation contract, especially in cases of newly hired and non-veteran CEOs. Francis et al. (2016) further suggest that providing the CEO with a contract that resembles that of her peers contributes to firm performance, especially when those peers are successful and can serve as a role model for the CEO.

Last, benchmarking makes CEO's pay defensible. Regulators, shareholders, proxy advisors and the media, closely examine the CEO pay and compare it to that of peers. Thus, benchmarking peer CEOs also serves directors to mitigate potential outside criticism and consequently protect their own (directors') reputation.

We employ extensive compensation data to examine the empirical relevance of these motives. Using a relatively large CEO compensation database of 7,688 firm-year observations and 130,475 peer-year observations on 1,440 unique firms included in the S&P Composite 1500 during 2006–2018, we find supportive evidence for all the above motives.

First, consistent with the retention view, we find that benchmarking is stronger for generalist CEOs, defined as CEOs with general managerial skills (Custodio et al., 2013). A generalist CEO can more easily move from one firm to another; hence retention worries tighten her pay benchmarking.

Second, consistent with the information opaqueness view, CEOs who the board knows and has experience with, veteran CEOs and owner CEOs in our tests, receive a pay that is relatively weakly benchmarked. Evidently, acquaintance with the CEO affords a more tailor-made pay contract. However, the milder benchmarking of veteran and owner CEOs' pay might also reflect their power and domination over the board. Veteran and owner CEOs may resist and mitigate benchmarking especially when their pay is inflated.

Third, we present evidence consistent with the contention that directors act cautiously and protect their reputation. A board with a higher proportion of less veteran directors and outside directors (for whom reputation concerns appear relatively strong) benchmarks CEO pay more vigorously, minimizing the likelihood of arduous outside criticism. Reputation is also extremely important for directors with multiple board assignments, busy directors henceforth.

The evidence on the impact of the board of directors' composition is also consistent with the view that busy, non-veteran and outside directors feel less confident

about their decisions regarding the firm because they have less information and/or less understanding of the firm's situation.[1] Thus, these directors act cautiously and rely more heavily on common practices, i.e. on the pay contracts at peer firms. Whether the directors' choices are driven by natural cautiousness or by their selfish reputational concerns eludes us. In practice, both cautiousness, knowledge deficiencies and reputational concerns might be at work.

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. CEO Pay Benchmarking and its Possible Motivations

2.1. The Benchmarking Practice

CEO pay benchmarking is a process of adjusting CEO's compensation towards that of a peer group of CEOs at similar firms, where "similarity" is typically interpreted as identical industry, similar firm size, and a common managerial reservoir (identified by past sources and destinations of the firm's executives). Existing research documents that the median CEO total pay in the peer group helps explain CEO pay (Bizjak et al., 2008; Faulkender and Yang, 2010; Bizjak et al., 2011; Albuquerque et al., 2013; and Laschever, 2013). There is also evidence that major pay components such as salary, non-equity performance pay and equity pay are benchmarked (Grinstein et al., 2022). Thus, benchmarking is a key determinant of CEO pay.

The commonly stated purpose of benchmarking is to provide the CEOs with a competitive market pay. A CEO who is compensated improperly may potentially resign

---

[1] Busy directors lack of information reflects their lack of time given their many commitments and tough workload.

from the company or neglect her duties. 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).

A major concern about benchmarking is that it may be used to justify pay raises unrelated to the 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's 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 extent of pay manipulation via benchmarking is unclear. Cadman & Carter (2014) do not find evidence for opportunistic selection of peers, and Larcker et al. (2021) assess that only in a third of their firm-year observations peers were selected opportunistically. 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. Last, Francis et al. (2016) suggest that some upward-bias in peer group composition may be beneficial. They find that firms that elected relatively skilled CEOs as their peer group exhibit superior performance. It is possible that choosing an upward biased (in terms of skill) peer group motivates the firm CEO to increase her work efforts in order to resemble and reach the achievements of her distinguished peers.

A more recent line of attack against benchmarking is the claim that it is excessive. Several studies (Faulkender & Yang, 2010; Bizjak et al., 2011; Albuquerque et al., 2013) demonstrate that the peer CEOs' median pay affects CEO pay more than

firm's stock price performance. Further, Cabezon (2022) and Jochem et al. (2021) show that over time the CEO pay structure became more and more uniform across firms, perhaps due to the benchmarking of CEO's pay structure (Grinstein et al., 2022). The convergence of CEO's pay structures across firms appears suboptimal, as it is likely that "one size does not fit all".

In this study we sidestep the argument over the possible misuse or over-use of benchmarking. Rather, we explore and test several potential fundamental reasons for total pay benchmarking. Besides the common CEO retention motive, we document for the first time in the literature, the impact of information opaqueness and directors' cautiousness on CEO pay benchmarking. This is our contribution to literature.

2.2. Hypotheses on Potential Motivations for Pay Benchmarking

2.2.1. Retaining CEOs

Extant literature has focused on the role of total pay benchmarking in retaining valuable human capital (e.g., Holmstrom & Kaplan 2003). Fair pay is a necessary condition for the proper functioning of the CEO.

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. Consistent with this argument, we propose:

Hypothesis 1: Benchmarking intensity is stronger for generalist CEOs.

2.2.2 Unobserved CEO Preferences and Character

CEO's character, preferences and match with the firm are gradually revealed over CEO's service at the helm. Thus, in the first years of CEO's service, the board and CEO might agree on a standard pay package, based on peers' median pay. Over time, as the acquaintance between the board and the CEO improves, benchmarking probably weakens and the CEO gets a tailor-made compensation contract, benefiting her and the firm.

The above logic of acquaintance with the CEO also suggests that the compensation of an owner CEO relies less on benchmarking. Thus, based on the ability of boards to observe CEO personality and preferences, we advance:

Hypothesis 2: Benchmarking intensity is stronger for CEOs in their first years in office, and weaker for owner CEOs.

2.2.3. Directors' Cautiousness and Reputation Concerns

It is plausible that outside directors and directors who are in their first years of service in the firm recognize and understand the firm less than insider and veteran directors. Thus, such directors are rationally and naturally more cautious about complex issues such as CEO pay. They may rely on veteran and insider directors' experience on such issues. However, a safer strategy for them is to hire external help in the form of a compensation consultant and adopt the consultant's advice. Another type of directors, busy directors, may lack the time to study the pay issues thoroughly, thus preferring consultants' help. Given that consultants typically build peer groups and employ benchmarking while advising on CEO pay, benchmarking becomes a salient ingredient of CEO pay, and especially so when cautious directors strongly adhere to the consultants' advice.

In addition, studies have shown that directors are often markedly concerned with their reputation (Jiang et al., 2016) as reputation governs their careers (Fama & Jensen, 1983; Yermack, 2004; Chen et al., 2022). These concerns may lead directors to hedge potential risks of legal and social liabilities. To the extent that directors are worried that executive compensation may ignite a negative response in the media or social networks, they may tend to align CEO's pay with the standard pay level at comparable firms. Such a cautious hedging attitude may be more prevalent among less veteran directors, outside directors, and busy directors, whose good reputation is a key for their directorship careers. Hence:

Hypothesis 3: Boards of directors with a higher proportion of outside directors and busy directors benchmark CEO pay more aggressively. In contrast, a higher proportion of veteran directors mitigates pay benchmarking.

3. Samples and Data

We collect CEO compensation data for all S&P Composite 1500 firms and their compensation peers in the years 2006–2018. 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) since fiscal year 2006.

We focus on executives classified as CEOs by the Standard & Poor's ExecuComp database, from which we collect CEO compensation data. The initial sample comprises 21,943 firm-year observations. Since our main dependent variable is the CEO's pay change, we exclude 482 firm-year observations with no available compensation data for the current or previous year, and 91 observations with zero total compensation. We further drop 4,506 firm-year observations of CEOs who were

replaced or appointed during the current or previous year, to exclude partial compensation or exceptionally high one-time payments (e.g., golden parachutes, severance pay, golden handshakes, and sign-on bonuses). This exclusion process reduces sample size to 16,864 firm-year observations.

For each of the 16,864 firm-years, we search the list of compensation peers. We collect peer lists 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 firms' proxy statements.[2] We construct peer lists for 2,293 firm-year observations based on the Albuquerque et al. (2013) dataset. Next, our peer data for 2009–2013 come from the Executive Compensation Analytics (ECA) database, provided by Institutional Shareholder Services (ISS).[3] We construct peer lists for 4,959 firm-year observations using the ECA database. Last, peer lists for 2014-2018 are collected from ISS Incentive Lab database, from which we extract 3,373 firm-year observations. In total, we attain an explicit list of peers for 10,625 firm-years.

Given our lists of peer CEOs, we seek current and prior year compensation data for 251,267 peer CEOs firm-year observations (peer-year observations, in short). Thus, there are on average approximately 24 peers for each CEO. Since among the peers there are foreign and private firms that are not included in the ExecuComp or ISS databases, we find compensation data on the ExecuComp and ISS datasets only for 194,138 peer-year observations.

We further exclude: a) 46 firm-years of focal firms that report only one or two peers; b) 849 firm-years with missing compensation data for 50% or more of their

---

[2] We are grateful to Ana Albuquerque and her coauthors for providing us with these data. See Albuquerque et al. (2013) for the data description.

[3] 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).

chosen peers;[4] c) 54 firm-years of co-CEOs; d) 1,949 firm-years of firms in the more regulated financial services industry (industries 45–48 in the Fama-French industry classification); and e) 39 firm-year observations where one of the reported pay components is negative.

The final sample comprises 7,688 firm-year observations (and 130,475 peer-year observations) on 1,440 unique focal firms. Our final sample pay observations are distributed almost uniformly across the sample years, 2006-2018. The average (median) peer group for our sample firms comprises about 23 (19) firms. However, given missing peer compensation data, the mean (median) number of peers with available compensation data per focal firm decreases to 18 (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).

We also employ stock return data, collected from the Center for Research in Security Prices (CRSP) database. Data on other variables (sales, ROA, market-to-book ratio, and financial leverage) with a potential explanatory power of CEO pay, are extracted from the Standard & Poor's Compustat database. Data on the CEO's name, age, and tenure in the firm are from the Execucomp database.

To examine the potential motives for benchmarking, we employ data on board attributes from the MSCI (formerly KLD and GMI) database, and data on generalist CEOs (the General Ability Index) was provided by Professor Custodio. Last, data on CEO duality, cases where the CEO serves also as Chairman of the board or President, is from the above-mentioned MSCI database.

---

[4] We mark peer CEO pay as missing also in years when the peer CEO was replaced or appointed.

Table 1 describes the sample. Notably, peer CEO pay statistics resemble those of the focal firm CEOs. For example, the average annual total compensation of our focal firm CEOs is 7.98 million dollars, while the average of the corresponding peer group median annual total compensation is 7.89 million dollars.

The mean (median) total assets of our focal companies is 7,311 (2,871) million dollars. The mean (median) logarithmic annual stock return is 12% (11%), and the mean (median) standard deviation of the firm's monthly stock returns over the preceding three-years period, our proxy for firm risk, is 0.10 (0.09). Return on Assets (ROA) has a mean and median of 6% per year, market-to-book ratio has a mean (median) of 1.88 (1.27), and financial leverage has a mean (median) of 0.35 (0.32). The mean and median CEO age is 56.4 years, and 54% of the CEOs in the sample also hold the position of the Chairman of the board.

[Insert Table 1 about here]

4. Empirical Findings

4.1. The Basic Benchmarking Model

The basic specification for explaining variations in CEO total compensation (Albuquerque et al., 2013; Bizjak et al., 2008; Faulkender & Yang, 2012, 2010; Laschever, 2013) is :

(1) $\text{Ln}(\text{CEO compensation}_{i,t}) = \alpha_0 + \alpha_1 \text{Ln}(\text{Sales}_{i,t-1}) + \alpha_2(\text{Stock return}_{i,t}) +$

$\alpha_3(\text{Stock return}_{i,t-1}) + \alpha_4(\text{ROA}_{i,t}) + \alpha_5(\text{ROA}_{i,t-1}) + \alpha_6\text{Ln}(\text{Risk}_{i,t-1}) +$

$\alpha_7(\text{MTB}_{i,t-1}) + \alpha_8(\text{Leverage}_{i,t-1}) + \alpha_9(\text{CEO Age}_{i,t}) + \alpha_{10}(\text{CEO Duality Dum}_{i,t}) +$

$\alpha_{11}(\text{IndustryDum}_{i,t}) \times (\text{YearDum}_t) + e_{i,t}$,

where i indexes firms and t indexes fiscal years. The explanatory variables comprise the following firm and CEO characteristics: (i) the natural logarithm of firm 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 financial leverage; (vi) CEO age; and (vii) CEO duality (a dummy variable that equals 1 when the CEO also serves as Chairman of the board). More details on all the variables are provided in the Appendix. 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.

Fitting equation (1) in our sample yields:

$$\text{Ln}(\text{CEO compensation}_{i,t}) = \alpha_0 + 0.39\text{Ln}(\text{Sales}_{i,t-1}) + 0.21(\text{Stock return}_{i,t}) +$$

$$0.19(\text{Stock return}_{i,t-1}) + 0.025(\text{ROA}_{i,t}) - 0.41(\text{ROA}_{i,t-1}) - 0.064\text{Ln}(\text{Risk}_{i,t-1}) +$$

$$0.058(\text{MTB}_{i,t-1}) - 0.06(\text{Leverage}_{i,t-1}) + 0.004(\text{CEO Age}_{i,t}) +$$

$$0.077(\text{CEO Duality Dum}_{i,t}) + \alpha_{11}(\text{IndustryDum}_{i,t}) \times (\text{YearDum}_t) + e_{i,t} .$$

Overall, the fitted CEO pay equation above is consistent with the findings of previous studies. For example, the coefficient of *lagged Ln(sales)* is positive and significant at the 1% level (see Tosi et al., 2000; Gabaix, Landier, & Sauvagnat, 2014; Edmans et al., 2017). The positive coefficient of firm size likely indicates that the managerial talent and skills needed for running larger and more complex firms are scarce and therefore command a higher compensation.

The coefficients of the firm's stock returns are positive and statistically significant, illustrating that CEOs are rewarded (punished) for good (poor) stock

performance. The found pay performance relation is consistent with previous research evidence (Edmans et al., 2017). Further, the coefficients of the market to book ratio and the CEO age are positive and significant at the 5% level, and the coefficient on CEO duality dummy is positive and significant at the 1% level. However, the relation of total CEO pay to firm's accounting performance, estimated by the coefficients of ROA, is statistically insignificant, as is the coefficient of financial leverage.

Since benchmarking has predictions regarding the yearly changes in CEO pay, we start by differencing both the left- and the right- hand-side variables of equation (1). However, for parsimony, we keep only the explanatory variables that were significant at the 1% level in the fitted CEO pay regression: sales, stock returns, and CEO duality.[5] To this parsimonious pay change model, we add a benchmarking term like that in Bizjak et al. (2008) and Grinstein et al. (2022). Our baseline benchmarking equation becomes:

$$(2) \; \Delta \mathrm{Ln}\big(\text{CEO total compensation }_{i,t}\big) = \beta_0 + \\ \beta_1 \mathrm{Ln}\big(\text{Relative level of CEO total compensation }_{i,t-1}\big) + \; \beta_2 \Delta \mathrm{Ln}\big(\text{Sales}_{i,t-1}\big) + \\ \beta_3 \Delta\big(\text{Stock return}_{i,t}\big) + \; \beta_4 \Delta\big(\text{Stock return}_{i,t-1}\big) + \beta_5 (\text{IndustryDum}_{i,t}) \times \\ (\text{YearDum}_t) + \varepsilon_{i,t} \,.$$

The dependent variable in equation (2) is the logarithmic change in CEO's total compensation, where i indexes firms and t indexes fiscal years. The first explanatory variable is the benchmarking variable, the natural logarithm of the median peer CEO total pay divided by the firm CEO total pay, both at year t-1. The implicit assumption is that the compensation committee and board of directors try to fix the previous year distortion in the firm CEO pay by narrowing the difference between the firm CEO pay

---

[5] The 1% significance requirement appears to us appropriate given the large sample size. In addition, when we difference the CEO pay equation to obtain our pay change model, the CEO Duality change is zero in 97.5% of the times; hence it is omitted.

and the median pay of peer CEOs. Other explanatory variables are: (i) the logarithmic change in firm sales from year t-2 to year t-1 (a measure of the change in firm size); and (ii) the changes in stock returns in years t and t-1 (representing changes in firm's performance). We further include dummy variables for each unique combination of industry and year, using the 49 Fama and French (1997) industries. Last, eit is a firm-year specific error term.

The fitted equation (2) is:

$$\Delta \text{Ln}\big(\text{CEO total compensation}_{i,t}\big) = -0.16 +$$

$$0.38\text{Ln}\big(\text{Relative level of CEO total compensation}_{i,t-1}\big) + 0.087\Delta\text{Ln}\big(\text{Sales}_{i,t-1}\big) +$$

$$0.12\Delta\big(\text{Stock return}_{i,t}\big) + 0.12\Delta\big(\text{Stock return}_{i,t-1}\big) + \beta_5(\text{IndustryDum}_{i,t}) \times$$

$$(\text{YearDum}_t) + \varepsilon_{i,t}.$$

All the coefficients in the fitted CEO pay change equation above are statistically significant. Of particular interest is the coefficient of the benchmarking term. It is positive and statistically significant at the 1% level. Its magnitude, 0.38, implies that if last year the median peer CEO total compensation exceeded the firm CEO total compensation by 10%, this year firm CEO's total compensation is expected to be revised upwards by approximately 3.7% *ceteris paribus*, i.e., due to benchmarking considerations alone. The statistically and economically significant impact of benchmarking on CEO pay in our study is consistent with the findings of previous studies (Bizjak et al., 2011).

4.2. Tests of the Motives Behind Pay Benchmarking

Tests of Hypotheses 1 through 3 are conducted by adding to our baseline benchmarking regression (Equation 2) an interaction term constructed by multiplying our benchmarking measure, Ln(relative level of CEO total compensation), by a dummy

variable that represents a factor suggested by one of our three hypotheses. For example, consider the interaction between the relative CEO total compensation and a dummy variable for Generalist CEOs. If Generalist CEO's pay is benchmarked relatively aggressively (weakly), the coefficient of the interaction term would be positive (negative) and statistically significant.

4.2.1. Tests of Hypothesis 1: CEO retention

We define a Generalist CEO as a CEO whose *General Ability Index* score is above the yearly median[6]. Generalist CEOs are presumably more mobile, hence retaining them is more difficult and requires more meticulous pay benchmarking. The first column of Table 2 documents our Generalist CEO findings. The coefficient of the interaction term between relative pay and the Generalist CEO dummy variable is positive and statistically significant at the 1% level. Consistent with Hypothesis 1, a Generalist CEO receives tighter pay benchmarking.

[Insert Table 2 about here]

4.2.2. Tests of Hypothesis 2: Unobserved CEO Preferences and Characteristics

Hypothesis 2 proposes a more aggressive pay benchmarking for CEOs in their first years in office and a weaker pay benchmarking for owner CEOs. This is because acquaintance with the CEO and her preferences affords tailoring a more efficient pay contract that relies less on benchmarking. We define non-veteran CEOs as CEOs with below our sample-median (i.e., below 6 years) of tenure within the firm.

Column 2 of Table 2 shows that pay benchmarking intensity is higher for CEOs in their first years of service. The estimated coefficient on the interaction term with non-

---

[6] 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 the *General Ability Index* data on most of our CEOs and up to 2016.

veteran CEOs is positive and highly statistically significant. This evidence supports Hypothesis 2 and is also consistent with the Edmans et al. (2023) finding that board members mention 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 total pay of owner CEOs. Owner CEOs are veteran CEOs within their firms. We interact CEO's relative total compensation with a dummy variable that equals 1 if the CEO is an owner CEO, and 0 otherwise. We define owner CEOs as CEOs who hold 4.3% or more of the firm's total shares outstanding, where the 4.3% ownership represents the 90th percentile of CEO ownership in our sample. The regression results are reported in column 3. Consistent with Hypothesis 2, the interaction term coefficient is negative and statistically significant, indicating that pay benchmarking intensity is weaker for owner CEOs.

Column 4 summarizes a regression with interaction terms for all the three CEO characteristics reviewed above. The interaction terms remain statistically significant at the 5% level at least for veteran CEOs and owner CEOs. However, the effect of a Generalist CEO diminishes and becomes statistically insignificant.

On reflection, our findings in the tests of Hypothesis 2 can also be interpreted in an alternative way. Owner CEOs and veteran CEOs are probably entrenched CEOs with relatively strong power inside their firms. They may control director appointments and overshadow the board. The pay of such CEOs is probably higher and more generous than that of the peer group CEOs. Hence, benchmarking their pay may require pay cuts that these powerful CEOs obviously resist. In sum, the power and perhaps rent seeking behavior of (some) owner CEOs and of (some) veteran CEOs may also explain why their firms benchmark their pay relatively mildly.

4.2.3. Tests of Hypothesis 3: Directors' Cautiousness and Reputation Concerns

Hypothesis 3 proposes that directors with a higher cautiousness and stronger reputational concerns prefer and lead the board of directors to a tighter benchmarking of CEO pay. We assume that outside directors are more cautious (due to their relatively inferior information and understanding of the firm) and more concerned about reputation (as their future careers depend on it). In column 1 of Table 3 we examine the effect of outside directors by adding an interaction term between relative CEO total compensation and a dummy variable that equals 1 for boards with above median percentage of outside directors (and equals 0 otherwise). Consistent with Hypothesis 3, the interaction term coefficient is positive and highly statistically significant.

[Insert Table 3 about here]

Second, we examine Hypothesis 3's prediction that a higher proportion of veteran directors mitigates benchmarking. We argue that veteran directors have an established reputation and sufficient knowledge; hence their reputational concerns and cautiousness may be muted to a point where they can afford milder benchmarking. We interact relative CEO pay with a dummy variable that equals 1 for firms with above median percentage of veteran directors (defined as directors with over 10 years tenure). Column 2 documents the negative and statistically significant coefficient of the interaction term between veteran directors and relative pay component. Consistent with Hypothesis 3, it appears that a veteran director does not rely on peer pay data as much as her less veteran director does.

Third, we examine the prediction that occupied directors with limited time availability, busy directors (defined by us as directors who hold seats on more than four boards), rely more on benchmarking. In Column 3 we add the interaction term between the relative CEO total compensation and a dummy variable for firms with above median

17

percentage of busy directors.[7] Consistent with Hypothesis 3, its coefficient is positive and statistically significant at the 5% level, suggesting that busy directors rely more on benchmarking.

Last, Column 4 reports results of a regression incorporating interaction terms for all three board attributes. The interaction terms with outside directors' and veteran directors' dummies remain statistically significant at the 1% level, whereas the significance of interaction term with the busy directors' dummy decreases to 10% level. In general, Column 4 results suggest that each of our three board attributes, percentage of outside directors, percentage of veteran directors and percentage of busy directors, has its own impact on the benchmarking of CEO pay.

Interestingly, the relatively weak impact of busy directors on pay benchmarking intensity, documented in column 4, may also point to the difficulties of categorizing busy directors. Some busy directors are skillful individuals, able to serve prudently on all their boards. Further, Field et al. (2013) propose that busy directors are selected when the firm needs the director's expertise rather than her time. In short, some busy directors serve the firm well while others are a poor choice. For example, some skillful and reputable busy directors may have the expertise, experience, and self-confidence to set the CEO pay without relying excessively on benchmarking. However, our finding in Table 3 that boards with busy directors benchmark their CEO's pay aggressively, suggests that in general busy directors lack time and prefer the quick and easy solution of benchmarking. This evidence is not surprising, as it is consistent with previous

---

[7] The median percentage of busy directors in our sample is zero, hence the dummy variable for above median percentage of busy directors is essentially a dummy variable for the presence of a busy director on the board.

evidence on the negative impact of busy directors on firm performance (Core et al., 1999; Fich & Shivdasani, 2006; Hauser, 2018).

5. Summary and Conclusions

We examine factors that may affect the extent of CEO pay benchmarking. Using a sample of 1,440 S&P 1500 firms in 2006-2018 we find that CEO characteristics and board of directors' attributes significantly affect the aggressiveness of CEO's pay benchmarking. CEO pay is relatively tightly linked to that of her peers when the percentage of outside directors, less experienced, and busy directors on the board is relatively high. In contrast, CEOs who the board is more acquainted with, veteran CEOs and owner CEOs, receive a pay that relies less on benchmarking to peers' pay.

Our finding that CEO characteristics and board attributes affect benchmarking intensity suggests to us that CEOs do not receive the optimal compensation contract, where the optimal compensation contract is the pay contract the CEO would get when the board has full information (all the relevant information) about the CEO and when the board is extremely professional and proficient in executive pay design. Our evidence suggests that information problems, i.e. lack of sufficient acquaintance with the CEO, lead the board of directors to a pay scheme that relies perhaps excessively on peer CEO pay. Likewise, the directors' cautiousness, limited experience, and reputational concerns restrict the efficacy of the CEO pay contract by potentially embracing tighter than needed benchmarking. One can argue though that CEO's pay is rational given the information available to the board and given directors' qualifications. In short, the claim may be that the CEO pay is conditionally efficient, that is optimal given the existing restrictions.

However, even the thesis that the CEO pay package is conditionally efficient can be criticized. For if the directors' selfish cautiousness and reputational concerns dominate the board decisions, it is possible that the board would "over-benchmark," i.e. adopt an even higher level of benchmarking than the conditionally efficient benchmarking process requires.

It is noteworthy that deviations from CEO pay contract optimality are not always in the direction of excessive pay benchmarking. Our findings that the pays of veteran and owner CEOs are relatively mildly benchmarked also raise concerns that sometimes benchmarking is too weak. These types of CEOs, owner and veteran CEOs, are powerful and relatively entrenched. They may have excessive power to control their own pay, and if their pay is inflated, they obviously resist benchmarking peers' pay. The results of their power and inflated pay is a mild token benchmarking that only illustrates these CEOs suboptimal compensation design.

Future studies should further explore our and other factors that may affect the benchmarking of CEO pay. Hopefully such research will lead to better understanding of benchmarking and to a better guide to the boards on how to use it properly. Future research may also inquire about the role of compensation consultants and regulators in optimizing the pay benchmarking process.

Appendix: Variables' Definition

Variable	Definition and source

I. The benchmarking variable:

Ln(relative level CEO of total compensation)	A benchmark measure defined as the natural logarithm of the median peer group CEO total compensation divided by firm CEO total compensation, both at year t-1.

II. The compensation variable:

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. This compensation data are disclosed in the summary compensation table of each public firm since December 2006 (Execucomp data item TOTAL_SEC, and ECA variable name DisclosedTotalCompensation).

III. Control Variables

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 the end of year t.
Lagged Ln(sales)	The natural logarithm of firm's sales revenue in millions of Dollars in year t-1 (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 the end of year t-1 (Compustat data items [CSHO*PRCC_F+TL+PSTKL-TXDITC]/AT).
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 return including dividends (Compustat data item RET) for the current fiscal year (year t).

IV. CEO characteristics

General Ability Index of CEO	An index measures CEO's general managerial skills and developed in Custodio et al. (2013).
Percentage of total shares outstanding held by the CEO	Percentage of total shares outstanding held by the CEO (Execucomp data item SHROWN_TOT_PCT).
CEO tenure	The number of years the CEO has been in the position. The tenure is calculated as the difference between current fiscal year end and the date on which a CEO became CEO (Execucomp data item BECAMECEO).

V. Board attributes

Percentage of outside directors	The percentage of outside directors is calculated by dividing the number of outside directors on the board by the total number of board members, both from the MSCI (KLD) database.
Percentage of veteran directors (over 10 years tenure)	The percentage of veteran directors is calculated by dividing the number of directors with over 10 years of tenure by the total number of board members, both from the MSCI (KLD) database.
Percentage of busy directors who hold seats on more than four boards	The percentage of busy directors is calculated by dividing the number of directors who hold seats on more than four boards by the total number of board members, both from the MSCI (KLD) database.

References

Albuquerque, A.M., De Franco, G., & Verdi, R.S. (2013). Peer choice in CEO compensation. *Journal of Financial Economics, 108* (1), 160-181.

Bizjak, J.M., Lemmon, M.L., & Naveen, L. (2008). Does the use of peer groups contribute to higher pay and less efficient compensation? *Journal of Financial Economics, 90* (2), 152–168.

Bizjak, J.M., Lemmon, M., & Nguyen, T. (2011). Are all CEOs above average? An empirical analysis of compensation peer groups and pay design. *Journal of Financial Economics, 100* (3), 538–555.

Cabezon, F. (2022). *Executive compensation: The trend toward one size fits all.* [Unpublished Working Paper]. Pamplin College of Business, Virginia Tech.

Cadman, B., & Carter, M.E. (2014). Compensation peer groups and their relation with CEO pay. *Journal of Management Accounting Research, 26* (1), 57-82.

Chaigneau, P., Edmans, A., & Gottlieb, D. (2024). *A Theory of Fair CEO Pay.* European Corporate Governance Institute – Finance Working Paper No. 865/2022.

Chen, M.A., Tran, H., Wu, Q., & Zhivotova, E. (2022). Are directors rewarded for excellence? Evidence from reputation shocks and career outcomes. *Review of Corporate Finance Studies 11* (2), 263-313.

Core, J.E., Holthausen, R.W., & Larcker, D.F. (1999). Corporate governance, chief executive officer compensation, and firm performance. *Journal of Financial Economics, 51*, 371–406.

Custodio, C., Ferreira, M.A., & Matos, P. (2013). Generalists versus specialists: Lifetime work experience and chief executive officer pay. *Journal of Financial Economics, 108* (2), 471–492.

Edmans, A., Gabaix, X., & Jenter, D. (2017). Executive compensation: A survey of theory and evidence. In: Hermalin, B.E., Weisbach, M.S. (Eds.), *The Handbook of the Economics of Corporate Governance, vol. 1*, Elsevier Science North Holland, Chapter 7, pp. 383–539.

Edmans, A., Gosling, T., & Jenter, D. (2023). CEO compensation: Evidence from the field. *Journal of Financial Economics, 150* (3) 103718, 1-20.

Fama, E.F., & Jensen, M.C. (1983). Separation of ownership and control. *Journal of Law and Economics 26* (2), 301-325.

Faulkender, M., & Yang, J. (2010). Inside the black box: The role and composition of compensation peer groups. *Journal of Financial Economics, 96* (2), 257–270.

Faulkender, M., & Yang, J. (2012). Is disclosure an effective cleansing mechanism? The dynamics of compensation peer benchmarking. *Review of Financial Studies, 26* (3), 806-839.

Fich, E.M., & Shivdasani, A. (2006). Are busy boards effective monitors? *Journal of Finance, 61* (2), 689-724.

Field, L., Lowry, M., & Mkrtchyan, A. (2013). Are busy boards detrimental? *Journal of Financial Economics, 109* (3), 63–82.

Francis, B., Hasan, I., Mani, S., & Ye, P. (2016). Relative peer quality and firm performance. *Journal of Financial Economics 122* (1), 196-219.

Gabaix, X., Landier, A., & Sauvagnat, J. (2014). CEO pay and firm size: An update after the crisis. *Economic Journal*, *124*(574), 40-59.

Grinstein, Y., Lauterbach, B., & Yosef, R. (2022). Benchmarking of pay components in CEO compensation design. *Journal of Corporate Finance, 77* 102308, 1-12.

Hauser, R. (2018). Busy directors and firm performance: Evidence from mergers. *Journal of Financial Economics, 128* (1), 16–37.

Holmstrom, B., & Kaplan, S. (2003). The state of US corporate governance: what's right and what's wrong? *Journal of Applied Corporate Finance, 15* (3), 8-20.

Jiang, W., Wan, H., & Zhao, S. (2016). Reputation concerns of independent directors: evidence from individual director voting. *Review of Financial Studies, 29* (3), 655-696.

Jochem, T., Ormazabal, G., & Rajamani, A. (2021). *Why Have CEO Pay Levels Become Less Diverse?* [Unpublished Working Paper]. European Corporate Governance Institute – Finance Working Paper No. 707/2020.

Larcker, D.F., McClure, C., & Zhu, C. (2021). *Peer group choice and chief executive officer compensation*. [Unpublished Working Paper]. Rock Center for Corporate Governance at Stanford University Working Paper No. 240.

Laschever, R.A. (2013). Keeping up with CEO Jones: Benchmarking and executive compensation. *Journal of Economic Behavior and Organization, 93*, 78–100.

Main, B., O'Reilly, J., & Wade J. (1995). The CEO, the board of directors, and executive compensation: economic and psychological perspectives. *Industrial and Corporate Change, 4* (2), 606-628.

Newman, H., & Mozes, H.A. (1999). Does the composition of the compensation committee influence CEO compensation practices? *Financial Management, 28* (3), 41-53.

O'Reilly. C.A., Main, B.G., & Crystal, G.S. (1988). CEO Compensation as Tournament and Social Comparison: A Tale of Two Theories. *Administrative Science Quarterly, 33* (2), 257- 274.

Tosi, H. L., Werner, S., Katz, J. P., & Gomez-Mejia, L. R. (2000). How much does Performance Matter? A Meta-Analysis of CEO Pay Studies. *Journal of Management*, *26*(2), 301-339.

Yermack, D. (2004). Remuneration, retention, and reputation incentives for outside directors. *Journal of Finance 59* (5), 1957-2444.

Table 1: Descriptive Statistics

The sample comprises 7,688 firm-year observations on CEOs of S&P 1500 firms in 2006–2018. Definition of and details on all variables are provided in the Appendix. All variables are winsorized at the 2.5th and 97.5th percentiles.

	Mean	**Standard deviation**	**Median**	**Number of obs.**
CEO's annual total compensation at focal firms (in thousand dollars)	7,983	6,020	6,380	7,462
Median peer CEO annual total compensation (in thousand dollars)	7,894	4,559	6,972	7,462
Sales (in million dollars)	7,311	27,650	2,871	7,653
Annual stock return	0.12	0.46	0.11	7,642
Return on Assets (ROA)	0.06	0.09	0.06	7,663
Monthly return standard deviation	0.10	0.05	0.09	7,432
Market-to-book ratio	1.88	1.27	1.60	7,067
Leverage	0.35	0.20	0.32	7,639
CEO Duality dummy	0.54	0.50	1.00	7,215
CEO age (years)	56.36	6.51	56.00	7,667

Table 2: Do CEO Characteristics Affect CEO Pay Benchmarking?

The table examines the effects of CEO characteristics on benchmarking aggressiveness. The sample comprises 7,688 firm-year observations on CEOs of S&P 1500 firms in 2006–2018. Panel A describes the CEO characteristics. Regressions 1-3 of Panel B present the results of fitting our baseline benchmarking model (equation 2) with an additional explanatory variable: the interaction between the relative CEO pay and a dummy variable for a particular CEO characteristic. Regression 4 of Panel B includes all CEO characteristics. Standard errors are reported in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively. Definition of and details on all variables are provided in the Appendix.

Panel A: Descriptive statistics of CEO characteristics

	Mean	Std. dev.	Median	N
General Ability Index of CEO	0.072	0.95	-0.092	6,044
Percentage of total shares outstanding held by the CEO	1.96%	4.83%	0.59%	7,013
CEO tenure (years)	7.96	6.468	6	7,505

Panel B: The effect of CEO characteristics

	Change in Ln (CEO total compensation)			
	(1)	(2)	(3)	(4)
Intercept	-0.138	-0.331**	-0.195***	-0.103***
	(0.183)	(0.165)	(0.019)	(0.0286)
Change in lagged Ln(sales)	0.0538	0.0851**	0.0928**	0.0352
	(0.0448	(0.0395)	(0.0428)	(0.0482)
Change in stock return	0.122***	0.116***	0.101***	0.102***
	(0.0141)	(0.0136)	(0.0145)	(0.0155)
Change in one-year lagged stock return	0.129***	0.123***	0.113***	0.119***
	(0.0123)	(0.0122)	(0.0124)	(0.0132)
Ln(relative level of CEO total compensation)	0.315***	0.324***	0.405***	0.327***
	(0.0198)	(0.0196)	(0.0151)	(0.0258)
Ln(relative level of CEO total compensation)×Dummy for generalist CEO	0.0922***			0.0391
	(0.0299)			(0.0311)
Ln(relative level of CEO total compensation)×Dummy for CEOs with tenure equal or below the median of 6 years		0.119***		0.0713**
		(0.0251)		(0.0277)
Ln(relative level of CEO total compensation)×Dummy for owner CEO			-0.216***	-0.157***
			(0.0346)	(0.0384)
Year × Industry FE	Yes	Yes	Yes	Yes
Observations	5,918	7,335	6,443	4,828
Adjusted R^2	0.267	0.267	0.255	0.265

Table 3: Do Board of Directors' Attributes Affect CEO Pay Benchmarking?

The table examines the effects of the Board of Directors' attributes on benchmarking aggressiveness. The sample comprises 7,688 firm-year observations on CEOs of S&P 1500 firms in 2006–2018. Panel A describes the Board of Directors' attributes. In Panel B, regressions 1-3 add to our baseline benchmarking model (equation 2) the interaction between the relative CEO pay and a dummy variable for the level of a certain attribute of the Board of Directors. Regression 4 of Panel B incorporates all board attributes. Standard errors are reported in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively. Definition of and details on all variables are provided in the Appendix.

Panel A: Descriptive statistics of board of directors' attributes

	Mean	Std. dev.	Median	N
Percentage of outside directors	76.4%	14.3%	80.0%	7,184
Percentage of veteran directors (over 10 years tenure)	34.5%	21.1%	33.3%	7,186
Percentage of busy directors who hold seats on more than four boards	2.3%	6.1%	0%	7,184

Panel B: The effect of board of directors' attributes

	Change in Ln (CEO total compensation)			
	(1)	(2)	(3)	(4)
Intercept	-0.131	-0.197	-0.206	-0.196
	(0.183)	(0.185)	(0.186)	(0.187)
Change in lagged Ln(sales)	0.0960**	0.0974**	0.1009**	0.0947**
	(0.0419)	(0.0418)	(0.0418	(0.0417)
Change in stock return	0.116***	0.116***	0.116***	0.115***
	(0.0139)	(0.0140)	(0.0140)	(0.0139)
Change in one-year lagged stock return	0.118***	0.118***	0.119***	0.117***
	(0.0125)	(0.0125)	(0.0125)	(0.0125)
Ln(relative level of total compensation)	0.333***	0.439***	0.368***	0.371***
	(0.0177)	(0.0210)	(0.0150)	(0.0256)
Ln(relative level of CEO total compensation)×Dummy for above median percentage of outside directors	0.1174***			0.1015***
	(0.0256)			(0.0262)
Ln(relative level of CEO total compensation)×Dummy for above median percentage of directors with over 10Y tenure		-0.0958***		-0.0721***
		(0.0267)		(0.0271)
Ln(relative level of CEO total compensation)×Dummy for above median percentage of busy directors who hold seats in more than 4 boards			0.0825**	0.0674*
			(0.0365	(0.0363)
Year × Industry FE	Yes	Yes	Yes	Yes
Observations	7,048	7,048	7,048	7,048
Adjusted R^2	0.263	0.262	0.260	0.266