Complexity of CEO Compensation Packages

Ana Albuquerque
Boston University
Questrom School of Management
albuquea@bu.edu

Mary Ellen Carter
Carroll School of Management
Boston College
maryellen.carter@bc.edu

Luann J. Lynch
Darden Graduate School of Business
University of Virginia
LynchL@darden.virginia.edu

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Abstract

We examine the determinants and implications of the complexity of CEO compensation packages. Using a sample of firms from Incentive Lab from 2006 – 2016, we construct an ex-ante measure of complexity based on multifaceted dimension of incentive contracts as described in proxy statements. We first examine economic determinants of contract complexity. We find that our proxies for firm complexity are associated with more contract complexity and that CEO characteristics also relate to complex contracts. In examining the implications of contract complexity, we find that complexity predicted by firm characteristics are positively associated with future performance and negatively associated with excess compensation. On the other hand, complexity predicted by CEO characteristics are negatively (positively) related to performance (excess pay). These results suggest that some dimensions of complexity may reflect agency problems in the firms. In addition, we find that complexity increases over our sample period and that unexplained complexity is associated with higher excess compensation, more consultants hired by the firm and more guidelines recommended by ISS. Together, these results suggest that unnecessary complexity may result from institutional factors as well as a desire to camouflage higher pay.

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1. Introduction

Institutional investors and large shareholders have been major proponents of tying executives' pay to specific performance goals. Through increase disclosure requirements, SEC regulations also encourage firms to link pay to performance. As a result, firms are increasingly tying cash compensation and equity grants to explicit performance goals and contracts have become more complex. Compensation contracts where CEOs are rewarded for achieving multiple explicit performance goals have the advantage that it allows for stronger incentives and it adds transparency to the pay process. But, complex compensation contracts also have disadvantages as they can lead CEOs to avoid taking actions that are value-increasing but conflict with the explicit performance targets or to have incentives to manipulate targets to achieve performance thresholds. Such concerns have been raised by market participants. "*The way executives are paid has become overly complex, with too many cash and share-based awards, long and short-term targets and a profusion of measures of success, ranging from earnings per share to total shareholder return to return on equity. … many chief executives and other top managers struggle to understand what is in their pay packages or how to hit their targets*" (Skapinker, 2015). In this paper, we study the economic determinants and the implications of compensation contract complexity.

The complexity of executive compensation packages likely reflects the scope and complexity of the CEO's role in managing a complex business organization (Kole, 1997). For example, the business environment can be such that it is important to promote intangible assets such as innovation, employee knowledge, and process improvement for which the use of non-financial performance metrics can be more suitable. In addition, agency theory suggests that because performance metrics are noisy and imprecise measures of CEO's actions using additional performance metrics that are informative of CEO's actions can improve incentive alignment. Moreover, including relative performance conditions or performance conditions that are less

affected by exogenous shocks can reduced the risk the CEO is exposed to leading to more efficient contracting. Relying on additional performance metrics and adding relative performance conditions increases contract complexity.

Using a sample of firms from Incentive Lab from 2006 to 2016, we construct two measures of CEO compensation complexity based on the criteria included in cash and equity compensation contracts as described in proxy statements. Our measures (described more fully in Section 3) captures a continuum of complexity with increasing complexity resulting from using more forms of pay, more performance metrics, more time periods over which performance is measured, and including both absolute and relative performance conditions in the CEO compensation contract. We then examine the relation between our measures of complexity and our proxies for firm characteristics that reflect the scope and complexity of the organizations and CEO characteristics that are predicted to be related to complex contracting.

We find that the larger firms with more R&D have more complex CEO compensation packages, while firms with more growth opportunities and more volatile operations have less complex plans. While these latter results seem counterintuitive, compensation plans for these firms may reflect reliance on stock price as a summary measure of value creation. In addition, we find that CEO tenure, proximity to retirement, and founder CEO status are associated with less complex contracts, possibly reflecting lower agency problems with long-serving CEOs holding large ownership stakes in the firm (e.g., Hermalin and Weisbach, 1998; Fahlenbrach, 2009). We also find that contract complexity has steadily increased through time and that contract complexity varies across industries with Utilities exhibiting the highest level of contract complexity and Financial Services and Consumer Discretionary firms having the lowest level.

Investors have expressed concerns about the increasing complexity of executive compensation contracts (Johnson, 2011; KPMG 2011; Conference Board 2013). With more

complex contracts (e.g., using several performance metrics, measured over different time periods and benchmarked to different peer groups), it can be difficult for outsiders to detect rent extraction and the extent to which compensation is not tied to the manager's own performance (Bebchuk and Fried, 2003). To further our understanding of contract complexity, we next examine the association between contract complexity and future performance and CEO excess compensation. We decompose contract complexity into a component predicted by its economic determinants and an unexplained component. We find that contract complexity related to its economic determinants is associated with future higher performance and lower excess pay, consistent with complexity reflecting better incentive alignment. However, the component of contract complexity explained by CEO firm characteristics is associated with lower future firm performance and higher excess pay, suggesting that an element of contract complexity may lead to worse incentive alignment. We find that unexplained complexity is unrelated to future performance, suggesting an idiosyncratic nature to it. But it is associated with higher excess pay, possibly reflecting an attempt to obscure greater compensation to the CEO.

Finally, we analyze the level of unexplained contract complexity and show that unexplained contracts are largely driven by the presence of compensation consultants and institutional investors guidelines. In particular, we find that the presence of compensation consultants has increasingly contributed to the level unexplained contract complexity overtime.

In the midst of heightened scrutiny by regulators, increased shareholder activism, and more interest in the media, we contribute to the executive compensation literature by providing new evidence on the complexity of compensation arrangements. Prior research has examined whether the level of executive compensation is related to firm complexity (Black, Dikolli and Dyreng, 2014) or whether the form of executive pay is related to firm characteristics (Kole, 1997). We extend this literature by examining the complexity in the compensation package itself, rather than

its level or form. We introduce two new measures of compensation contract complexity that explore the details of compensation contracts disclosed on proxy statements. We take advantage of an increase in compensation disclosure mandated by the SEC since 2006 and the change in compensation contract structure (e.g., performance share units have become a popular way of providing incentives to executives) to provide new measures that weren't previously available. In addition, we rely on a large sample of firms (approximately 1,000 firms from IncentiveLab) allowing us to analyze the drivers of compensation contract complexity using a broader and more recent sample. Finally, we also contribute to the literature by examining the implications of contract complexity.

The remainder of the paper is organized as follows. Section 2 provides background and develops our research questions. Section 3 discusses our research design while Section 4 discusses our findings. We provide further analyses on the implications of compensation contract complexity in Section 5. In Section 6, we consider institutional factors that may be related to contract complexity and in Section 7, we conclude.

2. Background and research questions

In the classical principal-agent problem, the agent's actions are not observable and the agent's objectives are not the same as those of the principal. As a result, the principal offers a compensation package to the agent that ties his/her payoff to some observable measures of performance. Prior research has documented that executive compensation contracts are tied to accounting- and stock-based measures (see for example Lambert and Larcker, 1987; Sloan, 1993; Murphy, 2000). In an attempt to address the agency conflict, theory provides several explanations for why the compensation contract offered to the CEO may become increasing complex.

First, performance measures intended to capture the CEO's efforts are imprecise and noisy. Not only are those performance measures affected by the agent's actions but they are also affected

by other factors outside of the agent's control. This imposes greater risk on the CEO; he/she would rather not bear all the uncertainties associated with firm performance. At the same time, the board does want to pass some performance risk to the CEO to align his/her incentives with the interests of shareholders. There are two ways that the board can mitigate the risks imposed on the CEO. First, the board could add relative performance criteria to the measures to remove the portion of the performance measure outcomes that are outside the control of the CEO. Second, it could add non-stock price performance metrics. If such measures are positively associated with stock performance (main focus of the shareholders) but less likely to be affected by exogenous shocks, by tying compensation to not only stock return performance metrics but also to other non-stock price measures the risk imposed on the CEO can diminish. Thus, risk-sharing between the principal and the agent can increase the complexity of contracts if relative performance metrics or non-stock price metrics are added to compensation contract.

Second, the Informativeness Principle suggests that optimal compensation contracts should include any measure that is incrementally informative about the CEO's efforts (Holmström, 1979). Since the actions of the CEO are difficult to observe, in particular because the effects of decisions may not be realized in the short term, the compensation contract of a CEO may contain several performance measures and time horizons over which performance is measured. Thus, under the Informativeness Principle, compensation contracts may be more complex if multiple performance measures (measured over multiple time horizons) each provides incremental information about the CEO's efforts.

Third, and related to the discussion above, the actions required of a CEO are complex and multifaceted. In addition to defining and implementing corporate strategic decisions, the CEO delegates to and manages other executives, ensures strategic goals are being met, monitors potential market opportunities and risks, among other tasks. In designing the compensation

contract, the board may want to encourage a balance of actions by the CEO and therefore may design a contract that takes into consideration this multitask setting. As a result, compensation contracts may be more complex to address the multi-tasking, complex nature of the CEO's position.

Collectively, these theories would predict that the complexity of compensation contracts arises as a result of firms' attempts to design efficient compensation contracts that reflect the economics of the situation the executive is charged with managing. Different executives assume roles with differing scopes and levels of complexity, and as a result, are compensated through compensation plans that differ in their complexity. Prior research has found that the level of executive pay varies with characteristics associated with firm complexity, including size (see Smith and Watts 1992, Gaver and Gaver 1993, among others), growth opportunities (Smith and Watts 1992), the volatility of the firm's operating environment (Demsetz and Lehn 1985), and industry and geographic diversification (Rose and Shepard 1997; Duru and Reeb 2002; Bushman, Chen, Engel, and Smith 2004; Black, et al. 2014). While these studies consider how the *level* of executive pay varies with proxies for complexity, they do not consider whether the *complexity of the contract itself* is related to firm complexity.[1] Thus, our first research question examines the extent to which compensation contract complexity is associated with firm and CEO characteristics that reflect the economics of business environment.

While more complex contracts may help to address agency problems in the firm, such contracts may impose costs on the firm through unintended consequences that may adversely affect

[1] In early work, Kole (1997) examines how compensation contracts are adapted to firm characteristics. She finds greater use of equity pay in high R&D firms, consistent with stock-based pay dominating accounting-based pay for research-intensive firms. She also finds longer vesting periods in high R&D firms consistent with greater uncertainty surrounding project payoffs and importance of specialized knowledge in certain firms. She doesn't address compensation contract complexity per se, but characterizes the form of equity and the length of vesting periods as features highlighting the potential complexity of contracting.

future performance. First, contracts that rely on explicit performance goals with "jumps and kinks" in the performance targets can lead to distorted actions if the CEO tries to achieve the specific target. For example, Bennett, Bettis, Gopalan, and Milbourn (2017) show that CEOs who just exceed their EPS goals in compensation contracts have higher abnormal accruals and lower research and development spending, suggesting that dysfunctional actions may result when tying managerial compensation to specific targets. Such problems may be exacerbated when the contract is more complex by involving multiple performance measures over multiple periods.

Second, tying pay to different measurable metrics may not necessarily result in balanced effort on the part of the CEO, as agents will concentrate too much attention on the activities that are more likely to be rewarded. The multi-task model in Holmstrom and Milgrom (1991, 1994) suggests that agents reallocate their efforts from uncompensated (non-incentivized) activities toward compensated (incentivized) activities. Under a continuum of rewards, this may be extended to suggest that the CEO may spend more effort towards those performance measures that are relatively more valuable in the compensation contract, even if other measures are included but would result in lower compensation. For example, CEOs whose compensation is more closely tied to the value of equity engage in more short-term earnings manipulation to increase its value (Bergstresser and Philippon, 2006).

Third, a contract that has many different performance metrics and time horizons can restrict the decision rights of a CEO. Grossman and Hart (1986) suggest that contracts are necessarily incomplete because not all outcomes can be specified and, as a result, it is optimal to give decision rights to the party that controls the assets. A contract that specifies particular targets over particular performance periods may constraints the CEO's willingness to take value-enhancing actions if those actions conflict with the goal targets set in the contract.

Based on these arguments above, our second research question examines whether complexity of compensation contracts result in unintended consequences. To address this question, we consider how both predicted and unexpected components of contract complexity is associated with future firm performance and excessive CEO compensation.

3. Research Design

3.1 Sample and data

Our sample includes all firms on the Incentive Lab database in 2006 - 2016 that have sufficient data to compute the variables in our initial regression of the determinants of compensation contract complexity (991 unique firms; 7,366 firm-years). We begin our sample period in 2006 because that is the first year the SEC required increased compensation disclosures, which we use to construct our measures of compensation contract complexity. We obtain financial statement data from Compustat, stock return data from CRSP, and executive compensation data from ExecuComp and Incentive Lab.

3.2 Methodology

3.2.1 Measures of compensation contract complexity

Using data from Incentive Lab, we construct two alternative measures of the complexity of compensation contracts (see Appendix A for details). First, we calculate an index of complexity (COMPLEX_IL) based on the number of components determining the potential payouts from incentive-based compensation contracts, as follows. We evaluate four types of compensation (short-term cash bonus, long-term cash bonus, restricted stock, stock options), as Kole (1997) suggests that the form of compensation is one aspect of complexity. Within each type, we assign a point each for having a time-vesting provision (e.g. stock units that vest after a three-year service period), an absolute performance condition (e.g., quantitative measures such as ROA, RET, sales

growth, EPS or qualitative measures such as successful completion of a merger and acquisition), and/or a relative performance condition (e.g., ROA measured relative to the 75% of the peer's ROA). Then, within each of the two performance conditions, we include an additional point if the absolute (relative) performance condition is based on more than one performance measure and if the absolute (relative) performance condition is based on performance over more than a single time period. These features have not been considered in the literature related to compensation contract complexity to date.

Second, we calculate a second index (COMPLEX_IL_ACTUAL) that expands on the previous one by taking advantage of all the information provided. Instead of assigning one point if the absolute (relative) performance condition is based on more than one performance measure or measured over more than a single time period, we assign a point for each unique (qualitative or quantitative) performance measure used and for each unique time period over which performance is measured. As an example, this index assigns a point to each absolute quantitative performance metric used, each quantitative performance metric measured relative to a benchmark, each absolute qualitative performance metric used[2], and each performance measurement period (e.g., ROA is measured over the a 3-year period, while RET is measured over the fiscal year). The index then adds all the points to get an overall measure of contract complexity. Because these measures are computed using incentive compensation characteristics from which realizations will be computed, these are ex-ante measures of complexity.

Table 1 presents descriptive statistics related to our measures of the complexity of compensation contracts. As shown in Table 1 Panel A, the mean (median) value of COMPLEX_IL

[2] Qualitative metrics are rarely used in relative performance benchmark. As a result, we do not account for the number of qualitative measures with relative performance conditions (less than 1% of observations had qualitative measures with relative performance conditions).

is 4.90 (5.00), with a standard deviation of 2.14. As shown in Appendix A, the theoretical value of COMPLEX_IL can be as high as 28. However, a value that high would require that the firm award all four types of incentive compensation, with both absolute and relative performance conditions within each type, based on more than one performance measure over more than one of time period. As this rarely occurs in practice, it is not expected that this variable will reach its maximum value. Indeed, its value at the first and ninety-ninth percentile is 1 and 10, respectively. The mean (median) value of COMPLEX_IL_ACTUAL is 12.20 (11.00), with a standard deviation of 7.14. This measure can assume large values if firms rely on many performance metrics or time horizons. Its value at the first and ninety-ninth percentile is 1 and 34, respectively. Our contract complexity measures are highly correlated (0.843 at $p < 0.01$).

Figure 1 graphically presents our measures by year over the sample period. The complexity of compensation packages increased steadily over the sample period, consistent with claims advanced in the popular press. COMPLEX_IL increased from 4.15 in 2006 to 5.91 in 2016; COMPLEX_IL_ACTUAL increased from 9.95 in 2006 to 15.11 in 2016. To assess whether the increase is statistically significant, we compare the complexity values over the period 2006 to 2010 to its value over the 2012 to 2016 period. (We exclude 2011 to have a balanced number of years in each sub-period.) The results in Panel B of Table 1 confirm a statistically significant ($p < 0.01$) increase in the mean and median values for COMPLEX_IL and COMPLEX_IL_ACTUAL from the earlier to the later period.

We present the mean values of our complexity measures by industry in Panel C. The complexity of compensation is highest in the Utilities industry using both of our measures of complexity. The Financial Services and Consumer Discretionary industries have the lowest values of complexity.

3.2.2 Economic determinants of compensation contract complexity

We examine several possible economic drivers of compensation contract complexity, including both firm and CEO characteristics.

3.2.2.1 Firm characteristics

Size. Larger firms likely are more complex and more difficult to manage, as they have more resources about which managers must make decisions and a larger scope of operations (Smith and Watts 1992; Gaver and Gaver 1993; Himmelberg, Hubbard, and Palia 1999) and a greater tendency to decentralize (Christie, Joye, and Watts 2003). In addition, it may be more difficult to monitor managers of larger firms (Eaton and Rosen 1983). As a result, we expect that they have more complex compensation packages. We measure size as the natural log of the market value of equity (lnMV).

Growth opportunities. Firms with higher growth opportunities have businesses that are more difficult to manage than other firms and are more difficult to monitor because outside constituents cannot easily observe the firm's investment opportunities (Smith and Watts 1992). As a result, they may have more complex compensation packages, as compensation contracts may include performance measures that are tailored to the specific characteristics of each business. Research shows that non-financial performance measures are used to determine executive incentive pay when growth opportunities are larger, when innovation is more important, and when financial measures are noisier, (see, for example, Bushman, Indjejikian, and Smith, 1996; Ittner, Larcker and Rajan, 1997). Finally, if growth firms invest more in research and development projects and contract length is associated with the realization of project payoffs (Kole, 1997), complex firms may consider multiple periods to cover the complexity inherent in their businesses. Thus, firms with more growth opportunities firms are likely to use more performance measures over more periods to capture different aspects of the CEO's actions. We measure growth opportunities as the ratio of the sum of the market value of equity and the book value of total

liabilities to the book value of assets (MTBA) and the ratio of R&D expenses to the book value of assets (R&D).[3]

Volatility of business operations. Firms that are more volatile firms place more risk on the CEO. Fluctuation in performance measures can make it harder to monitor CEO's actions (Demsetz and Lehn 1985) and can make the CEO more exposed to performance shocks outside his control. To alleviate the monitoring risk imposed on CEO due to the noisier performance measures, firms that are in more volatile businesses can have more complex contracts by including more performance metrics, including qualitative measures that are informative of his efforts. In addition, the firm may rely not only on multiple performance metrics to alleviate the signal to noise ratio of each performance metric, but also add relative performance conditions, in addition to absolute conditions, to diminish the risk the CEO is exposed. We measure the volatility of business operations as the natural log of the standard deviation of monthly stock returns (lnSTDRET).

Complexity of business operations. Firms with more complex business operations can have more complex compensation packages to match their business complexity. As firms with more business segments and firms with foreign operations potentially operate in more complex environments, we use business segments and the presence of foreign income to proxy for firm complexity. Using segment data obtained from Compustat, we calculate a Herfindahl Index based on the proportion of revenues accounted for by each segment (see also Jennings, Seo and Tanlu 2014); we subtract this Index from 1 so that higher values of this variable reflect greater complexity (SEGMTS_HH). As an example, the conglomerate General Electric has a high value of 0.86 (0.85) for this measure of complexity in 2015 (2016). In their footnotes, firms must report financial data

[3] Missing observations for R&D expenses are assumed to be zero, because firms with negligible R&D expenses are not required to report them separately.

on a segment basis, based on the segments used for the internal management of operations.[4] Most firms in our sample provide segment data based on business lines. Finally, we include an indicator variable to capture whether the firm has foreign operations, based on whether the firm reports pretax income from foreign operations (PIFO). We expect that firms that have more complex operations (greater SEGMTS_HH, and PIFO = 1) have more complex compensation plans.

Although firms with more complex business are expected to have more complex contracts with multiple performance metrics, performance conditions and time horizons, it is possible that having too many performance metrics and conditions can lead to distracting and conflicting objectives for the CEO. Thus, to ensure goal congruity, it may be optimal to ignore non-stock price performance-related information and focus instead on a single metric – stock returns – to evaluate CEO's performance in more complex business situation. If the valued added by the CEO is non-contractible information, then the market price can reflect the investors' equilibrium beliefs about the (unobservable and non-contractible) actions taken by the CEO and the information they have about the uncontrollable events that will influence the value of the firm. The extent to which contracts are more complex in more complex business situations depends on whether the benefits associated with having a more complex contract (better incentive alignment) outweigh the costs of such a contract (e.g., dysfunctional behavior) for those firms.

3.2.2.2 CEO characteristics

We include several characteristics about the CEO that have been shown to affect compensation contracting. First, we include CEO tenure, as prior studies suggest that longer serving CEOs may be less subject to agency conflicts due to less uncertainty about ability (Hermalin and Weisbach, 1998; Dikolli, Mayew, and Nanda, 2014). Second, we include an

[4] SFAS 131, implemented in 1997, requires that firms disclose information about each reportable segment in the same manner that management views operating segments for internal decision-making purposes. All firm years in our sample are subject to this standard.

indicator of whether the CEO is the company founder, as they are hypothesized to have lower principal-agent conflicts due to greater equity holdings (Fahlenbrach, 2009). Thus, long-serving and founder CEOs may not require complex contracts with multiple incentives to align CEO's interests to those of shareholders. Third, we include proximity to retirement, as Gibbons and Murphy (1992) find that older CEOs that are close to retirement receive higher incentive pay to substitute for declining incentive alignment due to career concerns. These variables address the relative importance of incentive pay in the compensation contract but do not speak to the complexity of the contract per se. The need for greater incentive pay may be or may not be achieved by more complex contracts, thus we do not make predictions regarding the complexity of their compensation contracts

3.2.3 Multivariate regression

We estimate the following regression of compensation complexity on proxies for the economic determinants of compensation complexity and our estimate of excess pay.

$$\begin{aligned} COMPLEXITY_{jt} = {} & \alpha + \beta_1 lnMV_{jt-1} + \beta_2 MTBA_{jt-1} + \beta_3 R\&D_{jt-1} + \beta_4 lnSTDRET_{jt} + \beta_5 SEGMTS\_HH_{jt-1} \\ & + \beta_6 PIFO_{jt} + \beta_7 lnTENURE_j + \beta_8 RETIRE_j + \beta_9 FOUNDER_j + \beta_j IND_j \\ & + \beta_t YEAR_t + \varepsilon_{it} \end{aligned} \quad (1)$$

Where:

$COMPLEXITY_{jt}$ is one of the following:

COMPLEX_IL = index of compensation complexity computed from Incentive Lab data. A point is added for (1) each component of pay, (2) having a time-vesting provision, (3) having absolute performance, (4) having relative performance conditions, and an additional point is added (5) if the absolute (relative) performance condition is based on more than one performance metric, (6) if the absolute (relative) performance condition is based on performance over more than a single time period.

COMPLEX_IL_ACTUAL = index of compensation complexity computed from Incentive Lab data in the same manner as *COMPLEX_IL,* except that instead of one point for having more than one performance metric or time

horizon over which the performance metric is calculated in (5) and (6) above the actual number of performance metrics and time periods is added to the index.

And:

$lnMV_{jt-1}$	=	natural log of the market value of equity of firm *j* at the beginning of year *t*
$MTBA_{jt-1}$	=	(market value of equity plus book value of total liabilities)/ book value of assets of firm *j* at the beginning of year *t*
$R\&D_{jt-1}$	=	research and development expenditures / total assets for firm *j* at the beginning of year *t*
$lnSTDRET_{jt}$	=	natural log of the standard deviation of monthly stock returns for firm *j* for the two years leading to the end of year *t*
$SEGMTS\_HH_{jt-1}$	=	1 – (Herfindahl Index computed based on the proportion of total revenues for firm *j* in year *t-1* accounted for by each business segment)
$PIFO_{jt}$	=	indicator variable equal to 1 if pretax foreign income for firm *j* in year *t* is greater than zero; 0 otherwise
$lnTENURE_{jt}$	=	natural log of the CEO tenure for firm *j* in year *t*
$RETIRE_{jt}$	=	indicator variable equal to 1 if the CEO is older than 65 in year *t.*
$FOUNDER_{jt}$	=	indicator variable equal to 1 if the CEO of firm *j* in year *t* is a founder of the firm.
IND_j	=	indicator variable for industry, based on Global Industry Classification codes for firm *j*
$YEAR_t$	=	indicator variable for year *t*

We winsorize the variable MTBA and R&D at the 1 and 99 percent level to mitigate the influence of outliers. We compute standard errors that are cluster-adjusted by firm.

4. Results

4.1 Descriptive statistics for sample firms

We present descriptive statistics in Table 2. Sample firms have a mean (median) market value of equity of $12,781 million ($4,524 million), mean (median) market-to-book ratio of assets of 1.935 (1.58), and mean (median) ratio of R&D to total assets of 0.03 (0.00). The mean (median) standard deviation of returns is 0.10 (0.08). The mean (median) number of business segments is 2.9 (3.0). At least 25% of firms report only one business segment, and at least 25% of firms report 4 or more business segments. Over half of the firms (63%) report pretax income from foreign

operations. CEOs have an average tenure of 7.5 years. And among our sample CEOs, approximately 12% are founders and only 6% are close to retirement.

4.2 Pearson correlations

Table 3 presents Pearson correlations among our independent variables. As previously mentioned, the correlation between our measures of complexity (COMPLEX_IL and COMPLEX_IL_ACTUAL) is 0.843, significant at $p < 0.01$. The high correlation is not surprising given that both capture the different components of pay, forms pay (with absolute or relative conditions), different performance metrics and time horizons. Considering firm characteristics, we find that size (lnMV) and having foreign operations (PIFO) are positively correlated with complexity while the market-to-book ratio of assets (MTBA), volatility of returns (lnSTDRET), and the relative dominance of any segments (SEGMTS_HH) are negatively related to compensation complexity. Research and development spending (R&D) is negatively, but not statistically significantly, related to complexity. Considering CEO characteristics, we find that longer tenure (lnTenure), being a founder (FOUNDER), and being closer to retirement (RETIRE) are each negatively correlated with complexity.

While several of the correlations among the independent variables are significant, there are a few notable correlations. Firm size is negatively correlated with volatility in returns (-0.478), and CEO tenure is positively correlated with being both a founder CEO (0.436).

4.3 Multivariate regression

Table 4 present results from estimating our regression. Columns (1) – (4) present results using COMPLEX_IL as the dependent variable; Columns (5) – (8) present results using COMPLEX_IL_ACTUAL as the dependent variable. For each dependent variable, we estimate the regression without industry and year fixed effects (Columns (1) and (5)), with year fixed effects

(Columns (2) and (6)), with industry fixed effects (Columns (3) and (7)), and with both industry and year fixed effects (Columns (4) and (8)).

We find that larger firms have more complex compensation contracts (the coefficient on lnMV is positive and significant a $p < 0.01$ in all regressions). This result is consistent with large firms being more complex, more difficult to manage and more difficult to monitor managers.

However, we find some evidence that growth firms have less complex contracts (the coefficient on MTBA is negative and significant a $p < 0.01$ in all regressions). Though inconsistent with our predictions, it may be associated with growth firms focusing primarily on stock price measures. These firm may usea large proportion of equity compensation, consistent with equity being used to align incentives of CEOs with those of investors in firms where monitoring of management is more difficult (Smith and Watts 1992; Gaver and Gaver 1993; Himmelberg, Hubbard, and Palia 1999). We currently are investigating this further.

We find that firms with high R&D have more complex contracts with the coefficient on R&D positive and significant a $p < 0.01$ in all regressions except column (3), when industry fixed are included. At first glance, this result seems counterintuitive, given the results on MTBA. However, noting that high R&D firms are a specific type of growth firm, they likely use different and more metrics, such as number of patents and similar measures, than other growth firms. Use of such additional metrics increases the complexity of their compensation contracts.

We find that firms with greater volatility in stock returns have lower complexity; the coefficient on lnSTDRET is negative and significant at $p < 0.05$ in Columns (1), (3) and (5). On the surface, this result seems counterintuitive, as firms with more volatile returns might be more likely to have more complex contracts. However, this result may be driven by the dominance of salary (and less incentive pay) in the compensation packages for CEOs to compensate them for assuming the greater risk associated with those firms. We note, though, that this relation is

insignificant after controlling for both year and industry fixed effects. This is likely due to the volatility of stock returns varying by industry and year, and while that volatility may indeed impact the complexity of compensation packages, its effect is picked up in those industry and year fixed effects.

Interestingly, we find limited evidence that any other proxies for operational complexity are associated with the complexity of compensation contracts. We note that the coefficient on PIFO is negative and significant at $p < 0.05$ in columns (5) and (6) when using the COMPLEX_IL_ACTUAL measure, but when industry fixed effects are included, that coefficient is no longer significant at conventional levels.

We find that CEOs with longer tenure have less complex compensation packages, consistent with less uncertainty about their ability mitigating potential agency conflicts. Similarly, we find that CEOs that are founders have less complex compensation packages, consistent with their having less agency conflicts. We also find that CEOs closer to retirement also have less complex contracts, despite having greater need to horizon alignment. . These results may be driven by the board relying more heaving on stock returns as single performance metric to solve the horizon problem. We are currently investigating this possibility.

The year indicator variables are positive and significant beginning with 2009, and the coefficients on those variables are increasing, reflecting an increasing complexity of compensation contracts over time. This result (consistent with Figure 1) affirms the anecdotal evidence and allegations in the media of an increasing complexity of CEO compensation.

In examining industry effects, the results suggest that compensation contracts are less complex in the financial services industry (the coefficient on GICS_40 is negative and significant a $p < 0.05$) and more complex in the utilities industry (the coefficient on GICS_55 is positive and significant at $p < 0.01$). Interestingly, these two industries often are excluded from studies of

executive compensation due to their being more heavily regulated. Our results suggest there may be learning opportunities from investigating those firms.

In sum, the results in this section suggest that compensation contract complexity is explained partially by organizational complexity, with large firms and high R&D firms having more complex contracts, but other growth firms, that reply heavily on equity and stock price measures, having less complex contracts. Interestingly, though, we observe little relation between other measures of organizational complexity and the complexity of compensation contracts. The results also suggest that more complex contracts may also be intended to address potential agency concerns, as CEOs for whom agency conflicts are likely less of a concern have less complex compensation contracts. We observe an increasing level of complexity over time, even after controlling for the economic determinants we expect to explain that complexity. And, finally, we observe intriguing industry differences in compensation complexity, with two notable industries typically excluded from compensation research – financial services and utilities – having lower and higher compensation complexity, respectively.

4.4 Analysis over time

As previously noted, contract complexity has increased over time during the sample period. To test whether the determinants of compensation contract complexity have also changed through our sample period, we replicate the results in Table 4 for two subsamples, 2006 to 2010 and 2012 to 2016, dropping 2011 to create balanced panels.

Table 5 presents the results. Columns (1) and (2) presents results for 2006-2010, using COMPLEX_IL and COMPLEX_IL_ACTUAL, respectively, as the dependent variable. Columns (3) and (4) presents results for 2012-2016, using COMPLEX_IL and COMPLEX_IL_ACTUAL, respectively, as the dependent variable. The results show that the ability of the model to explain contract complexity has increased from the earlier to the later period for both complexity measures.

The adjusted R^2 increases from 0.124 in Column (1) to 0.133 in Column (3), and from 0.100 in Column (2) to 0.163 in Column (4)). This is reinforced by the increase in significance of several determinants in the model. Specifically, the relation between complexity and lnMV becomes more positive in the later period; the relation between complexity and MTBA (FOUNDER) becomes more (less) negative in the later period; and the relation between SEGMTS_HH goes from negative in the earlier period to positive but insignificant in the later period. We also observe complexity not explained by economic determinants declines in several industries (GICS_15, 20, 25, 30, 35, and 45).

In sum, compensation contracts have become more complex over time, and the ability of economic determinants to explain that complexity has increased.

5. Implications of compensation contract complexity

In this section, we consider the implications of compensation contract complexity on firm performance and on CEO compensation. These analyses are intended to further our understanding of the reasons for the contract complexity. As a result, they are exploratory in nature. To provide the greatest depth of analysis, we first consider the implications of actual contract complexity. We then decompose that contract complexity into complexity that is explained by the economic determinants in Eq. (1) from Section 3 (*COMPLEX_Econ*), and complexity that is not explained by the economic determinants (*COMPLEX_Err*). Finally, we decompose the complexity explained by economic determinants into the component that is explained by firm characteristics (*COMPLEX_Econ_Firm*) and the component that is explained by CEO characteristics (*COMPLEX_Econ_CEO*). We compute *COMPLEX_Econ, COMPLEX_Err, COMPLEX_Econ_Firm*, and *COMPLEX_Econ_CEO* as follows:

$$COMPLEX\_Econ_{jt} = \hat{\beta}_1\, lnMV_{jt-1} + \hat{\beta}_2\, MTBA_{jt-1} + \hat{\beta}_3\, R\&D_{jt-1} + \hat{\beta}_4\, lnSTDRET_{jt} + \hat{\beta}_5\, SEGMTS\_HH_{jt-1} + \hat{\beta}_6\, PIFO_{jt} + \hat{\beta}_7\, lnTENURE_j + \hat{\beta}_8\, RETIRE_j + \hat{\beta}_9\, FOUNDER_j + \hat{\beta}_j\, IND_j, \quad (2)$$

$$COMPLEX\_Err_{jt} = COMPLEX_{jt} - COMPLEX\_Econ_{jt} \quad (3)$$

$$COMPLEX\_Econ\_Firm_{jt} = \hat{\beta}_1 lnMV_{jt-1} + \hat{\beta}_2 MTBA_{jt-1} + \hat{\beta}_3 R\&D_{jt-1} + \hat{\beta}_4 lnSTDRET_{jt} + \hat{\beta}_5 SEGMTS\_HH_{jt-1} + \hat{\beta}_6 PIFO_{jt} + \hat{\beta}_j IND_j, \quad (4)$$

$$COMPLEX\_Econ\_CEO_{jt} = COMPLEX\_Econ_{jt} - COMPLEX\_Econ\_Firm_{jt} \quad (5)$$

For all measures of complexity (actual, predicted, and unexplained), we examine their relations with future performance and with CEO excess compensation.

5.1 Implications for future performance

We first consider the relation between contract complexity and future performance. Doing so allows us to understand some features of contract complexity. First, observing a positive (negative) relation between contract complexity and future performance would indicate that contracts are appropriately (overly) complex in a way that is helpful (harmful) to running the firms. Second, partitioning complexity into that predicted by economic determinants and that which is unexplained, we can shed light on potential unnecessary complexity. If our unexplained complexity is systematically driven by firm or CEO characteristics that are uncorrelated with our proxies but is related to poor governance, we would predict a negative relation between unexplained high complexity and future performance. On the other hand, if our unexplained complexity is not systematic across firms, it will be unrelated to firm performance.

We estimate the impact of the explained and unexplained contract complexity components on future performance using the following model:

$$FuturePerf_{it+1} = \beta_0 + \beta_1 COMPLEX\_Econ_{it} + \beta_2 COMPLEX\_Err_{it} + \beta_3 \Delta Perf_{it} + \Sigma \beta_4 Controls_{it} + \beta_6 IND_j + \beta_7 YEAR_t + \varepsilon_{it}. \quad (6)$$

We measure future performance by change in accounting performance (ΔROA) and future stock returns (*FutureRET)*. ΔROA equals the change in operating income before depreciation (Compustat item OIBDP) scaled by total assets. *RET* is the annual stock return including dividends. We use both one-year-ahead performance, and the average of the one-year- and two-

year-ahead performance. For all analyses, we consider complexity as measured by COMPLEX IL and COMPLEX IL ACTUAL.

Table 6 Panel A presents the results examining change in accounting performance. Following Core et al. (1999), we include as control variables the log of total sales revenues (*LogSales)*, the log of standard deviation of return on assets over the prior four years (LogSTDROA), and industry (and year) fixed-effects to account for any change in future performance that is industry- (or year-) specific.[5] We further control for the current growth in return on assets to account for any mean reversion in return on assets growth.

As reported in Columns (1) and (4), we find no relation between compensation contract complexity and changes in accounting performance. However, when we decompose complexity into predicted complexity and unexplained complexity (Columns 2 and 5), we find that the portion of complexity that is associated with economic determinants is positively related to *FutureΔROA* (the coefficient on *COMPLEX_Econ* is positive and significant at $p < 0.01$ in both columns), consistent with contract complexity explained by firm and CEO characteristics having positive effects on future performance. We observe no relation between future performance and the proportion of complexity unexplained by those firm and CEO characteristics (*COMPLEX_Err*). Finally, in Columns (3) and (6), we further decompose *COMPLEX_Econ* into the proportion explained by firm characteristics and the proportion explained by CEO characteristics.[6] We observe a significant positive relation between *COMPLEX_Econ_Firm* and *FutureΔROA*, consistent with higher contract complexity that is related to firm characteristics being associated with improvements in ROA. We observe a negative relation between *COMPLEX_Econ_CEO* and

[5] To control for size, Core et al. (1999) use total sales, whereas we use instead the natural logarithm of sales. (LogSales) to account for skewness of the variable (4.55) in our sample (the mean (median) value for Sales is $3,485 ($9,511) Million).

[6] We also decompose the *COMPLEX_Err* into unexpected high complexity and unexpected low complexity, but observe no significant coefficient on either variable.

Future∆ROA, although it is statistically significant (*p*-value < 0.05) only in Column (3). As our proxies to determine contract complexity for CEO characteristics (FOUNDER, TENURE, and RETIRE) may be associated with potential managerial entrenchment and thus higher agency and horizon problems in the firm, the negative relation suggests that contract complexity based on these characteristics is associated with poor incentive alignment.

Our findings using one year ahead performance are generally similar to those using the average of two year ahead performance. Interestingly, we continue to observe no significant relation between the portion of complexity not explained by economic determinants and *Future∆ROA*. This finding, consistent across all specifications, suggests that unexplained complexity is likely idiosyncratic to the firm and not systematically related to characteristics of the firm or CEO. In other words, seemingly "unnecessary" complexity is unrelated to declining future performance.

Table 6 Panel B presents the results using future stock returns as our performance measure. Following Core et al. (1999), we include as control variables the log of total market capitalization (*LogMV)*, the log of standard deviation of monthly stock returns over the prior two years (*LogSTDRET*), the book-to-market of equity (*BTM*), and industry (and year) fixed-effects to account for any change in future performance that is industry- (or year-) specific.

The findings in Panel B are generally similar to those of Panel A. While we continue to find no relation with contract complexity (Columns 1 and 4) and future stock returns, we also do not find a relation with contract complexity explained by economic determinants (Columns 2 and 5). This is different from our analysis in Panel A but can be explained when we consider the results in Columns 3 and 6. When we decompose predicted complexity into that which is predicted by firm characteristics and that which is predicted by CEO characteristics, we find, as before, that contract complexity explained by firm characteristics is associated with greater future stock

returns. We also now find that complexity explained by CEO characteristics is negatively related to future performance and statistically significant using both measures of complexity. Like before, we find no relation between unexplained complexity and future performance, and our findings are consistent when we consider that average stock returns for one- and two-years ahead.

In untabulated tests, we also use *FutureΔSales* our performance measure. Following Mironov (2013) and Billet et al. (2017), we include as control variables the log of total sales (*LogSales)*, to account for the fact that size is negatively correlated with sales growth, the ratio of total debt to assets (*Leverage*) to account for the fact that firms with more leverage face financial constraints to growth, the ratio of market-to-book value of assets (*MTBA*) and firm performance (RET and ROA) to account for the fact that firms with more growth opportunities and better performance exhibit higher sales growth, and current sales growth to control for any firm-specific omitted variable that is associated with sales growth. Our findings are consistent with those in Table 6 Panel B and thus, for brevity, we do not tabulate them.

Together, the results in Table 6 suggest that the compensation contract complexity predicted by firm characteristics is positively associated with future firm performance, suggesting that the net benefits of firm-related complexity are positive, resulting in better incentive alignment. However, contract complexity predicted by CEO characteristics is negatively associated with future performance, suggesting that CEO-related complexity to solve horizon and agency conflicts is net costly. In addition, we find no association between unexplained complexity and future firm performance.

5.2 Implication for excess pay

Next, we examine the relation between contract complexity and excess pay. As a way to make it less transparent to shareholders that the CEO is overly compensated, the boards may offer their CEOs more complex contracts, possibly with multiples performance measures and time

horizons that are easily achieved, but that give the impression that the CEO pay is strongly tied to performance. Consistent with firms attempting to obfuscate rent extraction, Laksmana, Tietz, and Yang (2012) document an association between positive excess pay and CD&A readability. Bebchuk and Fried (2003) suggest that firms use pay practices that make less transparent both the total executive compensation and the extent to which that compensation is tied to his performance. Some have asserted that shareholders may not be able to understand the complex compensation plans found in many firms (e.g., Bebchuk and Fried 2004; Bebchuk, Fried and Walker 2002; Hoffman, 2015). Indeed, results in an experimental study by Gillenkirch, Hendriks, and Welker (2014) suggest that shareholders are better able to anticipate the incentive effects of compensation when compensation packages are less complex. We extend this literature by examining contract complexity directly.

By partitioning contract complexity into components explained and unexplained by economic determinants, we can examine if the unexplained component is related to excess pay. If contract complexity that is not related to its economic determinants is due to a desire of the board to obfuscate excessive pay, we expect a positive association between excess pay and the unexplained contract complexity.[7]

We estimate excess pay following Core, Guay, and Larcker (2008), where excess pay is the residual pay from an expected CEO compensation model that controls for economic determinants such as CEO tenure, firm size, book-to-market, stock return, accounting return, whether the firm belongs to the S&P500, and year and industry fixed effects.[8]

[7] It is possible that our proxy for excess pay may contain more measurement error for more complex firms. For example, it may be the case that in more complex firms, performance measures include non-financial measures or individual performance objectives that are missing in our model. In robustness tests, we control for the number of qualitative performance measures and obtain similar results.

[8] In robustness tests, we use alternative measures of excess pay following Cai and Walkling (2009) and Larcker et al. (2011) and obtain similar results. The Cai and Walkling (2009) excess pay measure is calculated as the as the residual from a model that estimates CEO compensation (natural logarithm of total compensation, variable TDC1 from ExecuComp) on average three-year stock returns, annual ROA, the log of the lagged market value of equity, lagged book-to-market ratio, leverage, and industry fixed effects. The Larcker et al. (2011) excess pay measure is the

In Table 7, we estimate the association between excess pay and contract complexity and its different components. We include CEO, industry and year fixed effects to control for person, industry or time invariant factors that may explain excess pay. We control for CEO fixed effects to account for any time invariant CEO characteristic that can explain the level of pay (e.g., CEO risk aversion) but its inclusion also helps to address concerns that some omitted firm characteristic could explain excess compensation. In untabulated tests, we find that our conclusions remain when we exclude the CEO fixed effects. In addition, we also control for the CEO's level of total compensation to alleviate concerns that any positive association between complexity and excess pay may reflect payment for compensation risk (Black et al. 2014). The increased complexity in compensation packages, particularly in the growth in the number of incentive plans and performance metrics, brings greater uncertainty about expected pay, for which companies must pay a premium for executives to accept (Gosling, 2014).

We first estimate the association between total contract complexity and excessive pay as a benchmark. We find (Columns 1 and 4) that excess pay is positively associated with total contract complexity. When we decompose contract complexity into its predicted and unexplained components (Columns 2 and 5) we find that the component of complexity that is associated with economic determinants is negatively related to EXCESSPAY (the coefficient on *COMPLEX_Econ* is negative and significant at $p < 0.01$ in both columns), and the unexplained component of complexity is positively related to EXCESSPAY (the coefficient on *COMPLEX_Err* is positively and significant at $p < 0.01$ in both columns), consistent with excessive (unexplained) contract complexity being used to hide excessive CEO pay. Finally, in Columns (3) and (6), we further decompose *COMPLEX_Econ* in Eq. (3) into the proportion explained by firm characteristics and

difference between CEO compensation and the median compensation of a set of peer firms in the same industry and of similar size as that of the firm. Specifically, it is calculated as the natural logarithm of total compensation for the CEO less the natural logarithm of the median total annual pay for all remaining firms on ExecuComp that are in the same GICS and size quintile of the firm for the year.

the proportion explained by CEO characteristics.[9] We find a significant negative relation between *COMPLEX_Econ_Firm* and EXCESSPAY, consistent with higher contract complexity that is related to firm characteristics being associated with lower excessive pay (more efficient contracts). We also find that a significant positive relation between *COMPLEX_Econ_CEO* and EXCESSPAY, suggesting that contract complexity related to CEO characteristics is associated with higher excessive pay. The evidence in this table together with the evidence in Table 6 suggest that contract complexity related to CEO (firm) characteristics is associated with not only poor (better) incentive alignment, but also with higher (lower) excess pay, suggesting that CEO (firm)-related complexity is inefficient (efficient) and generates costs (benefits) to the firm.

6. Outside factors influencing complexity

We document that contract complexity has steadily increased over our sample period (see Figure 1, Table 1, Panel B and the analysis in Table 4). This leads to the question of what causes contracts to be more complex. While we document that the importance of firm and CEO characteristics have changed over time, in this section, we consider what factors might influence contract complexity that is unexplained by those characteristics. To explore this question, we analyze the association between unexplained contract complexity and three institutional factors that may be related to contract complexity: the use of compensation consultants, institutional ownership of the firm, and the role of Institutional Shareholder Services (ISS) guidelines.

The first variable we consider is the number of compensation consultants hired by the firm (NumCONSULT). While the use of consultants is generally not thought to be related to rent extraction (Cadman, Carter, and Hillegeist 2010), firms needing more complex contracts may be more likely to hire consultants. Or, consultants hired by the firm may recommend more complex

[9] Again, we also decompose the *COMPLEX_Err* into unexpected high complexity and unexpected low complexity, but observe no significant coefficient on either variable.

contracts to justify their retention. Although the direction of causality is not clear, we expect that the use of consultants is related to the unexplained contract complexity.

The second variable is the Herfindhal-Hirschman Index of the percentage of shares owned by institutional investors using data from Thomson-Reuters Institutional Holdings (INST_HLD_HH). This variable captures the concentration of shares owned by institutional investors. If firms offer excessive complex compensation arrangements to appease institutional shareholders' demand for a greater appearance of pay associated with performance, we predict a positive relation between INST_HLD_HH and unexplained contract complexity. Gerakos, Ittner and Larcker (2007) find that firms with greater institutional holdings grant options with performance vesting conditions but do so alongside traditional option grants. Since these grants are a smaller proportion of total grants for firms with high institutional holdings, they interpret the evidence on the use of performance-based options as placating institutional investor demand. If, on the other hand, institutional inventors pressure firms to have more complex contracts when such contracts are beneficial for firms then we expect a negative association between INST_HLD_HH and unexplained contract complexity.

Our third variable counts the number of recommended guidelines in the Compensation section of the ISS annual Summary Proxy Voting Guidelines for each year (Nr_Guidelines_ISS). ISS provides guidelines to serve as recommendations for voting on proxy statement proposals. These guidelines are broadly focused on executive pay evaluation, equity and other incentive plans and shareholder proposals on compensation and include, for example, particular guidelines around repricing provisions, pay for performance misalignment, and non-deductible compensation. In counting the number of guidelines related to executive compensation, we exclude those guidelines that are specific to director pay only. Our expectation is that if firms are altering their compensation contracts to reflect (or adhere to) the guidelines recommended by ISS, then contract

complexity will increase in the number of guidelines offered by ISS.

Table 8 presents the results. We find that unexplained contract complexity is positively associated with the number of compensation consults and the number of ISS recommended compensation guidelines. Curiously, we also find a negative association between INST_HLD_HH and unexplained contract complexity (in Column1), suggesting institutional holders are associated with a desired level of complexity, but the results only hold using the complexity measure COMPLEX_IL_Err. Next, we explore whether the increase in complexity overtime is associated with pressure from compensation consultant and ISS. We replace the variables NumCONSULT and Nr_Guidelines_ISS with their interactions with yearly indicator variables. The results in Columns 2 and 4 show that the presence of compensation consultants has increasingly contributed to the level unexplained contract complexity overtime, especially after 2011.

In summary, we find that the level of unexplained contract complexity is driven by the presence of more compensation consultants and more institutional investors guidelines, consistent with institutional investors and shareholder activism calling for more pay-for-performance. As a result, contracts have become more complex and not necessarily related to firm or CEO characteristics.

7. Conclusion

While there is greater pressure on firms to increase pay-for-performance in CEO compensation contracts, market participants have also observed that contracts are becoming increasingly complex. Using proxy statement data that identifies multiple features of compensation contracts including the qualitative and quantitative performance measures used, the time periods over which different performance metrics are measured and the form of pay that will result if targets are achieved, we construct a novel measure of contract complexity and examine the economic determinants and implications of compensation contract complexity.

We use a sample of firms from Incentive Lab over the period of 2006 – 2016, for which we can construct measures of complexity that increases with the number of factors determining performance-based pay. Drawing from theory to determine proxies for firm and CEO characteristics that may influence the complexity of the compensation contracts, we first examine which determinants explain contract complexity. Consistent with larger firms and firms with greater R&D spending having more complex operations, we find that CEOs of those firms have more complex contracts. In addition, we find that growth firms and more volatile firms have less complex contract, contrary to our expectation, but this may result from these firms' greater reliance on stock performance in their compensation contracts as a less costly way to address firm complexity. We also find that CEOs closer to retirement and founder CEOs have less complex contracts. Finally, we provide statistical evidence supporting the observation that contract complexity has increased over time.

We then examine the implications of contract complexity on firm performance and its association with excessive CEO compensation. Decomposing compensation contract complexity in the portion predicted by firm and CEO characteristics, we find that predict complexity due to firm complexity is positively related to future performance and negatively related to excess compensation. These findings suggest that a portion of contract complexity reflects incentive alignment. On the other hand, we find evidence that the predicted complexity due to CEO characteristics is associated with lower future performance and higher excess pay, suggesting that at least part of the contract complexity is value decreasing to shareholders. We also find that the unexplained component of complexity is unrelated to future performance but positively related to excess compensation. In further tests, we show that unexplained complexity appears to result, at least partially, from institutional forces. We document that unexplained complexity is positive associated with the number of compensation consultants hired by the firm and with the annual

number of compensation guidelines proposed by ISS. Curiously, we find some evidence that more concentrated institutional ownership is associated with lower unexplained complexity, suggesting that a dominant institutional holder reigns in the potentially unnecessary complexity.

Our findings should be of interest to compensation committees, shareholders and regulators. We are among the first to document statistically what market observers have alleged, that contracts have become increasing complex. For compensation committees, our findings suggest that aligning contract complexity with the complexity of the CEO's job in running the firm is efficient contracting and good for shareholders. On the other hand, compensation committees should examine more careful how contract complexity relates to CEO specific characteristics and shareholder should take note, as more complexity related to CEO characteristics may be an attempt transfer wealth to the CEOs. Finally, regulators should consider the influence of proxy advisors and how companies respond to their guidelines. Firms may be over-complicating compensation contracts to achieve approval of their incentive (pay-for-performance) compensation.

Appendix A

Component of pay	Characteristics	COMPLX_IL Score	COMPLX_IL_Actual Score
Short Term Cash Bonus	Has time conditions	1	1
	Has absolute performance conditions	1	1
	• Number of performance measures > 1	1	
	• Number of performance measures	1	Actual #
	• Number time periods >1	1	
	• Number time periods		Actual #
	Has relative performance conditions	1	1
	• Number of performance measures > 1	1	
	• Number of performance measures	1	Actual #
	• Number time periods > 1	1	
	• Number time periods		Actual #
Long Term Cash Bonus	Has time conditions	1	1
	Has absolute performance conditions	1	1
	• Number of performance measures > 1	1	
	• Number of performance measures	1	Actual #
	• Number time periods > 1	1	
	• Number time periods		Actual #
	Has relative performance conditions	1	1
	• Number of performance measures > 1	1	
	• Number of performance measures	1	Actual #
	• Number time periods > 1	1	
	• Number time periods		Actual #
Restricted Stock	Has time conditions	1	1
	Has absolute performance conditions	1	1
	• Number of performance measures > 1	1	
	• Number of performance measures	1	Actual #
	• Number time periods > 1	1	
	• Number time periods		Actual #
	Has relative performance conditions	1	1
	• Number of performance measures > 1	1	
	• Number of performance measures	1	Actual #
	• Number time periods > 1	1	
	• Number time periods		Actual #
Stock Options Stock	Has time conditions	1	1
	Has absolute performance conditions	1	1
	• Number of performance measures > 1	1	
	• Number of performance measures	1	Actual #
	• Number time periods > 1	1	
	• Number time periods		Actual #
	Has relative performance conditions	1	1
	• Number of performance measures > 1	1	
	• Number of performance measures	1	Actual #
	• Number time periods > 1	1	
	• Number time periods		Actual #
	Potential Total Score	28	N/A

Appendix B

ConocoPhilips has a score of 9 for fiscal year of 2010 using the COMPLEX_IL measure. Below, we provide details regarding how the information from the proxy statement (DEF 14A) about incentive contracts is used to calculate the COMPLEX_IL measure score.

Summary:

Component	Characteristics	COMPLEX_IL	COMPLEX_IL_ACTUAL
ST Cash Bonus	Has absolute perf conds	1	1
	• No of perf measures > 1	1	
	• Number of perf measures		2
	Has relative perf conds	1	1
	• No. of perf measures > 1	1	
	• Number of perf measures		4
LT Cash Bonus		0	0
Restr Stock	Has absolute perf conds	1	1
	• No of perf measures > 1	1	
	• Number of perf measures		3
	Has relative perf conds	1	1
	• No. of perf measures > 1	1	
	• Number of perf measures		4
Stock Options	Has time conditions	1	1
Total Score		9	18

Information from Proxy Statement regarding short-term cash bonus is as follows:

"In 2010, our Variable Cash Incentive Program (VCIP) program used both quantitative and qualitative performance measures relating to the Company as a whole, including:

- *Ranking 1st in relative annual total stockholder return compared with our performance-measurement peer group (ExxonMobil, Royal Dutch Shell, BP, Total, and Chevron);*
- *Ranking 2nd in percentage change and 3rd in absolute change in improvement in relative annual adjusted return on capital employed compared with the same peer group noted above;*
- *Ranking 3rd in percentage and absolute change in relative annual adjusted cash return on capital employed compared with the same peer group noted above;*
- *Ranking 2nd in relative adjusted cash contribution BOE compared with the same peer group noted above;*
- *Our health, safety and environmental performance; and*
- *Advancement and support of our key strategic initiatives and plans."*

Note that BOE stands for barrel of oil extracted.

ConocoPhilips uses both relative and absolute performance measures in their short-term cash program, which gives them 2 points. In addition, they have four relative performance measures and two absolute

performance measures. Hence, we further assign 1 point if each absolute (relative) performance measure has more than one metric.
Information from Proxy Statement regarding restricted stock and stock options plans is as follows:

"Our program targets generally provide approximately 50 percent of the long-term incentive award in the form of stock options and 50 percent in the form of restricted stock units awarded under the PSP.

- *Stock Option Program—The Stock Option Program is designed to maximize medium- and long-term stockholder value. .... Our stock options have three-year vesting provisions and ten-year terms in order to incentivize our executives to increase the Company's share price over the long term.*

- *Performance Share Program—The PSP rewards executives based on their individual performances and the performance of the Company over a three-year period. Each year the Committee establishes a three-year performance period over which it compares the performance of the Company with that of its performance-measurement peer group using pre-established criteria.*

In Dec 2007, the Committee established the sixth performance period under the PSP, for the three-year period beginning Jan 1, 2008, and ending Dec 31, 2010. In determining awards under the PSP for this period, the Committee considered quantitative and qualitative performance measures relating to the Company as a whole, including:
• Ranking 3rd in relative total stockholder return compared with our performance-measurement peer group (ExxonMobil, Chevron, Royal Dutch Shell, BP, and Total);
• Ranking 6th in percentage change and 3rd in absolute change in relative improvement in adjusted return on capital employed compared with the same peer group noted above;
• Ranking 2nd in relative adjusted cash contribution per BOE compared with the same peer group noted above;
• Ranking 6th in relative adjusted income per BOE compared with the same peer group noted above;
• Our health, safety and environmental performance;
• Advancement and implementation of the Company's strategic plans;
• Leadership development and succession planning."

Stock options granted are just time vested and thus receive a score of one. The restricted stock units are granted based on both relative and absolute performance metrics, which again gives them 2 points. In addition, they have four relative performance measures and three absolute performance measures. Hence, we further assign 1 point if each absolute (relative) performance measure has more than one metric.

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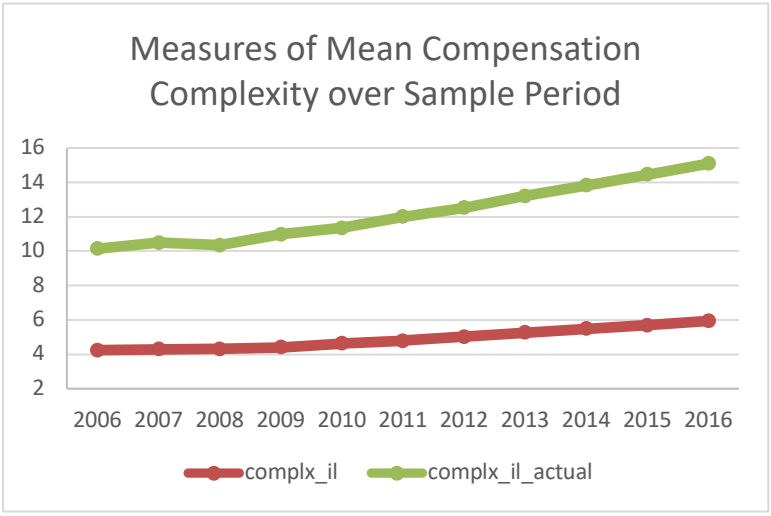
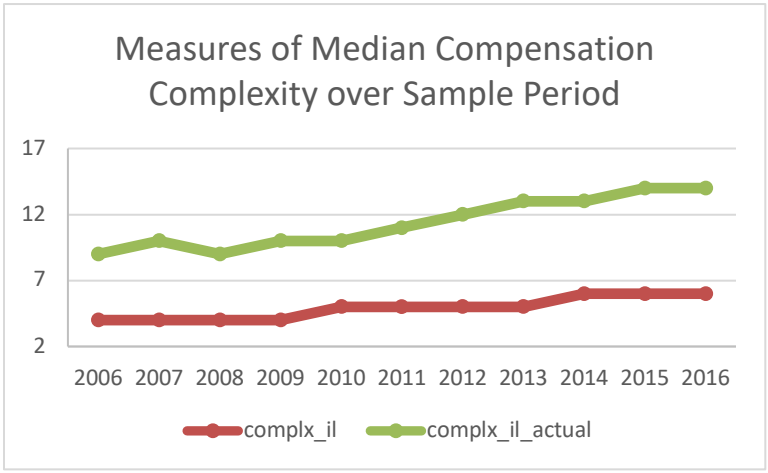
Figure 1

Measures of compensation complexity and total pay by year over the sample period 2006-2016





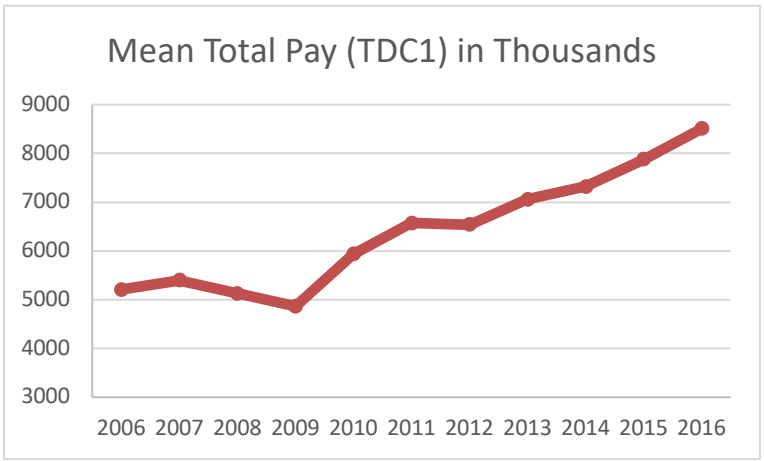


Table 1
Descriptive statistics for measures of contract complexity

This table provides descriptive statistics for our two measures of contract complexity. These measures are defined in Section 3.2.1. Panel A reports overall statistics. Panel B reports statistics over two time periods in our sample. Panel C reports the mean values by industry where industry is defined as Global Industry Classification Sectors.

Panel A: Statistics for contract complexity measures

Variable	N	Mean	Std. Deviation	1%	25%	50%	75%	99%
COMPLEX_IL	7,366	4.90	2.14	1	3	5	6	10
COMPLEX_IL_ACTUAL	7,366	12.20	7.14	1	7	11	16	34
TDC1	7,366	8,065.9	7,310.7	788.1	3,824.2	6,285.4	6,285.4	10,066. 0

Panel B: Contract complexity measures over time

	Pre-Period (2006-2010)			Post-Period (2012-2016)			Difference	
Variable	N	Mean	Median	N	Mean	Median	Mean *t*-value	Median *p*-value
COMPLEX_IL	3,373	4.38	4	3,993	5.34	5	21.11	0.00
COMPLEX_IL_ACTUAL	3,373	10.70	9	3,993	13.46	13	18.02	0.00

Panel C: Mean values of complexity variables by Fama French industry code

				COMPLEX_IL		COMPLEX_IL_Actual	
GIC Sector		N	%	Mean	Median	Mean	Median
10	Energy	530	7.2%	4.99	5	12.98	13
15	Materials	419	5.7%	5.44	5	13.34	12
20	Industrials	1,091	14.8%	4.96	5	11.91	11
25	Consumer Discretionary	1,093	14.8%	4.38	4	10.05	10
30	Consumer Staples	362	4.9%	5.08	5	12.29	11.5
35	Health Care	837	11.4%	5.21	5	13.19	13
40	Financials	664	9.0%	4.35	4	11.02	10
45	Information Technology	1,487	20.2%	4.81	5	11.34	11
50	Telecommunication Services	95	1.3%	4.79	5	12.94	14
55	Utilities	401	5.4%	6.15	6	19.00	17
60	Real Estate	387	5.3%	4.74	5	12.59	11
	Total	7,366	100%				

Table 2
Descriptive statistics

This table reports descriptive statistics for our explanatory and control variables. MV (lnMV) = market value (natural log of) of equity, MTBA = market value of equity plus book value of total liabilities divided by the book value of assets, R&D = research and development expenditures / total assets, STDRET (lnSTDRET) = the standard deviation (natural log of) of monthly stock returns for the prior two years, SEGMTS_HH = 1 – (Herfindahl Index computed based on the proportion of total revenues accounted for by each business segment). PIFO = indicator variable equal to 1 if pretax foreign income for firm j in year t is greater than zero and 0 otherwise, lnTENURE = natural log of the CEO tenure, RETIRE = indicator variable equal to 1 if the CEO's age is greater than 65, FOUNDER = indicator variable equal to 1 if the CEO is a founder of the firm.

variable	N	Mean	Std. Dev.	25%	50%	75%
MV	7,366	12,781	27,108	2,248	4,524	11,775
lnMV	7,366	8.54	1.31	7.72	8.42	9.37
MTBA	7,366	1.935	1.11	1.20	1.58	2.25
R&D	7,366	0.03	0.05	0.00	0.00	0.03
STDRET	7,366	0.10	0.05	0.06	0.08	0.12
lnSTDRET	7,366	0.09	0.04	0.06	0.08	0.11
SEGMTS	7,366	2.90	1.81	1	3	4
SEGMTS_HH	7,366	0.69	0.28	0.44	0.68	1
PIFO	7,366	0.63	0.48	0	1	1
CEOTenure	7,366	7.50	6.64	2.83	5.67	10
LnTenure	7,366	1.87	0.74	1.34	1.90	2.40
RETIRE	7,366	0.06	0.23	0	0	0
FOUNDER	7,366	0.12	0.32	0	0	0

Table 3
Pearson correlations

This table reports the Pearson correlations of our measures of compensation complexity, firm complexity, and CEO characteristic variables. Compensation complexity variables are defined in Section 3.2.1. All other variables are defined in Table 2. * indicates significance at $p < 0.01$.

	1	2	3	4	5	6	7	8	9	10
1. COMPLEX_IL	1									
2. COMPLEX_IL_Actual	0.8432*	1								
3. lnMV	0.2022*	0.1955*	1							
4. MTBA	-0.1041*	-0.0949*	0.1769*	1						
5. R&D	-0.0018	-0.0078	-0.0943*	0.2987*	1					
6. lnSTDRET	-0.1488*	-0.1325*	-0.4782*	-0.1043*	0.1366*	1				
7. SEGMTS_HH	-0.1017*	-0.0676*	-0.1594*	0.2345*	0.1277*	0.1245*	1			
8. PIFO	0.0389*	-0.0370*	0.0689*	0.1502*	0.3031*	0.0490*	-0.1566*	1		
9. LnTenure	-0.1145*	-0.0817*	0.0185	0.0769*	0.0008	-0.0404*	0.0644*	-0.0471*	1	
10. FOUN DER	-0.1994*	-0.1332*	-0.0714*	0.0974*	0.0368*	0.0811*	0.1190*	-0.0387*	0.4364*	1
11. RETIRE	-0.0816*	-0.0651*	-0.0152	0.0252	-0.0219	-0.0323*	0.0097	-0.0325*	0.2633*	0.1820*

Table 4

Regression of compensation complexity on proxies for economic determinants and rent extraction

This table provides results of OLS regressions of compensation complexity on proxies on proxies for firm complexity and CEO characteristics. Columns (1) and (5) includes only firm and CEO characteristics, Columns (2) and (6) adds year fixed effects, Columns (3) and (7) adds industry fixed effects to the firm and CEO characteristics, and Columns (4), (8) include both year and industry fixed effects. Compensation complexity is defined in Section 3.2.1. All other variables are defined in Table 2. Standard errors are clustered by firm. Robust t-statistics are reported in parentheses. ***, **, and * indicate significance at $p < 0.01$, $p < 0.05$ and $p < 0.10$, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES		**COMPLEX_IL**				**COMPLEX_IL_ACTUAL**		
lnMV	0.30***	0.26***	0.31***	0.26***	1.09***	0.96***	1.07***	0.94***
	(7.17)	(6.07)	(7.27)	(6.14)	(7.20)	(6.32)	(7.16)	(6.26)
MTBA	-0.28***	-0.28***	-0.26***	-0.26***	-0.89***	-0.86***	-0.69***	-0.68***
	(-6.78)	(-6.60)	(-6.27)	(-6.18)	(-5.67)	(-5.44)	(-4.73)	(-4.58)
R&D	2.91***	3.04***	1.74	1.90*	11.07***	11.42***	9.78**	10.17***
	(3.12)	(3.29)	(1.56)	(1.71)	(3.21)	(3.34)	(2.49)	(2.61)
lnSTDRET	-3.61***	-2.32*	-2.13**	-0.41	-8.78**	-5.52	-0.48	4.92
	(-3.35)	(-1.91)	(-2.01)	(-0.34)	(-2.39)	(-1.28)	(-0.13)	(1.20)
SEGMTS_HH	0.11	0.17	0.06	0.12	0.08	0.26	-0.28	-0.12
	(0.60)	(0.93)	(0.32)	(0.63)	(0.14)	(0.44)	(-0.48)	(-0.19)
PIFO	0.09	0.04	0.12	0.07	-0.86**	-1.02**	0.08	-0.07
	(0.83)	(0.35)	(1.05)	(0.59)	(-2.17)	(-2.55)	(0.22)	(-0.20)
lnTenure	-0.10	-0.13**	-0.09	-0.12**	-0.32	-0.40*	-0.31	-0.38*
	(-1.64)	(-2.08)	(-1.58)	(-1.99)	(-1.55)	(-1.93)	(-1.59)	(-1.94)
RETIRE	-0.36*	-0.46**	-0.31	-0.41**	-1.10	-1.39**	-0.79	-1.09*
	(-1.79)	(-2.37)	(-1.53)	(-2.15)	(-1.64)	(-2.10)	(-1.21)	(-1.73)
FOUNDER	-0.95***	-0.82***	-0.93***	-0.80***	-1.87***	-1.51***	-1.68***	-1.29**
	(-5.97)	(-5.32)	(-5.82)	(-5.13)	(-3.24)	(-2.64)	(-2.84)	(-2.22)
Dummy_2007		-0.00		0.00		0.24		0.27
		(-0.06)		(0.04)		(0.86)		(0.97)
Dummy_2008		0.10		0.07		0.31		0.10
		(1.10)		(0.73)		(0.98)		(0.32)
Dummy_2009		0.25**		0.18		1.17***		0.76**
		(2.28)		(1.63)		(3.12)		(2.10)
Dummy_2010		0.45***		0.38***		1.41***		0.99***
		(3.88)		(3.26)		(3.60)		(2.59)
Dummy_2011		0.56***		0.51***		1.95***		1.64***
		(5.00)		(4.59)		(5.14)		(4.54)
Dummy_2012		0.72***		0.72***		2.29***		2.24***
		(6.52)		(6.60)		(6.55)		(6.57)
Dummy_2013		0.92***		0.93***		2.84***		2.87***
		(8.54)		(8.75)		(8.56)		(8.70)
Dummy_2014		1.07***		1.09***		3.27***		3.32***
		(9.91)		(10.13)		(9.89)		(10.13)
Dummy_2015		1.26***		1.29***		3.84***		3.93***
		(11.34)		(11.52)		(10.88)		(11.22)
Dummy_2016		1.49***		1.51***		4.38***		4.41***
		(12.89)		(13.00)		(11.79)		(12.03)
GICS_15			0.49	0.52*			0.78	0.85
			(1.58)	(1.66)			(0.76)	(0.84)
GICS_20			0.04	0.04			-0.65	-0.64
			(0.16)	(0.17)			(-0.87)	(-0.86)
GICS_25			-0.29	-0.31			-	-2.09***

							2.01***	
			(-1.36)	(-1.49)			(-3.11)	(-3.23)
GICS_30			0.10	0.11			-0.56	-0.52
			(0.35)	(0.38)			(-0.68)	(-0.63)
GICS_35			0.38	0.42*			0.35	0.50
			(1.62)	(1.85)			(0.46)	(0.66)
GICS_40			-0.54**	-0.57**			-1.59**	-1.68**
			(-2.23)	(-2.38)			(-1.97)	(-2.09)
GICS_45			0.06	0.02			-1.22*	-1.32*
			(0.25)	(0.08)			(-1.65)	(-1.79)
GICS_50			-0.20	-0.17			0.05	0.14
			(-0.51)	(-0.42)			(0.03)	(0.09)
GICS_55			0.94***	1.01***			5.72***	5.92***
			(3.25)	(3.46)			(3.98)	(4.11)
GICS_60			0.05	-0.03			0.46	0.24
			(0.15)	(-0.10)			(0.45)	(0.24)
Observations	7,366	7,366	7,366	7,366	7,366	7,366	7,366	7,366
Adjusted R-squared	0.1008	0.1472	0.1235	0.1735	0.0763	0.1108	0.1235	0.1622

Table 5

Regression of compensation complexity on proxies for economic determinants for two sample periods of 2006-2010 and 2012-2016.

This table provides results of OLS regressions of compensation complexity on proxies for firm complexity and CEO characteristics. All regressions include industry and year fixed effects. Columns (1) and (3) report the results using the complexity measure COMPLX_IL while Columns (2) and (4) report results using the COMPLX_IL_Actual measure. In each panel, Columns (1) – (2) are for the early sample period 2006-2010 while Columns (3) – (4) are for the later period 2012-2016; we leave 2011 out to have balanced sub-periods. Compensation complexity is defined in Section 3.2.1. All other variables are defined in Table 2. Standard errors are clustered by firm. Robust t-statistics are reported in parentheses. ***, **, and * indicate significance at $p < 0.01$, $p < 0.05$ and $p < 0.10$, respectively.

	(1)	(2)	(3)	(4)		
	COMPLX_IL	COMPLX_IL_Actual	COMPLX_IL	COMPLX_IL_Actual	Difference in means (3)-(1)	Difference in means (4)-(2)
VARIABLES	2006-2010		2012-2016		*p*-value	*p*-value
lnMV	0.22***	0.68***	0.30***	1.21***	0.16	**0.01**
	(4.23)	(4.02)	(5.65)	(6.27)		
MTBA	-0.22***	-0.47**	-0.33***	-0.94***	**0.07**	**0.02**
	(-4.57)	(-2.54)	(-6.03)	(-5.49)		
R&D	1.18	7.06*	3.00*	12.67**	0.26	0.28
	(0.96)	(1.66)	(1.94)	(2.42)		
lnSTDRET	-0.48	3.00	-0.38	9.75	0.96	0.33
	(-0.34)	(0.61)	(-0.20)	(1.51)		
SEGMTS_HH	0.46**	0.87	-0.29	-1.06	**0.00**	**0.02**
	(2.11)	(1.29)	(-1.23)	(-1.37)		
PIFO	0.01	-0.16	0.17	0.28	0.36	0.45
	(0.10)	(-0.37)	(1.11)	(0.53)		
lnTenure	-0.16*	-0.45	-0.05	-0.20	0.28	0.46
	(-1.87)	(-1.60)	(-0.65)	(-0.81)		
RETIRE	-0.56**	-1.53	-0.33	-0.87	0.49	0.56
	(-2.08)	(-1.61)	(-1.36)	(-1.11)		
FOUNDER	-0.93***	-1.87***	-0.60***	-0.54	0.15	**0.09**
	(-5.44)	(-3.02)	(-2.74)	(-0.70)		
GICS_15	0.80**	2.15*	0.09	-0.83	**0.06**	**0.02**
	(2.16)	(1.70)	(0.24)	(-0.70)		
GICS_20	0.19	0.24	-0.17	-1.70*	0.28	**0.09**
	(0.67)	(0.26)	(-0.57)	(-1.78)		
GICS_25	-0.16	-1.08	-0.59**	-3.40***	0.18	**0.03**
	(-0.59)	(-1.18)	(-2.22)	(-4.20)		
GICS_30	0.42	0.61	-0.25	-1.84*	**0.09**	**0.05**
	(1.28)	(0.60)	(-0.68)	(-1.75)		
GICS_35	0.58*	1.44	0.23	-0.68	0.32	**0.07**
	(1.91)	(1.39)	(0.83)	(-0.78)		
GICS_40	-0.38	-0.84	-0.80***	-2.46**	0.24	0.19
	(-1.21)	(-0.78)	(-2.72)	(-2.52)		

GICS_45	0.11	-0.50	-0.23	-2.51***	0.31	**0.08**
	(0.41)	(-0.53)	(-0.79)	(-2.70)		
GICS_50	0.05	0.94	-0.50	-0.96	0.36	0.32
	(0.11)	(0.56)	(-0.91)	(-0.43)		
GICS_55	1.09***	5.46***	0.79**	5.90***	0.47	0.82
	(3.04)	(3.66)	(2.16)	(3.06)		
GICS_60	0.25	0.84	-0.26	-0.12	0.25	0.50
	(0.56)	(0.62)	(-0.74)	(-0.11)		
Observations	3,373	3,373	3,289	3,289		
Adj. R-squared	0.1242	0.1000	0.1326	0.1634		
Year FE	Yes	Yes	Yes	Yes		

Table 6
The impact of compensation complexity on future performance

This table reports results of OLS regressions of future performance on compensation complexity. In Panel A, we consider change in ROA in t+1 and the average change in ROA in t+1 and t+2. In Panel B, we consider future stock returns and average future returns. We start with contract complexity and then we partition complexity into the component predicted by economic determinants (COMPLEX_Econ) and the unexplained component (COMPLEX_Err). We further partition compensation complexity predicted into the component predicted by firm characteristics (COMPLEX_Econ_Firm) and the component predicted by CEO characteristics (COMPLEX_Econ_CEO). For all cases, we present the results using the COMPLEX_IL and COMPLEX_IL _Actual measures. All regressions include industry and year fixed effects. Compensation complexity is defined in Section 3.2.1. ΔROA is the change in return on assets measured by operating income before depreciation divided by total assets, LogSales is the natural logarithm of Sales Revenue and the LogSTDROA is the natural logarithm of the standard deviation of return on assets over the prior four years. LogMV is the log of market value of equity, BTM is the book to market value of equity, Leverage is the ratio of total debt to assets. All remaining variables are defined in Table 2. Standard errors are clustered by firm. Robust t-statistics are reported in parentheses. ***, **, and * indicate significance at $p < 0.01$, $p < 0.05$ and $p < 0.10$, respectively.

Panel A: Using CHGROA (Change in OIBDP /TA)

	ΔROA_{t+1}						$Avg\Delta ROA_{t+1,t+2}$					
VARIABLES	**COMPLEX_IL**			**COMPLEX_IL_ACTUAL**			**COMPLEX_IL**			**COMPLEX_IL_ACTUAL**		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
COMPLEX	0.00			0.00			0.00			0.00		
	(0.81)			(0.86)			(1.45)			(1.44)		
COMPLEX_Econ		0.00**			0.00*			0.00*			0.00**	
		(2.30)			(1.87)			(1.95)			(2.08)	
COMPLEX_Econ_Firm			0.01***			0.00***			0.00**			0.01**
			(3.33)			(3.06)			(2.34)			(2.48)
COMPLEX_Econ_CEO			-0.01**			-0.00			-0.00			-0.00
			(-2.37)			(-1.55)			(-0.85)			(-1.45)
COMPLEX_Err		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
		(0.18)	(0.36)		(0.41)	(0.55)		(0.92)	(1.01)		(0.83)	(0.95)
ΔROA	-0.17***	-0.17***	-0.17***	-0.17***	-0.17***	-0.17***	-0.15***	-0.15***	-0.15***	-0.15***	-0.15***	-0.15***
	(-6.69)	(-6.48)	(-6.35)	(-6.69)	(-6.50)	(-6.41)	(-8.52)	(-8.16)	(-8.07)	(-8.51)	(-8.13)	(-8.03)
LogSales	-0.00**	-0.00***	-0.00***	-0.00**	-0.00**	-0.00***	-0.00**	-0.00**	-0.00***	-0.00**	-0.00***	-0.00***
	(-2.37)	(-2.98)	(-3.99)	(-2.29)	(-2.54)	(-3.52)	(-2.33)	(-2.43)	(-2.79)	(-2.39)	(-2.63)	(-3.04)
LogSTDROA	0.07	0.06	0.08*	0.07	0.06	0.06	0.00	-0.00	0.00	0.00	0.00	0.01
	(1.58)	(1.46)	(1.74)	(1.56)	(1.36)	(1.51)	(0.07)	(-0.12)	(0.01)	(0.10)	(0.01)	(0.26)
Observations	5,909	5,699	5,699	5,909	5,699	5,699	5,203	5,008	5,008	5,203	5,008	5,008
Adjusted R-squared	0.0749	0.0754	0.0771	0.0749	0.0759	0.0757	0.0981	0.1005	0.1000	0.0983	0.0999	0.1014
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Panel B: Using Future RET

VARIABLES	RET_{t+1}						$AvgRET_{t+1,t+2}$					
	COMPLEX_IL			**COMPLEX_IL_ACTUAL**			**COMPLEX_IL**			**COMPLEX_IL_ACTUAL**		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
COMPLEX	-0.00			0.00			-0.00			0.00		
	(-0.44)			(0.11)			(-0.61)			(0.54)		
COMPLEX_Econ		0.01			0.01			-0.01			0.00	
		(0.55)			(1.52)			(-0.84)			(0.54)	
COMPLEX_Econ_Firm			0.10**			0.05***			0.04*			0.02***
			(2.50)			(3.05)			(1.77)			(2.65)
COMPLEX_Econ_CEO			-0.13***			-0.07***			-0.07***			-0.04***
			(-3.23)			(-3.98)			(-2.72)			(-3.70)
COMPLEX_Err		-0.00	-0.00		-0.00	-0.00		-0.00	-0.00		0.00	0.00
		(-0.79)	(-0.78)		(-0.54)	(-0.44)		(-0.68)	(-0.67)		(0.21)	(0.35)
lnMV	-0.04***	-0.05***	-0.07***	-0.04***	-0.06***	-0.09***	-0.03***	-0.02***	-0.04***	-0.03***	-0.03***	-0.05***
	(-4.30)	(-3.08)	(-3.63)	(-4.28)	(-3.02)	(-3.69)	(-6.61)	(-4.36)	(-4.73)	(-6.76)	(-4.38)	(-5.10)
LogSTDRET	0.84***	0.87***	1.07***	0.84***	0.88***	0.96***	0.19	0.17	0.28**	0.18	0.20	0.20
	(2.81)	(2.72)	(3.03)	(2.82)	(2.76)	(2.90)	(1.52)	(1.39)	(2.14)	(1.51)	(1.59)	(1.57)
BTM	0.14**	0.14**	0.10*	0.14**	0.13**	0.09	0.06***	0.07***	0.05**	0.06***	0.06***	0.04*
	(2.26)	(2.34)	(1.75)	(2.26)	(2.24)	(1.61)	(3.54)	(3.60)	(2.29)	(3.50)	(3.26)	(1.66)
Observations	6,806	6,554	6,554	6,806	6,554	6,554	5,970	5,741	5,741	5,970	5,741	5,741
Adjusted R-squared	0.1824	0.1822	0.1839	0.1824	0.1828	0.1858	0.2873	0.2903	0.2923	0.2873	0.2901	0.2890
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table 7 – Impact of compensation complexity on excess pay

This table reports results of OLS regressions of excess pay on compensation contract complexity. Columns 1-3 (4-6) present the results using the COMPLEX_IL (COMPLEX_IL _Actual) measure. The dependent variable, Excess pay, is the log of excess CEO total compensation based on the methodology in Core, Guay, and Larcker (2008). The lnTDC1 is the natural logarithm of total pay (TDC1 on Execucomp). All regressions include CEO, industry and year fixed effects. Compensation complexity is defined in Section 3.2.1. Standard errors are clustered by firm. Robust t-statistics are reported in parentheses. ***, **, and * indicate significance at $p < 0.01$, $p < 0.05$ and $p < 0.10$, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
	Using COMPLEX_IL			Using COMPLEX_IL_Actual		
COMPLEX	0.01***			0.00***		
	(3.63)			(2.93)		
COMPLEX_Econ		-0.21***			-0.11***	
		(-6.46)			(-9.87)	
COMPLEX_Econ_Firm			-0.25***			-0.12***
			(-7.24)			(-10.27)
COMPLEX_Econ_CEO			0.27***			0.10***
			(4.24)			(3.69)
COMPLEX_Err		0.01***	0.01***		0.00***	0.00***
		(4.14)	(4.22)		(3.50)	(3.47)
LnTDC1	0.83***	0.84***	0.84***	0.84***	0.85***	0.85***
	(37.72)	(38.10)	(38.03)	(38.31)	(38.95)	(38.83)
Observations	7,013	6,987	6,987	7,013	6,987	6,987
Adjusted R-squared	0.9326	0.9362	0.9370	0.9323	0.9390	0.9396
CEO FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes

Table 8 – Association of unexplained complexity, number of compensation consultants, institutional investors and shareholders activists

This table reports results of OLS regressions of unexplained complexity excess pay on the number of compensation consultants hired by the firm (NumCONSULT), the Herfindhal-Hirschman Index of the percentage of shares owned by institutional investors using data from Thomson-Reuters Institutional Holdings (INST_HLD_HH), and the number of recommended guidelines in the Compensation section of the ISS annual Summary Proxy Voting Guidelines for each year (Nr_Guidelines_ISS). Columns 1-2 (3-4) present the results using the COMPLEX_IL_Err (COMPLEX_IL_Actual_Err) measure. The dependent variable, Excess Pay, is the log of excess CEO total compensation based on the methodology in Core, Guay, and Larcker (2008). The lnTDC1 is the natural logarithm of total pay (TDC1 on Execucomp). Standard errors are clustered by firm. Robust t-statistics are reported in parentheses. ***, **, and * indicate significance at $p < 0.01$, $p < 0.05$ and $p < 0.10$, respectively.

	(1)	(2)	(3)	(4)
VARIABLES	COMPLEX_IL_Err		COMPLEX_IL_Actual_Err	
INST_HLD_HH	-1.94**	-2.04**	-2.64	-3.00
	(-2.13)	(-2.18)	(-0.80)	(-0.87)
NumCONSULT	0.53***		0.93**	
	(3.86)		(2.28)	
Nr_Guidelines_ISS	0.05***		0.14***	
	(10.94)		(10.30)	
NumCONSULT _2006		0.36*		0.67
		(1.94)		(1.18)
NumCONSULT _2007		0.25		1.16
		(0.93)		(1.24)
NumCONSULT _2008		0.60*		0.80
		(1.92)		(1.08)
NumCONSULT _2009		0.34		0.02
		(1.49)		(0.02)
NumCONSULT _2010		0.24		-0.09
		(1.25)		(-0.15)
NumCONSULT _2011		0.52**		0.71
		(2.30)		(1.05)
NumCONSULT _2012		0.69***		2.15***
		(2.84)		(2.75)
NumCONSULT _2013		1.22***		2.60***
		(4.55)		(2.73)
NumCONSULT _2014		1.24***		2.51***
		(3.98)		(2.73)
NumCONSULT_2015		1.60**		3.04
		(2.13)		(1.11)
Nr_Guidelines_ISS _2007		0.00		-0.01
		(0.43)		(-0.15)
Nr_Guidelines_ISS _2008		-0.00		0.01
		(-0.15)		(0.44)
Nr_Guidelines_ISS _2009		0.01		0.06**
		(1.22)		(2.00)
Nr_Guidelines_ISS _2010		0.02**		0.08***
		(2.33)		(2.67)
Nr_Guidelines_ISS _2011		0.01		0.04**

		(1.49)		(2.13)
Nr_Guidelines_ISS _2012		0.01		0.02
		(1.36)		(0.84)
Nr_Guidelines_ISS _2013		0.00		0.03
		(0.52)		(1.13)
Nr_Guidelines_ISS _2014		0.01		0.04
		(0.82)		(1.54)
Nr_Guidelines_ISS _2015		0.00		0.04
		(0.01)		(0.59)
Observations	5,140	5,140	5,140	5,140
Adjusted R-squared	0.0375	0.0479	0.0261	0.0324