Do Compensation Consultants Drive Up CEO Pay?

Evidence from UK Public Firms

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Abstract

Do compensation consultants drive up CEO pay for the benefit of managers, or do they design pay packages to benefit firm owners? Using a large sample of UK firms from the FTSE All-Share Index over the 2003-2011 period, we show a positive correlation between the presence of compensation consultants and CEO pay. Importantly, isolating this effect is somewhat dependent on the endogenous selection of consultants and the statistical modelling strategy deployed. We find evidence that compensation consultants improve CEO compensation design when their expertise is of greater importance (e.g., during the post-financial crisis period, or for firms that have particularly weak compensation policies). In addition, our findings show that compensation consultants increase CEO pay-performance sensitivity. The balance of evidence supports optimal contracting theory more than managerial power theory, but we caution the limits to this verification. We are careful to note that the more compelling evidence for the positive effect of pay consultants on CEOs is based on advanced methods (such as propensity score matching and difference-in-differences), and that more standard approaches (such as OLS and fixed effects) are unlikely to reveal the same level of causality of consultants on CEO pay.

Keywords: Corporate governance, Executive compensation, Compensation consultants

INTRODUCTION

This paper investigates the relations among compensation consultants, CEO pay, and managerial incentives. Specifically, we address whether the presence of consultants tends to raise CEO pay and/or change the structure of incentive-based pay. The central issue is whether pay consultants impede or improve compensation arrangements in the boardroom. Our paper augments the literature on compensation consultants and CEO compensation (Conyon, Peck, and Sadler, 2009; Murphy and Sandino, 2010; Armstrong, Ittner, and Larcker, 2012).

Studying compensation consultants is important because their roles in setting CEO pay is controversial (Waxman, 2007). Managerial power theorists argue that compensation consultants are captured by powerful CEOs leading to non-optimal and excessive executive compensation arrangements (Bebchuk and Fried, 2006; Waxman, 2007). In consequence, executive pay arrangements favour CEOs at the expense of owners and society. Agency theorists, in contrast, argue that pay consultants use their expertise to align the interests of owners and managers and help alleviate moral hazard risks arising from the separation of ownership and control. In this view, CEO pay arrangements are largely optimal, and ae set against inevitable contracting costs (Conyon et al., 2009; Murphy and Sandino, 2010). There is thus a tension between these two theories, in principle, can be addressed empirically. Disentangling these two claims is fraught with difficulty, not least because the firm's selection of consultants is endogenous and/or prone to other statistical biases arising from omitted variable bias. This paper aims to address these issues.

Our paper makes the following contributions to the literature on pay and governance. First, we contribute to the extant compensation consultant literature by showing that the ability to establish a correlation between CEO pay and pay consultants is highly sensitive to

the type of econometric method used. Specifically, the long panel of data on UK publicly-traded firms enables us to test both the cross-sectional and time series relationships between CEO compensation and compensation consultants. Prior research has largely focused only on the cross-sectional variation in the pay and compensation consultant relationship. Our cross-sectional OLS results show that the presence of consultants is positively associated with both level of compensation and percentage of incentive-based pay, consistent with prior literature (e.g., Conyon et al., 2009; Voulgaris, Stathopoulos, and Walker, 2010). However, by exploiting the time series nature of the data, we show that these findings do not adequately control for firm-specific heterogeneity in corporate culture, managerial quality, or the endogenous selection of consultants. When we control for these factors, the effect of consultants on CEO pay is much less clear-cut. To elaborate, we find that the effect of pay consultants on the level of CEO pay and the structure of CEO incentives disappears after controlling for firm- and CEO-level fixed effects.

Second, given the presence of compensation consultants is endogenous, we do not consider findings from the OLS / FE models sufficiently convincing as a way to isolate the causal effect of consultants on CEO pay. We therefore use more compelling econometric methodologies including propensity score matching to optimally identify similar consultant and non-consultant firms and isolate the average treatment effect of the compensation consultants on CEO pay (Angrist and Pischke, 2009; Rosenbaum and Rubin, 1983). Moreover, we follow this up by using a difference-in-differences (DiD) estimator utilizing the 2008 financial crisis as an exogenous shock to observe CEO pay adjustments. While the economic magnitude of the consultant effect decreases, we document a positive link between the presence of compensation consultants and CEO pay using the propensity score matching method. We also find that the presence of compensation consultants increases CEO pay in the post-2008 financial crisis period. The impact is mainly driven by an increased proportion of

equity-based pay. This suggests that compensation consultants helped firms re-arrange their executive compensation packages to gain back the public's confidence after the financial crisis.

Third, we investigate the contexts in which compensation consultant advice matters. We also show that compensation consultants affect the level of CEO pay and the structure of incentives when their expertise is more likely to be important. Specifically, we find that the effect of compensation consultants on CEO pay is driven by their impact on firms with observable *ex-ante* weak compensation policies. This is consistent with the expectation that shareholders face greater moral hazard risks in firms with weak compensation policies, and that these firms are more likely to rely on and benefit from consultants' advice.

Fourth, we add to prior findings in the literature by showing that there is a positive relation between consultants and CEO pay-performance sensitivity, indicating that the CEO pay is more linked to performance (both stock returns and return on assets) in firms that retain compensation consultants.

Finally, we conduct a battery of additional analysis to investigate the effects of compensation consultants' quality on CEO pay, the determinants of changes in compensation consultants, the effect of internal adviser and compensation committee characteristics on CEO pay, as well as the effects of consultants on CEO pay in firms across different regulatory regimes. Our evidence adds to the wider corporate governance literature, with a special focus on executive compensation (e.g., Skovoroda and Bruce, 2017; Stathopoulos and Voulgaris, 2016).

The remainder of the paper is organised as follows. The next section reviews the relevant literature and develops our main hypotheses. The third section describes the sample selection, statistical methodologies, and measurement of variables used in our empirical

analysis. The fourth section presents the summary statistics and empirical results, while the fifth section contains some additional relevant findings. The sixth section concludes.

COMPENSATION CONSULTANTS AND EXECUTIVE LABOR MARKETS

The Role of Compensation Consultants

Compensation consultants are retained by a firm's board of directors to assist in structuring CEO and other executives' compensation. Baker, Jensen, and Murphy (1988) were among the first to point out the importance of consultants in designing compensation contracts to motivate CEOs, arguing that they supply valuable market information to boards. Main et al. (2008) document the critical role compensation consultants play both in providing market data and in putting forth ideas on compensation design.

The academic literature is divided on the precise role of compensation consultants, as well as on their effects. On the one hand, the managerial power view argues that they can be assailed by powerful CEOs, which ultimately leads to inefficient pay contracts that are incongruent with shareholder interests (Bebchuk and Fried, 2006). In this framework, pay consultants facilitate CEO rent-seeking behaviour. Several rationales support this view.

First, the repeat business hypothesis argues that a compensation consultant who recommends a low level of CEO compensation is unlikely to win favour with a powerful CEO. Second, the cross-selling hypothesis argues that a conflict of interest arises from supplying different services to the client firm. A consultant might receive lucrative fees from these other services. Therefore, when recommending CEO pay, the consultant may be considering the fees arising from the non-CEO pay consulting services (Conyon, 2014; Conyon et al., 2011; Murphy and Sandino, 2010).

In contrast, the optimal contracting view argues that firms and boards use compensation consultants because they optimise the structure of pay packages (Conyon et al., 2009). Specifically, pay consultants work with an independent compensation committee to evaluate and propose appropriate executive compensation contracts. In consequence, they more effectively align the interests of shareholders and managers, while reducing latent moral hazard in the principal-agent relationship (Fama and Jensen, 1983). Consultants have powerful incentives to supply accurate and unbiased information to client firms because they could suffer reputation loss in the market otherwise, and could even jeopardise potential future business. This is also a serious risk if shareholder outrage ensues from, e.g., overly high CEO compensation levels. Therefore, the economic view asserts that consultants are used because the incremental benefits of their use are greater than the costs, and that consultants have appropriate incentives to serve client firms' shareholder interests.

Ogden and Watson (2012) also explore the complexities of the interaction between compensation committees and consultants. Using case study evidence, they argue that compensation committees are proactive in managing pay policy rather than being passively influenced by compensation consultants. Therefore, the precise effect of compensation consultants on the level and structure of CEO pay is an open empirical question. There is a growing body of literature on this topic, which is summarised briefly below. The primary finding is a positive relation between CEO pay and consultants. However, it is difficult to interpret that association because of the methods used in existing studies. The goal of this paper is to provide additional empirical evidence on the effect of compensation consultants with a range of identification approaches. Specifically, we apply panel data fixed effects models, propensity score matching models, and difference-in-differences models to explore whether and how compensation consultants influence the level and structure of CEO compensation.

Previous Research and Hypotheses

Several extant studies provide empirical evidence that CEO pay levels are higher when firms retain compensation consultants (Conyon et al., 2009; Armstrong et al., 2012; Murphy and Sandino, 2010). The evidence is (partially) consistent with managerial power theory and rent-seeking behaviour by CEOs. Moreover, this phenomenon has attracted the criticism of policy makers. For example, in the United States, the Waxman Commission criticised pay consultants, and argued that they had contributed significantly to the growth in CEO pay. However, it is far from clear that there is a causal relation between compensation consultants and CEO pay. The association may simply reflect the endogenous selection of pay consultants, or reverse causality. For example, firms with highly paid CEOs may simply be more likely to retain expert consultants to ensure the optimal design of complex employment and pay contracts. Alternatively, the statistical methods used by extant studies (e.g., based on cross-sectional techniques) may be prone to specification errors and hence potential statistical biases.

Overall, existing studies provide mixed evidence and explanations for the relation between CEO pay and compensation consultants. Murphy and Sandino (2010) argue that using compensation consultants may lead to higher recommended levels of pay if the consultants face potential conflicts of interest, such as a desire to "cross-sell" services and to secure "repeat business." They find supporting evidence in both the US and Canada in 2006. However, contrary to expectations, they find higher CEO pay in US firms when the consultant works for the board rather than for management. Cadman, Carter, and Hillegeist (2010) study 755 firms from the S&P 1500 in 2006, and find no evidence that consultants with potential conflicts of interest drive up levels of pay or induce lower CEO pay-performance sensitivities. This casts doubt on the effect of compensation consultants with conflicts of interest.

The positive statistical association between CEO pay and compensation consultants also depends crucially on the measure of pay. Some studies consider the structure of CEO compensation, and find that the association is driven largely by a higher proportion of performance-related, equity-based compensation, which is more aligned with optimal contract theory (Conyon et al., 2009; Voulgaris et al., 2010). This is important, as compensation levels can increase overall, but if the balance of compensation shifts away from the fixed component of salaries and toward an equity-based component, this would be evidence against the managerial power view.

The statistical techniques used by researchers also matter. The studies mentioned thus far typically use one- or two-year cross-sectional data. This enables them to provide only correlation analysis, but may not provide enough solid evidence. A limited number of US and UK studies have been conducted with short length time series panel data, but the empirical findings remained inconclusive (Cai, Kini, and Williams, 2016; Chu, Faasse, and Rau, 2017; Goh and Gupta, 2010; Kabir and Minhat, 2014; Murphy and Sandino, 2015).

Some studies have also expanded the standard research hypothesis (e.g., what is the direct effect of consultants on CEO pay) in various directions. Chu et al. (2017) investigate how the 2009 SEC ruling on the disclosure of non-compensation consultant fees affects the influence of compensation consultants on CEO pay. They provide more nuanced empirical evidence that some firms may retain compensation consultants to design optimal pay, while others may do it to justify higher pay. Cai et al. (2016) use a large sample of US public firms to study the effect of compensation consultants' distinct styles. They conclude that the role of compensation consultants agrees with the efficient contracting view.

Given the mixed results found in the existing literature, a genuine puzzle remains as to the precise effect that compensation consultants have on CEO pay. Motivated by the inconclusive body of empirical findings, this paper uses a unique set of panel data on UK

publicly traded firms to explore these issues. The panel covers data over the nine-year period from 2003 to 2011, and includes all UK FTSE All-Share firms. Our goal is to document the empirical relations among pay consultants and CEO pay levels and structure. We propose and test the following main hypotheses:

H1a: The level of CEO compensation is positively associated to the presence of compensation consultants.

H1b: The positive association between CEO compensation and the presence of compensation consultants is driven by the percentage of incentive-based pay.

An important empirical challenge is the econometric identification of the "consultant effect," because the choice of retaining a compensation consultant may be endogenous (Conyon et al., 2009; Murphy and Sandino, 2010; Armstrong et al., 2012). In other words, companies that hire pay consultants differ on other key dimensions from those that do not. Ideally, we would like to randomly assign consultants to firms in order to identify the causal treatment effect of consultants on CEO pay.

In the absence of random assignment, however, and with the necessity of addressing the endogeneity problem, this paper uses a range of empirical strategies. We first present standard OLS and fixed effects models to provide a "benchmark" against which to compare previous studies. Since these models are likely to be contaminated by issues such as omitted variables bias problems and potential persistence of the presence of compensation consultants, we stress this is for comparison purposes only.

Next, the more compelling empirical evidence we present is based on propensity score matching, which optimally identifies similar consultant and non-consultant firms. We then present the average treatment effect of the consultant on CEO pay (Angrist and Pischke, 2009; Rosenbaum and Rubin, 1983). We subsequently use a difference-in-differences

strategy to observe how CEO pay adjusts from the period before the 2008 financial crisis to the period afterward. The use of propensity score matching and difference-in-differences strategies provide the most compelling evidence of the causal effect of consultants on CEO pay.

From an optimal contracting perspective, if compensation consultants provide advice based on firm characteristics, then their effect is likely to disappear after controlling for omitted variables. However, from a managerial power perspective, if compensation consultants recommend excessive CEO pay after having taken into account firm characteristics, then the effect will persist. Generally, we hypothesise that:

H2: Compensation consultants exhibit a positive effect on CEO pay after controlling for the omitted variable bias and/or selection effects.

In addition, we test whether the quality of firms' *ex-ante* compensation policies affects the relation between compensation consultants and CEO pay. Prior literature suggests governance quality is an important factor in understanding the role of compensation consultants. It also supports the managerial view that their effect is more likely to be abused in poorly governed firms (Armstrong et al., 2012; Cai et al., 2016; Cho, Hyun, and Shin, 2015). In this paper, we intend to provide direct analysis by focusing on the role of firms' *ex-ante* compensation policies in order to test the following hypothesis:

H3: The positive effects of compensation consultants on CEO pay and incentives are stronger in firms with weak compensation policies.

DATA AND METHODS

Data Sources and Sample

We combine data from four separate sources to generate a significant and unique dataset that will allow us to examine the relation between CEO pay and the presence of compensation consultants. CEO compensation levels, incentives, and corporate governance characteristics come from BoardEx. The compensation consultant data come from Manifest. Manifest data has been used in previous prominent corporate governance studies (Conyon et al., 2009; Gregory-Smith, Thompson, and Wright, 2009; Gregory-Smith, Main, and O'Reilly, 2014). The economic variables we use here come from Datastream. Finally, the compensation policy quality data come from the Thomson Reuters ASSET4 database. ASSET4 is the leading provider of environmental, social, and corporate governance (ESG) data. It gathers extensive objective, quantitative, and qualitative ESG data on 3,100 global companies, and scores them from 0 to 100 on four pillars: Environmental, Social, Corporate Governance, and Economic. In the UK, ASSET4 has covered the FTSE 250 since fiscal year 2002.

Our sample is based on the population of the FTSE All-Share UK firms from 2003 to 2011. This is important, because the FTSE All-Share Index captures 98% of the UK's market capitalisation, and consists of the FTSE 100, the FTSE 250, and the FTSE Small Cap Indexes. The FTSE 100 contains the 100 largest firms in terms of market capitalisation; the FTSE 250 contains the next largest 250 firms; and the FTSE Small Caps contain smaller firms. We exclude investment trusts and firms with missing data. We then manually identify the CEO of each firm by using BoardEx, Manifest, and corporate annual reports. The final sample consists of 4,480 firm-year observations, with 748 unique firms and 1,236 unique CEOs.

The UK provides an important context for our study. First, the UK disclosure requirements relating to compensation consultants, such as the Directors' Remuneration Report Regulations (UK Government, 2002), have a longer history than in the US. This permits the collection of time series data to test our hypotheses across different model selections. Second, the level of UK disclosure requirements relating to executive compensation is high (Vander Bauwhede and Willekens, 2008). Third, UK regulations on executive compensation date back to at least the 1990s, with the Cadbury committee report on corporate governance in 1992 and the Greenbury Committee on executive pay in 1995. This history has served to bolster social and cultural norms relating to the putative appropriateness of pay outcomes in a UK context (Conyon, Core, and Guay, 2010).

Empirical Models

To test the effect of compensation consultants on CEO pay levels and financial incentives, we first estimate the following pooled OLS regression model. This is consistent with prior studies:

$$y_{i,t} = \alpha + \beta Consultant_{i,t} + \gamma Controls_{i,t} + Industry_t + Year_t + \varepsilon_{i,t} \qquad (1)$$

where y_{it} stands for compensation measures such as "CEO compensation" and "CEO pay structure," each measured for CEO of firm "i" at time "t." The term $Consultant_{i,t}$ is an indicator variable of the compensation consultant that equals 1 if the firm uses any compensation consultants, and 0 otherwise. The compensation consultant measure varies across individual firms "i" and time "t." The definitions of the main variables are in the appendix. We a set of industry dummies ($Industry_t$) to capture inter-industry differences in the demand for executive talent and a set of year time dummies ($Year_t$) to capture the effects of macroeconomic shocks.

The estimation of Equation (1), however, does not allow for separate intercepts (i.e., firm-fixed effects), and assumes that the presence of consultants is exogenous. Thus, a primary concern is that the effect of the compensation consultant variable may be contaminated by the omission of firm-fixed effects, missing variables, and the fundamentally endogenous selection of the pay consultant.[1] Such problems may lead to statistical biases and are very difficult to fully resolve. One way to at least partially handle the identification issue is to conceptualise it as an econometric "omitted variable" problem. The application of firm-fixed effects to some extent controls for any unobserved, non-time-varying firm-specific factors that may influence CEO pay and incentives. Therefore, we estimate the following general panel data econometric model:

$$y_{i,t} = \alpha Firm_i + \beta Consultant_{i,t} + \gamma Controls_{i,t} + Year_t + \varepsilon_{i,t} \quad (2)$$

The term $\alpha Firm_i$ is a set of firm-fixed effects. This specification helps mitigate statistical biases associated with firm-level omitted variables that may be important for compensation arrangements (e.g., the stock of a firm's reputation, or unmeasured firm capabilities).

Furthermore, consider that approximately 12% of our firm-year observations feature a CEO turnover event (541 of 4,480), it is essential to examine CEO-fixed effects regressions in addition to the more common firm-fixed effects regressions. Hence, we also apply CEO-fixed effects in order to control for unobservable CEO-specific time-invariant characteristics with the following model:

$$y_{i,t} = \alpha CEO_i + \beta Consultant_{i,t} + \gamma Controls_{i,t} + Year_t + \varepsilon_{i,t} \quad (3)$$

[1] We thank an anonymous referee for suggesting tests for endogeneity. We performed a Durbin-Wu-Hausman test, which is an augmented regression test for endogeneity (Davidson and MacKinnon, 1993). The test indicates that OLS is not consistent, suggesting a potential endogeneity issue. We also performed a Hausman test, which suggests that a fixed effects model, rather than a random effects model, would be more appropriate.

The term αCEO_i is a set of CEO-fixed effects. This specification helps mitigate statistical biases associated with CEO-level omitted variables (e.g., CEO talent, appetite for risk).

To further address the endogenous selection of pay consultants, we use propensity score methods (Angrist and Pischke, 2009; Rosenbaum and Rubin, 1983). The goal of propensity score matching is to find a set of non-consultant control firms that can be optimally matched to the set of firms that have hired consultants (Imbens, 2000). The treatment (consultant) firms and the control group (non-consultant) firms are then made as statistically alike as possible by using a matching algorithm. This allows us to compare average CEO pay and incentives between the treatment and control groups because they are statistically alike in all other economically relevant characteristics.

In principle, the propensity score method can isolate the effect of the treatment effect on the treated firm. Accordingly, we use a set of firm-level covariates that may be considered influences on managerial labour markets. We acknowledge that our conclusions are based entirely on the model specifications we use here. In other words, they match distributions based on the observable covariates in the model. This is the case for all propensity score matching studies.

In addition, we investigate whether the financial crisis of 2008 altered the growth path of CEO pay in firms that use consultants. The financial crisis shone a spotlight on corporate governance practices, especially those regarding executive compensation (indeed, in the US, it led directly to changes in federal law that required firms to disclose information about pay consultants, namely the Dodd-Frank Act in 2010). Our approach is to estimate a difference-in-differences model as follows:

$$y_{i,t} = \alpha Firm_i + \beta_1 Consultanti_{,t} + \beta_2 Consultant_{i,t} * Crisis_t + \gamma Controls_{i,t} + Year_t + \varepsilon_{i,t} \quad (4)$$

$Crisis_t$ is an indicator variable that equals 1 during the 2008-2011 period. The coefficient on the interaction between $Consultant_{i,t}$ and $Crisis_t$ (β_2) represents the differential impact of compensation consultants on CEO pay since the financial crisis.

Variable Measurements

Regarding CEO pay level, we consider levels of salary, equity, and total compensation. Level of salary is the annual base pay. Level of equity is made up of the sum of shares awarded, the estimated value of options awarded, and any long-term incentive plan awarded during the fiscal year. Level of total compensation is measured as the annual sum of salary, bonus, and equity. CEO incentives are defined in various ways in the literature (Murphy, 1999). A typical measure is the CEO pay mix. In terms of CEO incentives, we consider the proportion of salary and equity to total compensation.

The term "Consultant" refers to the presence of compensation consultants, which is an indicator variable that equals 1 if the firm uses any compensation consultants, and 0 otherwise. This is a commonly used variable in prior literature to examine the effect of compensation consultants (Conyon et al., 2009; Voulgaris et al., 2010). In terms of compensation policy quality, we capture firms with high quality by means of an indicator variable that equals 1 if the ASSET4 score is above the sample median, and 0 otherwise.

In addition to the main explanatory variable, we also use a set of firm-level economic and corporate governance control variables that have been found to affect CEO compensation (Core, Holthausen, and Larcker, 1999; Murphy, 1985). In terms of firm-specific economic controls, firm size indicates organisational complexity and is proxied for by the logarithm of total assets. Firm performance reflects the potential alignment of managers' and shareholders' interests. This is measured by two variables: 1) total shareholder return captures market-based performance, and 2) return on assets captures accounting-based performance. Firm

growth opportunity is measured by the market-to-book ratio. Firm risk is measured by stock volatility, which is the standard deviation of annualised monthly stock returns over the calendar year. We include firm risk because risk-averse CEOs may require greater compensation for higher risk-taking. Finally, leverage is included as a measure of the firm's capital structure calculated as the ratio of total debt to total assets.

In terms of corporate governance controls, board characteristics are captured by the logarithm of board size, the logarithm of compensation committee size, CEO-chair duality and the ratio of non-executive directors to all directors. CEOs' quality (or perhaps skills and experience) are proxied by the logarithm of CEO age and the logarithm of CEO tenure. Ownership characteristics are captured by CEO ownership and institutional ownership. The use of these variables is consistent with prior studies (Core, Holthausen, and Larcker, 1999; Murphy, 1999).

RESULTS

Descriptive Statistics

Table 1 provides summary statistics relating to UK executive compensation consultants in 2011. The top half of the table focuses on firms that hire compensation consultants and shows the market share of the top consultants in 2011. The most prominent actor in the market is Hewitt New Bridge Street Consulting with a market share of 42%. The only other firm with a market share in excess of 20% is Towers Watson[2] (22%). The bottom half of Table 1 shows the number of compensation consultants retained by a given firm in 2011. As the table shows, 144 firms in our sample did not have an external pay consultant in 2011,

[2] Towers Watson was formed from the merger of Towers Perrin and Watson Wyatt in 2010 and currently trades under the name Willis Towers Watson following the merger with Willis Group in 2016

while approximately half had only one consultant. 75 firms (16%) retained two consultants, and 17 firms (4%) retained four or more.

[Insert Table 1 about here]

Panel A of Table 2 provides descriptive statistics pertaining to the main variables used in the study for the total sample. Average CEO salary compensation is approximately £388,000, and average CEO total compensation (the sum of salary, bonus, options, and other equity pay granted during the year) is approximately £1,449,000. We find that the percentage of total compensation comprised of salary is approximately 48%, while the percentage comprised of equity-based pay is approximately 33%. These findings correspond with those from previous UK studies, such as Conyon et al. (2009). Furthermore, consistent with Table 1, we find that compensation consultants are present in about 72% of firms. We also consider their presence across different indices and find that it is a clear size effect. Smaller firms in our sample are much less likely to retain a compensation consultant. In detail, we find that 94.6% of firms in the FTSE 100, 86.9% of firms in the FTSE 250, and 69.1% of firms in the FTSE Small Cap hire compensation consultants. This result is consistent with Conyon et al. (2009). Other controls are also consistent with previous studies that used UK data (e.g., Goh and Gupta, 2010; Kabir and Minhat, 2014).

Panel B of Table 2 provides a summary of average value in terms of our key dependent and test variables between 2003 and 2011. There is an increasing trend of CEO compensation over our sample period. While all pay levels are increasing, the proportion of total compensation that consists of salary is decreasing, offset by an increased proportion of equity-linked compensation. As noted above, larger firms are more likely to retain a compensation consultant than smaller firms, however, whilst the decision to retain a compensation consultant differs within different share indexes, the within index patterns are quite stable over the period, notwithstanding a slight decrease towards the end.

[Insert Table 2 about here]

Table 3 presents the univariate analysis on the key variables in this paper. We find that firms that hire compensation consultants pay their CEOs higher, with a higher proportion of equity pay and a lower proportion of salary pay. We also find that the independent variables differ between firms that hire consultants and those that do not. In detail, in terms of firm-level characteristics, we find that firms that hire compensation consultants are larger, have better accounting performance but lower stock performance, have higher levels of leverage, and have higher market-to-book ratios. In terms of corporate governance characteristics, they generally have larger boards, a higher proportion of independent directors, no CEO duality, a larger compensation committee, and lower CEO and institutional ownership.

[Insert Table 3 about here]

Regression Results

Panel A of Table 4 investigates the relation between compensation consultants and CEO pay levels and incentives based on the OLS estimator with standard errors robust to arbitrary heteroscedasticity (Hypotheses 1a and 1b). We include panel A to show the CEO pay and consultant correlations in our data when we use methods similar to those in prior studies.

In terms of CEO pay levels, panel A shows that the presence of consultants is positively correlated with CEO salary, equity compensation, and total compensation. This confirms Hypothesis 1a. In terms of CEO pay incentives, we find that the presence of compensation consultants is negatively correlated with the percentage of total pay made up of salary (non-incentive element), and positively correlated with the percentage of equity (incentive element) in the CEO compensation contract. The results are consistent with Hypothesis 1b and imply that consultants are more inclined to link CEO compensation contracts with firm

performance. The OLS results are consistent with previous studies (e.g., Conyon et al., 2009; Voulgaris et al., 2010).

Panels B and C in Table 4 present the regression estimates for CEO pay levels and incentives. They use firm- and CEO-fixed effects, respectively, to control for any unobserved but fixed heterogeneity across firms or CEOs.[3] Both panels show that, once fixed effects are included, the effects of consultants on CEO compensation levels and incentives become statistically insignificant. This is inconsistent with Hypothesis 2, and indicates that the positive findings in panel A, as well as prior research using OLS regression models, may be attributable to omitted variable problems rather than to the effects of consultants per se.

[Insert Table 4 about here]

Firm- and CEO-level fixed effects control to some extent for the omitted variable bias because they filter out the permanent yet unobserved effects of a variable. However, an alternative solution is to use a propensity score matching approach, as described earlier, to control for any observable selection bias by the firm in retaining consultants. Propensity score matching proceeds in two steps.

First, we estimate a probit model to determine the propensity score. Table 5 gives the estimates of the determinants of the presence of a compensation consultant. Column 1 includes compensation, economic, and CEO characteristics; column 2 also includes governance characteristics. In terms of firm characteristics, firms with higher total assets, lower prior performance, and higher growth opportunities are more likely to use a consultant. In terms of compensation characteristics, we find that the percentage of equity pay is

[3] We thank an anonymous referee for suggesting alternative fixed effects methods following Graham et al. (2011). We continue to find an insignificant impact of consultants on CEO pay by using the "spell-fixed effects methods," with joint CEO-firm-fixed effects, as well as Graham et al.'s (2011) primary method, which separates manager- from firm-fixed effects.

positively correlated with the likelihood of using a consultant, while the coefficient on total wealth is negative, consistent with Chu et al. (2017). Furthermore, total compensation is positively correlated with the likelihood of using a consultant. This indicates that firms that already had higher total compensation were more likely to retain consultants, not that consultants drove up CEO total compensation. Most of the statistical and economic effects dampen when controlling for the corporate governance variables, which suggests it is important to consider the effect of corporate governance on CEO pay equations. Specifically, we find that firms with a higher proportion of independent directors, CEO is not also the chairman, larger compensation committees, and lower CEO and institutional ownership are more likely to hire a pay consultant. The results confirm the concern that the use of consultants is strongly endogenous to the observable covariates.

[Insert Table 5 about here]

Second, we compare the average treatment effects on the treated firms on CEO compensation levels and incentives between the consultant and non-consultant samples based on the model from column 2 of Table 5. We match like-for-like firms using a nearest neighbour algorithm with caliper 0.01 and no replacement. Table 6 presents the treatment effect of compensation consultants on compensation levels and incentives, based on the propensity score method.[4] In general, after controlling for selection effects, we find that the pay differences remain statistically significant and the economic differences decrease dramatically. In fact, we note at least a 66% decrease across the different measures of CEO pay levels and incentives. The results in Table 6 imply that differences in compensation and

[4] The covariate balance check provides confidence that the matching procedures effectively increase the similarity between the treatment and control groups, and that the selection bias has been significantly reduced after the matching procedure. Covariate balance tables are available from the authors upon request.

incentives between firms that use consultants and those that do not are driven largely by selection effects, rather than by the presence of the consultants alone.

[Insert Table 6 about here]

Next, we investigate the effects of compensation consultants on CEO pay using a difference-in-differences estimator. The macro shock that ushered in the 2008 financial crisis brought public attention to the governance of publicly listed firms and highlighted how managerial incentives and pay are determined in the boardroom. According to the managerial power view, if consultants drove up CEO pay before the financial crisis, then we would expect firms with overpaid CEOs that retain consultants to reduce their CEO pay due to increased public outrage and regulatory scrutiny after the financial crisis.

However, as Table 7 shows, our empirical results suggest otherwise. Compensation consultants have a positive and statistically significant effect on CEO pay after the onset of the financial crisis. On average, their presence is associated with an approximately 7.3% increase in CEO total compensation in the post-financial crisis period. This increase in pay is driven mainly by an increase in equity, not salary. Also, compared to firms that do not retain compensation consultants, CEO pay packages in firms that do have generally had a higher proportion of equity-based pay and a lower salary component since the financial crisis. This indicates that consultants are more likely to help improve CEO pay packages in order to align pay with performance after the sudden economic shock.

[Insert Table 7 about here]

Next, we investigate the effects of compensation consultants on CEO pay and incentives using different subsamples (Hypothesis 3) based on the ASSET4 scores specifically for compensation policy quality. In Table 8, we find that the effect of compensation consultants on CEO pay is driven by their impact on firms with weak

compensation policies. The impacts are persistent in the weak compensation quality subsample across different regression models, in which the presence of a compensation consultant is positively correlated with an increased proportion of equity-based pay and a decreased proportion of fixed pay. The results indicate that compensation consultants may help firms with weak compensation quality by designing compensation structures that can better align the interests of managers and shareholders.

Non-tabulated results suggest that the moderating effect varies when the subsamples are based on ASSET4 aggregated scores for general governance quality. Hence, our results complement prior literature by showing that the presence of a compensation consultant is more impactful in firms with weak compensation policies rather than weak corporate governance overall.

[Insert Table 8 about here]

ADDITIONAL ANALYSIS

Pay-Performance Sensitivity

Building on our main results, we further test the effect of compensation consultants on pay-performance sensitivity (PPS). We aim to determine whether the compensation contracts suggested by consultants are associated with firm performance. We consider both accounting and financial performance, measured by return on assets (ROA) and stock returns, respectively. From the managerial power view, if consultants recommend favourable compensation packages that help managers extract wealth from shareholders, we would expect the presence of compensation consultants to be negatively correlated with PPS.

In panel A of Table 9, we find a positive coefficient on the interaction "Consultant 1/0 * ROA" in OLS, firm-, and CEO-fixed effects regressions. In panel B of Table 9, we also find a persistent positive coefficient on the interaction "Consultant 1/0 * Stock returns"

across all three regression models. The results suggest that firms with consultants compensate their CEOs with higher PPS than firms without consultants, which is inconsistent with the managerial power view.

[Insert Table 9 about here]

Quantile Regressions

We apply quantile regression methods to test whether the effect of compensation consultants differs at different quantiles of CEO pay distribution (this line of reasoning is motivated by Rees and Rodionova, 2015). We assume that the relationship we find between consultants and CEO pay could be due to compensation consultants having a direct influence on CEO pay, or to firms with certain pay levels being more likely to hire consultants.

In Figure 1, we find no evidence that the impact of pay consultants on CEO incentive-based pay is stronger for conditionally high compensation levels. We find relatively stable trends, with a slightly decreasing effect of compensation consultants on the level of salary and total compensation. This is inconsistent with the view that firms in higher pay percentiles use compensation consultants to justify their higher pay. We also find that the effect of compensation consultants on equity pay is more salient in firms with low to medium equity pay percentiles. This indicates that firms with lower levels of equity-based pay are more likely to benefit from retaining compensation consultants to design contracts that better align the interests between managers and shareholders.

[Insert Figure 1 about here]

Compensation Consultant Quality

In addition to a firm's decision whether to hire compensation consultants, we explore whether the quality of the consultant has an impact on CEO pay. Quality is based essentially on consultant firms' market shares (see Table 1) and we define a "top 3 consultant" variable

that equals 1 if the firm uses a top 3 consultant (in terms of number of clients), and 0 otherwise. In non-tabulated results, we find similar effects for both top 3 and non-top 3 consultants on CEO compensation, suggesting there is no distinct style between bigger consultants and the rest. The results remain qualitatively similar if we use top 4 or top 5 consultants.

Determinants of Changes in Compensation Consultants

The panel data enables us to examine whether the previous year's CEO pay level or structure influence changes in compensation consultants. Specifically, we identify whether a firm changes its consultant by increasing/decreasing the number of consultants it retains, by changing from single to multiple consultants or vice versa, by switching the main consultant, or by starting to and ceasing to retain consultants. Our key test variables are previous year total compensation, total wealth, and percentage of equity-based pay. In non-tabulated results, we find no evidence that previous years' compensation levels or structures influence changes in compensation consultants. This is inconsistent with the notion that firms tend to "opinion shop," and with the "consultant repeat business" hypothesis.

Internal Adviser

We consider a firm's use of an internal adviser to address the concern that the consultants effect on CEO pay might be affected by whether the firm has sufficient internal guidance in setting CEO already. We define an "Internal Adviser 1/0" equal to 1 if the firm has an internal adviser in place, and 0 otherwise. For 1,236 firm-year observations without compensation consultants, approximately 30% (374) have an internal adviser. We control for this and re-estimate our main regressions. Our results remain consistent with the view that having an internal adviser reduces the difference between firms that use a compensation consultant or not in pooled OLS regressions. However, the economic effect is small

compared to the effect of the compensation consultants. Both effects become insignificant once we control for fixed effects.

Compensation Committee Characteristics

Besides size, which is included in our main regressions, we also consider whether other compensation committee characteristics affect the impact of compensation consultants on CEO pay. First, we consider the independence of the compensation committee, proxied for by the proportion of non-executives on the committee (Conyon and Peck, 1998). The average proportion of independent members on a compensation committee is 0.82. We find that statistical significances vary across regression models, but, in general, the independence of the compensation committee is associated with higher levels of pay, higher proportions of equity-based pay, and lower proportions of salary. Second, we consider the experience of the compensation committee, as measured by the average age and tenure of committee members. We do not find any persistent association between compensation committee age or tenure on CEO pay. Overall, we find that the coefficients for the presence of compensation consultants reduce by controlling for additional compensation committee characteristics. However, the reduction of the coefficients is trivial, albeit sensitive to the model selection.

FTSE 100, 250, and Small-Cap Indexes

To provide further evidence, we re-estimate our pooled OLS and the firm- and CEO-fixed effects regressions of our main results for observations in each FTSE index. For the FTSE 100 sample, we find no significant impact of compensation consultants even in pooled OLS regressions, which is likely to be the case because of the limited variation across these firms. In terms of the FTSE 250 and FTSE Small Cap samples, we find a statistically significant relation between the presence of compensation consultants and CEO pay levels and incentives in pooled OLS regressions. However, these relations disappear once we

control for unobservable time-invariant variables by including firm- or CEO-fixed effects. Overall, our results are consistent with those in Table 4.

Other Robustness Checks

We also conduct further checks to ensure the robustness of our analysis. First, our results are not sensitive to considering the mergers and acquisitions event by leading consultants.[5] Second, our results are robust to controlling for the CEO turnover event. Third, our main results hold when we use other measures to proxy for firm size instead of total assets, such as sales revenue and market capitalisation.

DISCUSSION AND CONCLUSION

Prior studies have asserted that CEO pay is positively correlated with compensation consultants. This is often interpreted as "managerial power," and suggests that CEOs may have captured the pay-setting process for their own benefit at the expense of shareholders. In other words, executive pay consultants are seen as facilitating managerial rent-seeking. If this is the case, one potential policy response would be to regulate consultants or impose further disclosure requirements on firms. Our paper provides empirical evidence to help inform this debate.

We document the following empirical results. First, the pooled OLS results show that CEO pay is positively correlated with the presence of compensation consultants. This finding is consistent with extant studies. However, we find that the OLS results are sensitive to the model specification. Specifically, the effect of compensation consultants on the level of CEO

[5] Hewitt Associates acquired New Bridge Street Consultants LLP (Previously Advisor) on 18 March 2008 to form Hewitt New Bridge Street; Towers Perrin merged with Watson Wyatt in 2009 (announced on 28 June 2009, completed on 4 January 2010) to form Towers Watson.

pay and structure of CEO incentives becomes insignificant after controlling for firm- or CEO-level fixed effects.

Second, since the OLS and fixed effect regressions are potentially contaminated by issues such as the endogenous selection of compensation consultants, we provide more compelling evidence using propensity score matching and the average treatment effect on the treated estimator. We also leverage the financial crises as an exogenous shock and explore difference-in-differences estimators of the effect of consultants on CEO pay. Both these approaches show once again, a positive link between CEO pay and the presence of a consultant, as well as the CEO equity pay mix and the presence of a pay consultant. The economic magnitude of the effect, though, is smaller compared to the OLS results. The propensity score matching, average treatment effect on the treated and difference-in-differences estimator collectively provide strong evidence that consultants do indeed influence pay levels and the design of CEO compensation packages.

Third, we find evidence that compensation consultants matter in CEO compensation design when their expertise is more likely to be important. Specifically, we find that the presence of compensation consultants is positively associated with CEO total compensation in firms with weak compensation policy quality. Again, we show that the impact is mainly driven by an increase proportion of equity-based pay. This is consistent with shareholder-management alignment.

Fourth, additional analysis shows a positive relation between consultants and CEO pay-performance sensitivity, indicating that CEO pay is more linked to performance in firms that retain compensation consultants. The paper also conducts a battery of additional analysis including quantile regressions, compensation consultants' quality, determinants of changes in compensation consultants, internal adviser, compensation committee characteristics, specific indexes (FTSE100, 250 and small-cap indexes), as well as other robustness checks. Overall,

our paper provides a wealth of new empirical evidence on the role of compensation consultants in UK firms.

Our paper inevitably contains limitations that might form the basis for future research. First, we recognise the potential differences between the US and the UK in terms of corporate governance features and executive compensation practices. This raises the question of whether our results are generalizable to the US market or, indeed, other European markets. Second, due to data limitations, we are not able to examine whether other important factors, such as activist investors or pension funds, affect how compensation consultants influence CEO pay. Third, the effect of consultants was measured by their presence not their other characteristics. Further studies might explore the effect of consultant heterogeneity (e.g., consultant background, type, demographic, prior experience, consultant fee, etc.). Fourth, while we find evidence that the positive link between compensation consultants and CEO pay is driven by the equity portion of pay, we cannot rule out the possibility that compensation consultants might be using equity-based schemes with easy-to-achieve performance hurdles in designing CEO compensation package. Therefore, it appears that the link between compensation consultants and CEO pay is complex and cannot be easily explained by either optimal contracting view or managerial powerful alone.

Overall, this paper provides substantial new evidence on the role of compensation consultants. The empirical findings show that compensation consultants have numerous, complex effects on CEO pay and our results show that it is critical to control for the endogenous selection of compensation consultants to explain CEO pay outcomes. We strongly encourage further future research in this area.

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Appendix. Variable definitions

This appendix defines the variables used in the paper. Economic variables come from Datastream, corporate governance and compensation data come from BoardEx, Corporate governance score and compensation policy score come from Datastream ASSET4, and compensation consultant data come from Manifest.

Variable	Definition
CEO compensation	
Log salary	The log of base annual pay (BoardEx item: Salary)
Log equity	The log of equity-linked pay (BoardEx item: Equity-linked)
Log total compensation	The log of the sum of: Salary, Bonus, Equity-linked (BoardEx item: Total Compensation)
Salary %	Salary as a proportion of total compensation (BoardEx item: Salary/Total Compensation)
Equity %	Equity-linked pay as a proportion of total compensation (BoardEx item: Equity-Linked/Total Compensation)
Log total wealth	The log of the value of cumulative holdings over time of stock, options, and LTIPs for the CEO (BoardEx item: Total Wealth)
Compensation consultants	
Consultant 1/0	An indicator variable that equals 1 if the firm uses any compensation consultants, and 0 otherwise
Firm characteristics	
Log total assets	The log of total assets (Datastream item: Total Assets (WC02999))
Stock returns (1 year)	[(RIt/RIt-1)-1]*100% (Datastream item: Total Return Index (RI))
ROA	Net income divided by total assets (Datastream item: Net Income Before Preferred Dividends (WC01651)/Total Assets (WC02999))
Stock volatility	A measure of a stock's average annual price movement to a high and a low from a mean price for each year (Datastream item: Price Volatility (WC08806))
Leverage	Total debt divided by total assets (Datastream item: Total Debt % Total Capital (WC08221))
Market to book	Market value of ordinary equity divided by the balance sheet value of ordinary equity in the company (Datastream item: Market To Book Value (MTBV)
Governance characteristics	
Log of board size	The log of total number of directors on the board (BoardEx item: Total Directors on the Board)
Non-executive ratio	The number of non-executive directors over the total number of directors on the board (BoardEx item: Number of Independent NED on Board/Total Directors on the Board)
CEO is chairman	An indicator variable that equals 1 if the CEO is also the chairman, and 0 otherwise (BoardEx item: Combined role of CEO & Chairman is present)
Log comp. comm. size	The log of total number of remuneration committee members (BoardEx item: Remuneration/Compensation Committee Size)
CEO turnover	An indicator variable that equals 1 if there was CEO turnover during the fiscal year, and 0 otherwise
Corporate governance score	The measure of a company's systems and processes that ensures its board members and executives act in the best interests of its long-term shareholders. It reflects a company's capacity, through its use of best management practices, to direct and control its rights and responsibilities to the creation of

	incentives, as well as checks and balances, in order to generate long-term shareholder value. The original score ranges from 0 to 100. High (Low) corporate governance quality is defined as above (below) sample median. (ASSET4 item: CGVSCORE)
Compensation policy score	The board of directors/compensation policy category measures a company's management commitment and effectiveness to following best practice corporate governance principles related to competitive and proportionate management compensation. It reflects a company's capacity to attract and retain executives and board members with the necessary skills by linking their compensation to individual or companywide financial or extra-financial targets. The original score ranges from 0 to 100. High (Low) compensation policy quality is defined as above (below) sample median. (ASSET4 item: CGCP)
CEO characteristics	
Log of CEO age	The log of CEO age (BoardEx item: Age (Yrs))
Log of CEO tenure	The log of the number of years the CEO has held the role at the firm (BoardEx item: Time in Role)

Table 1. UK Compensation consultants

This table presents the market share of the primary consultants, as well as the distribution of the number of consultants based on 469 FTSE All-Share firms in 2011. Compensation consultant data come from Manifest, own calculations.

Consultant name	Market share in 2011
Hewitt New Bridge Street Consulting	0.42
Towers Watson	0.22
Deloitte	0.17
Monks	0.15
Kepler	0.14
Mercer	0.06
Hay	0.03
KPMG	0.03

Number of pay consultants	Frequency	Percent	Cumulative Percent
0	144	30.7	30.7
1	202	43.07	73.77
2	75	15.99	89.77
3	31	6.61	96.38
4 or more	17	3.62	100
Total	469	100	

Table 2. Descriptive statistics

This table presents descriptive statistics of key variables. Variable definitions are provided in the appendix. Compensation levels and total assets are in thousands of GBP. Age and tenure are in years. CEO ownership and institutional ownership are in percentages.

Panel A: Total sample

Variable	Number	Mean	Std Dev	Median
Salary	4480	387.50	238.41	335.00
Equity-linked compensation	4480	784.72	2196.47	245.50
Total compensation	4480	1448.60	2519.06	780
Salary %	4480	0.48	0.27	0.43
Equity %	4480	0.33	0.27	0.35
Consultant 1/0	4480	0.72	0.45	1.00
Total assets	4480	12123.85	95153.24	403.10
Stock returns (1-year)	4480	0.18	0.66	0.12
ROA	4480	0.02	0.13	0.04
Stock volatility	4480	0.33	0.12	0.31
Leverage	4480	0.34	0.3	0.31
Market to book	4480	2.36	3.85	1.72
Board size	4480	8.20	2.59	8.00
Non-executive ratio	4480	0.49	0.15	0.5
CEO is chairman	4480	0.22	0.42	0.00
Compensation committee size	4480	3.48	1.09	3.00
Age	4480	51.51	7.02	51.00
Tenure	4480	5.53	5.68	3.80
CEO ownership	4480	4.92	14.81	0.28
Institutional ownership	4480	23.18	20.7	18.39
Corporate governance pillar score	2069	71.82	17.36	74.89
Compensation policy quality	2069	75.24	15.32	80.05

Panel B: By year

Year	Salary	Equity	Total compensation	Salary %	Equity %	Consultant 1/0			
						All Sample	FTSE 100	FTSE 250	FTSE Small Cap
2003	318.95	429.01	910.04	0.55	0.28	0.73	0.96	0.87	0.70
2004	328.52	487.06	1011.43	0.54	0.28	0.74	0.99	0.85	0.73
2005	350.80	737.88	1316.94	0.51	0.31	0.73	0.96	0.87	0.69
2006	371.73	678.27	1330.89	0.46	0.34	0.74	0.93	0.90	0.67
2007	398.51	978.49	1727.36	0.42	0.36	0.74	0.95	0.89	0.70
2008	422.65	704.27	1436.34	0.49	0.32	0.72	0.89	0.88	0.66
2009	431.92	963.39	1684.51	0.48	0.36	0.72	0.94	0.86	0.73
2010	439.79	1112.27	1911.81	0.44	0.38	0.70	0.95	0.85	0.67
2011	451.83	1088.28	1886.05	0.44	0.38	0.69	0.95	0.84	0.65
Total	387.50	784.72	1448.60	0.48	0.33	0.72	0.95	0.87	0.69

Table 3. Univariate analysis

This table presents a univariate analysis of the key variables. Variable definitions are provided in the appendix. Compensation level and total assets are in thousands of GBP. Age and tenure are in years. CEO ownership and institutional ownership are in percentages.

	Consultant 1/0			
	No (0)	Yes (1)	Difference (0)-(1)	t-stat
Salary	269.5	432.5	-163.0***	(-21.47)
Equity-linked compensation	265.5	982.5	-717.1***	(-9.871)
Total compensation	693.3	1736.4	-1043.0***	(-12.60)
Salary %	0.617	0.432	0.185***	(21.21)
Equity %	0.211	0.377	-0.166***	(-19.25)
Total assets	606.8	16512.0	-15905.2***	(-5.014)
Stock returns (1-year)	0.211	0.166	0.0454**	(2.072)
ROA	0.006	0.030	-0.0251***	(-5.665)
Stock volatility	0.372	0.312	0.0599***	(15.73)
Leverage	0.247	0.371	-0.124***	(-12.65)
Market to book	2.043	2.482	-0.439***	(-3.418)
Board size	7.018	8.648	-1.630***	(-19.60)
Non-executive ratio	0.416	0.512	-0.0967***	(-19.98)
CEO is chairman	0.363	0.169	0.194***	(14.26)
Compensation committee size	2.939	3.686	-0.748***	(-21.60)
Age	51.18	51.63	-0.453*	(-1.929)
Tenure	5.870	5.397	0.474**	(2.498)
CEO ownership	7.752	3.840	3.913***	(7.957)
Institutional ownership	32.75	19.53	13.21***	(19.92)

Table 4. Compensation consultants and CEO pay levels and incentives

This table presents results for the effect of consultants on CEO pay levels and incentives using pooled OLS, and firm-, and CEO-fixed effect regressions. A full set of firm-specific economic characteristics, CEO characteristics, and corporate governance controls are included, but are not reported for simplicity (available upon request). Variable definitions are provided in the appendix. Robust t-statistics in parentheses; ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

	Log salary	Log equity	Log total compensation	Salary %	Equity %
	(1)	(2)	(3)	(4)	(5)
Panel A: Pooled OLS regressions					
Consultant 1/0	0.168***	0.868***	0.224***	-0.067***	0.058***
	(6.067)	(9.033)	(7.648)	(-7.199)	(6.260)
Observations	4480	4480	4480	4480	4480
R-squared	0.429	0.396	0.599	0.352	0.271
Industry-fixed effects	Yes	Yes	Yes	Yes	Yes
Panel B: Firm-fixed effects regressions					
Consultant 1/0	0.001	0.011	0.051	-0.024*	0.011
	(0.016)	(0.067)	(1.290)	(-1.684)	(0.660)
Observations	4480	4480	4480	4480	4480
R-squared	0.163	0.077	0.246	0.129	0.068
Firm-fixed effects	Yes	Yes	Yes	Yes	Yes
No. of firms	748	748	748	748	748
Panel C: CEO-fixed effects regressions					
Consultant 1/0	-0.018	-0.113	0.051	-0.018	0.007
	(-0.467)	(-0.692)	(1.277)	(-1.216)	(0.430)
Observations	4480	4480	4480	4480	4480
R-squared	0.190	0.050	0.270	0.121	0.048
CEO-fixed effects	Yes	Yes	Yes	Yes	Yes
No. of CEOs	1,236	1,236	1,236	1,236	1,236
Controls	Yes	Yes	Yes	Yes	Yes
Year-fixed effects	Yes	Yes	Yes	Yes	Yes

Table 5. The determinants of the presence of compensation consultants

This table presents probit regression results on the determinants of the presence of compensation consultants. Variable definitions are provided in the appendix. Robust t-statistics are in parentheses; ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

	Consultant 1/0	
	(1)	(2)
Log of total compensation (t-1)	0.331***	0.241***
	(7.855)	(5.498)
Log of total wealth (t-1)	-0.037**	-0.014
	(-2.450)	(-0.792)
Equity % (t-1)	0.326***	0.259**
	(2.705)	(2.074)
Log of total assets (t-1)	0.253***	0.179***
	(10.439)	(6.464)
Stock returns (1 year) (t-1)	-0.080**	-0.069*
	(-2.193)	(-1.857)
ROA (t-1)	-0.194	-0.134
	(-0.958)	(-0.647)
Market to book value (t-1)	0.027***	0.026***
	(3.535)	(3.342)
Stock volatility (t-1)	-0.616**	-0.650**
	(-2.269)	(-2.354)
Leverage (t-1)	0.294***	0.362***
	(3.006)	(3.586)
Log of CEO age (t-1)	0.351*	0.542***
	(1.817)	(2.711)
Log of CEO tenure (t-1)	0.020	0.019
	(0.556)	(0.520)
Log of board size (t-1)		0.201
		(1.423)
Non-executive ratio (t-1)		1.008***
		(4.897)
CEO is chairman (t-1)		-0.318***
		(-5.108)
Log of comp. comm. size (t-1)		0.439***
		(3.135)
CEO ownership (t-1)		-0.003*
		(-1.682)
Institutional ownership (t-1)		-0.003**
		(-2.141)
Constant	-4.428***	-5.738***
	(-5.216)	(-6.449)
Observations	3670	3670
Pseudo R-squared	0.224	0.254
Industry-fixed effects	Yes	Yes
Year-fixed effects	Yes	Yes

Table 6. Treatment effect of compensation consultants on CEO pay levels and incentives

This table presents the results of propensity score matching on CEO pay levels and incentives. ATT is short for average treatment on the treated. Treated = 731. We use a nearest neighbour algorithm with caliper 0.01 and no replacement, and we restrict the observations to be on the common pillar.

Variable	Sample	Treated	Controls	Difference	S.E.	t-stat
Log salary	Unmatched	5.94	5.31	0.63	0.03	21.78
	ATT	5.62	5.51	0.11	0.04	2.66
Log equity	Unmatched	5.25	2.75	2.50	0.10	25.14
	ATT	4.02	3.18	0.84	0.15	5.68
Log total compensation	Unmatched	6.99	6.04	0.95	0.04	25.84
	ATT	6.44	6.27	0.17	0.05	3.58
Salary %	Unmatched	0.42	0.61	-0.19	0.01	-19.80
	ATT	0.52	0.58	-0.06	0.01	-4.34
Equity %	Unmatched	0.39	0.21	0.18	0.01	18.63
	ATT	0.29	0.23	0.07	0.01	4.95

Table 7. The impact of compensation consultants on CEO pay around the 2008 financial crisis

This table presents the regression results of the effect of consultants on CEO pay levels and incentives around the global financial crisis. Crisis is a dummy variable that equals 1 for periods between 2008 and 2011. Variable definitions are provided in the appendix. Robust t-statistics are in parentheses; ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

	Log salary	Log equity	Log total compensation	Salary %	Equity %
	(1)	(2)	(3)	(4)	(5)
Consultant 1/0	0.025	-0.126	0.025	-0.013	-0.007
	(0.638)	(-0.756)	(0.588)	(-0.848)	(-0.426)
Consultant 1/0 * Crisis	-0.066*	0.369**	0.070*	-0.030**	0.048***
	(-1.784)	(2.346)	(1.778)	(-2.092)	(2.991)
Log of total assets	0.116***	0.371***	0.176***	-0.027***	0.027***
	(5.222)	(3.966)	(7.496)	(-3.071)	(2.775)
Stock returns (1 year)	0.006	0.291***	0.151***	-0.060***	0.043***
	(0.483)	(5.449)	(11.284)	(-12.203)	(7.947)
ROA	0.007	1.161***	0.450***	-0.221***	0.088**
	(0.087)	(3.422)	(5.289)	(-7.039)	(2.536)
Stock volatility	0.081	-1.788**	-0.424**	0.237***	-0.110
	(0.423)	(-2.216)	(-2.095)	(3.171)	(-1.336)
Leverage	-0.050	0.063	-0.112**	0.032	0.001
	(-0.996)	(0.298)	(-2.100)	(1.633)	(0.023)
Market to book	-0.002	-0.001	-0.001	0.001	-0.000
	(-0.707)	(-0.074)	(-0.411)	(0.818)	(-0.115)
Log of board size	0.046	0.886***	0.124	-0.028	0.079**
	(0.626)	(2.882)	(1.608)	(-0.989)	(2.515)
Non-executive ratio	0.297***	1.405***	0.339***	-0.083**	0.069
	(2.891)	(3.242)	(3.121)	(-2.067)	(1.552)
CEO is chairman	-0.163***	-0.279*	-0.114***	0.011	0.005
	(-4.802)	(-1.949)	(-3.171)	(0.793)	(0.319)
Log comp. comm. size	0.034	0.112	0.032	0.008	0.012
	(0.590)	(0.459)	(0.528)	(0.335)	(0.472)
Log of age	-0.302***	-2.419***	-0.542***	0.225***	-0.150***
	(-2.708)	(-5.131)	(-4.584)	(5.163)	(-3.113)
Log of tenure	0.275***	0.087	0.160***	0.018***	-0.030***
	(17.759)	(1.324)	(9.782)	(2.984)	(-4.508)
CEO ownership	0.000	-0.001	0.002**	-0.001*	0.000
	(0.138)	(-0.162)	(2.037)	(-1.687)	(0.796)
Institutional ownership	-0.000	-0.010***	-0.001	0.001***	-0.001**
	(-0.425)	(-3.464)	(-1.601)	(3.489)	(-2.227)
Constant	5.649***	9.776***	7.327***	-0.278	0.640***
	(11.873)	(4.868)	(14.546)	(-1.497)	(3.121)
Observations	4480	4480	4480	4480	4480
R-squared	0.163	0.079	0.246	0.130	0.070
Year-fixed effects	Yes	Yes	Yes	Yes	Yes
Firm-fixed effects	Yes	Yes	Yes	Yes	Yes
No. of firms	748	748	748	748	748

Table 8. Subsample analysis of compensation policy quality

This table presents the regression results for the effect of consultants on CEO pay level and incentives in subsamples based on ASSET4 scores of compensation policy quality. Our sample is reduced to 2,069 firm-years due to data availability of ASSET4. We define high quality (n=1,035) as those with scores above the sample median, and low (n=1,304) otherwise. Robust t-statistics are in parentheses; ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

	Log salary	Log equity	Log total compensation	Salary %	Equity %
	(1)	(2)	(3)	(4)	(5)
Panel A: Pooled OLS regressions					
High	0.012	0.382	-0.043	0.002	0.052**
	(0.349)	(1.547)	(-0.558)	(0.098)	(2.272)
Low	0.044	1.039***	0.115	-0.084***	0.094***
	(0.631)	(4.107)	(1.584)	(-3.451)	(4.003)
Industry-fixed effects	Yes	Yes	Yes	Yes	Yes
Panel B: Firm-fixed effects regressions					
High	-0.023	-0.197	-0.056	0.020	-0.023
	(-0.386)	(-0.575)	(-0.650)	(0.679)	(-0.651)
Low	0.001	0.759*	0.175	-0.067*	0.129***
	(0.013)	(1.713)	(1.482)	(-1.787)	(2.820)
Firm-fixed effects	Yes	Yes	Yes	Yes	Yes
Panel C: CEO-fixed effects regressions					
High	-0.089	0.029	0.038	-0.023	0.026
	(-1.396)	(0.075)	(0.410)	(-0.734)	(0.653)
Low	-0.105	0.794	0.211	-0.099**	0.132**
	(-1.113)	(1.581)	(1.638)	(-2.308)	(2.499)
CEO-fixed effects	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes
Year-fixed effects	Yes	Yes	Yes	Yes	Yes

Table 9. Compensation consultants and CEO pay performance sensitivity

This table presents regression results for the effect of consultants on CEO pay-performance sensitivity. Firm accounting and financial performance are measured by return on assets (ROA) and stock returns, respectively. A set of firm-specific economic characteristics, CEO characteristics, and corporate governance controls are included, but are not reported for simplicity. Robust t-statistics are in parentheses; ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Return on assets (ROA)

	OLS		Firm-fixed effect		CEO-fixed effect	
	Log equity	Log total compensation	Log equity	Log total compensation	Log equity	Log total compensation
	(1)	(2)	(3)	(4)	(5)	(6)
Consultant 1/0	0.842***	0.217***	-0.000	0.049	-0.130	0.048
	(8.766)	(7.362)	(-0.003)	(1.246)	(-0.794)	(1.201)
ROA	-0.890*	0.125	0.164	0.293**	0.188	0.464***
	(-1.890)	(0.779)	(0.341)	(2.428)	(0.362)	(3.629)
Consultant 1/0 * ROA	2.285***	0.628***	1.367***	0.215*	1.165**	0.211*
	(4.484)	(3.761)	(2.897)	(1.817)	(2.288)	(1.680)
Observations	4480	4480	4480	4480	4480	4480
R-squared	0.400	0.601	0.079	0.246	0.052	0.270
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Industry-fixed effects	Yes	Yes	No	No	No	No
Year-fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Firm-fixed effects	No	No	Yes	Yes	No	No
CEO-fixed effects	No	No	No	No	Yes	Yes

Panel B: Stock returns

	OLS		Firm-fixed effects		CEO-fixed effects	
	Log equity	Log total compensation	Log equity	Log total compensation	Log equity	Log total compensation
	(1)	(2)	(3)	(4)	(5)	(6)
Consultant 1/0	0.814***	0.203***	-0.059	0.030	-0.191	0.026
	(8.337)	(6.794)	(-0.372)	(0.761)	(-1.163)	(0.648)
Stock returns	0.363***	0.167***	0.275***	0.174***	0.179*	0.141***
	(2.864)	(3.899)	(2.643)	(6.722)	(1.688)	(5.440)
Consultant 1/0 * Stock returns	0.335**	0.129***	0.353***	0.107***	0.372***	0.122***
	(2.253)	(2.658)	(2.827)	(3.448)	(2.961)	(3.975)
Observations	4480	4480	4480	4480	4480	4480
R-squared	0.400	0.605	0.086	0.263	0.059	0.289
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Industry-fixed effects	Yes	Yes	No	No	No	No
Year-fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Firm-fixed effects	No	No	Yes	Yes	No	No
CEO-fixed effects	No	No	No	No	Yes	Yes

Figure 1. Quantile analysis of the effect of compensation consultants on CEO pay level

This figure presents the quantile analysis of the effect of compensation consultants on CEO pay. The horizontal scale represents the quantiles of the dependent variables; the vertical scale represents the estimated coefficient on compensation consultants for each quantile.