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 CEO compensation contract complexity. We construct a measure of complexity based on proxy statements disclosures and find that the average compensation contract complexity steadily increases between 2006 and 2016. We then document that contract complexity is associated with various factors including firm complexity, the number of compensation consultants, ISS guidelines and contract complexity of peer CEOs. Hiring a new CEO, prior poor performance, and changes in contracts of peer firms appear to drive changes in a firm's contract complexity. We also find that an increase in complexity not explained by economic characteristics is associated with higher excess compensation. While this may be consistent with a desire to camouflage higher pay, we find only limited evidence that is associated with lower future performance, suggesting that higher pay might, instead, reflect pay for greater pay at risk borne by the CEO. Finally, greater complexity is associated with lower discretionary accruals, consistent with diffuse performance measurement (over time and over metrics) reducing incentives to manage to one particular measure.

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1. Introduction

Shareholders have been major proponents of tying executives' pay to specific performance goals. Tax rules and SEC regulations, through increased disclosure requirements, also encourage firms to link pay to performance. As a result, firms are increasingly tying cash compensation and equity grants to multiple performance goals with different time horizons, and there is anedoctal evidence that compensation contracts have become more complex.[1] The benefits of contract complexity are debatable. Compensation contracts where CEOs are rewarded for achieving multiple explicit performance goals over multiple time horizons have advantages, in that they allow for stronger incentives by tying pay to realization of project payoffs and add transparency to the pay process. 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. This debate and the apparent trend in compensation complexity raise a number of important, yet unanswered, questions. What are the economic determinants of compensation contract complexity? What causes complexity to change over time? What are the implications of complex contracts?

Our ability to answer these questions is hampered by the fact that there is no current measure that quantifies overall contract complexity. In order to fill this gap in the literature, we first develop a novel measure to quantify compensation contract complexity. We construct a measure of CEO compensation complexity based on details of compensation contracts as described in proxy statements. Our measure (described in Section 3) captures a continuum of complexity that

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[1] For example, Skapinker (2015) notes that "*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*" and Wilmot (2017) mentions that *"(T)he fad for stock awards with complex performance triggers has gone too far*." Recently, Credit Suisse replaced the 28-performance metrics used to evaluate its top executive team to a few incentives tied to the banks' group-wide performance as a result of investors' call for simpler and more transparent metrics (Noonan 2018).

increases with the number of pay components (bonus, stock, options), the number of performance metrics used, the number of different time periods over which performance is measured, and the inclusion of relative performance conditions in the CEO compensation contract. We then use this measure to examine the three questions above.

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. Agency theory suggests that because performance metrics are noisy and imprecise measures of CEOs' actions, using additional performance metrics that are informative of those actions can improve incentive alignment.

Although economic characteristics of the firm or CEO may warrant more complex contracts, firms may not write such contracts. There may be unintended consequences that result from multiple performance goals distorting CEOs' actions toward shareholder value maximization by managing to particular targets or overemphasizing some components of the firms' operations because of their representation in the contracts (e.g., Brickley, Smith and Zimerman 2001 and Jensen 2001).[2] In addition, firms may anticipate that the implicit cognitive load required to understand a complex contract could diminish performance (Hart 1986). Jensen (2001) argues that because "it is logically impossible to maximize in more than one dimension, purposeful behavior requires a single-valued objective function." As a result, the extent to which contract complexity is beneficial for firms remains an empirical question.

[2] For example, Brickley, Smith and Zimerman (2001, p.403) mentions that if managers' compensation is based on numerous performance measures (as in a balanced score card framework), they will choose the easiest measures to achieve and ignore the more difficult tasks. As another example, Zimmerman (2006, Ch.14) suggest that using customer satisfaction as a performance metric can destroy firm value if after a certain optimal level of customer satisfaction the cost of keeping the customer satisfied is larger than the resulting increase in sales revenue. In addition, evaluating managers based on multiple criteria can also reduce their accountability for destroying firm value.

Using a sample of firms from Incentive Lab from 2006 to 2016, we find that contract complexity has steadily increased through time, driven by the use of more performance measures, more time periods over which performance is measured, and the inclusion of both absolute and relative performance conditions. Examining firm and CEO characteristics, we find that larger firms and those 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 may seem counterintuitive, compensation plans for growth option firms reflect reliance on stock price as a summary measure of value creation whereas compensation plans for firms with more volatile operations reflect greater reliance on fixed pay. In addition, we find that CEO tenure and share ownership are associated with less complex contracts, possibly reflecting the board's information about the CEO's quality and lower agency problems (e.g., Hermalin and Weisbach 1998; Anderson and Reeb 2003). We also find that contract complexity is increasing with outside factors, including the number of Institutional Shareholder Services guidelines, retaining more compensation consultants, and greater complexity of contracts in peer firms. In changes analysis, we find that increasing complexity is largely driven by hiring a new CEO, poor prior performance and increasing complexity in peer firms.

Investors have expressed concerns about the increasing complexity of executive compensation contracts (Johnson 2011; KPMG 2011; Conference Board 2013). With more complex contracts, it can be difficult for outsiders to understand the implications of contract complexity – the extent to which it is helpful in running the firm or harmful to shareholders (for example, as a way to enrich the CEO in the spirit of Bebchuk and Fried 2003). To further our understanding of contract complexity, we examine several implications of contract complexity that are not related to its economic determinants (firm and CEO characteristics). We find that an increase in complexity unexplained by its economic determinants is associated with greater excess

CEO compensation. While that may reflect potential rent extraction through camouflaged pay, we find only limited evidence that it is associated with poor future performance. Finally, despite concerns of detractors, we do find a benefit from greater complexity: Firms with more complex contracts have lower discretionary accruals, consistent with a multifaceted reward structure reducing the incentives to manipulate one particular performance measure.

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. Black, Dikolli and Dyreng (2014) examine whether the level of executive compensation is related to firm complexity, and Kole (1997) studies whether the form of pay and vesting periods are related to firm characteristics using a small sample of 371 firms in 1980. Murphy and Sandino (2017) examine the association between the level of CEO pay and the use of compensation consultants, acknowledging that both may influence compensation contract complexity. Their measure of complexity, the number of incentives plans used by the firm (ranging from 0 to 5), is positively associated with both the level of pay and the use of a consultant. We extend this literature by examining the complexity in the compensation package itself, rather than its level or form, in a large sample. We introduce a new measure of compensation contract complexity that explores the details of compensation contracts disclosed in proxy statements, allowing us to consider multiple aspects of the contracts simultaneously. We take advantage of compensation disclosures 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 a new feature of compensation contracts that wasn't previously available. In addition, we rely on a large sample of firms (approximately 1,000 firms from IncentiveLab), allowing us to analyze the economic drivers and implications of compensation contract complexity using a broader and more recent sample.

Although past studies have analyzed the economic determinants and implications of pay packages' composition (equity vs non-equity components), pay duration, relative performance evaluation usage, and reliance on price/non-price measures of performance individually, we are the first to study these contract characteristics in an aggregate way.

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. In Section 5, we examine implications of changes in contract complexity and we conclude in Section 6.

2. Background and research questions

In the classical principal-agent problem, the agent's actions are not observable and his objective is not the same as that 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; Bettis, et al., 2016). In an attempt to address the agency conflict, theory provides several explanations for why the compensation contract offered to the CEO may become increasingly 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 (Holmström and

Milgrom, 1987). Second, it could add non-stock price performance metrics that are more directly associated with the CEO's actions. 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 CEO's actions are difficult to observe, in particular because the effects of decisions may not be realized in the short term, the contract 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 CEOs 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, and monitors potential market opportunities and risks, among other tasks. In designing compensation contracts, 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.[3] Thus, we examine the extent to which compensation contract complexity is associated with firm and CEO characteristics that reflect the economics of the 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. First, contracts that rely on explicit performance goals with "jumps and kinks" in the performance targets can lead to distorted actions as 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.

[3] 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. Her study does not 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.

Second, tying pay to different measurable metrics may not necessarily result in balanced effort on the part of the CEO, as agents may concentrate too much attention on the activities that are more likely to be rewarded. The multi-task model in Holmström 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 included lead to higher firm value 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 ex ante 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 constrain the CEO's willingness to take value-enhancing actions if those actions conflict with the targets set in the contract.

Finally, contracts can be influenced by factors outside of firm or CEO characteristics, reflecting market pressures rather than addressing the idiosyncratic factors of the firm or CEO. For example, the use of compensation consultants may be associated with more complex contracts. Firms may desire to have a more complex contract to address firm or CEO characteristics and hire a consultant to help design the contract. Or, consultants could design overly complex contracts in an effort to justify their role with the firm.[4] Firms may also adopt more complex compensation

[4] It may be that complexity is associated with a desire to over-compensate the CEO and consultants are the vehicle through which that occurs, although the use of consultants is not shown to be associated with excess pay (Cadman, Carter, and Hillegeist 2010).

contracts as an attempt to placate pressure from institutional investors. Gerakos, Ittner and Larcker (2007) provide some evidence that the adoption of performance-vested stock option plans is associated with institutional holdings. Related to this, Institutional Shareholder Services provides guidelines on executive compensation plans as part of their recommendation in advising proxy votes. Greater complexity in compensation contracting may result as firms attempt to structure compensation with these guidelines in mind to avoid a negative say on pay vote. Finally, compensation policies often emulate compensation contracts of CEOs in peer firms through benchmarking practices as a way to retain and attract talent. Holmström and Kaplan (2003) argue that the practice of benchmarking pay packages to peers enables firms to gauge the "market compensation" for their CEO. In benchmarking peer pay, firms may also emulate contract complexity of other CEOs.

With this background in mind, we examine three questions in this study. We first pose the question, what are the economic determinants of compensation contract complexity? In exploring this question, we consider the extent to which firm, CEO and external factors influence contract complexity. We then pose the question, what causes changes in contract complexity? In answering this question, we consider whether the influence of economic determinants has changed over time or whether other factors explain the change in complexity over time. Finally, we pose the question, what are the implications of compensation contract complexity? The discussion above suggests that complexity may have unintended consequences. Thus, we examine whether changes in compensation contract complexity resulting in excess (or too little) contract complexity are associated with excess (lower) pay and impact negatively the firm's future performance if excess (too little) complexity represent deviations from optimal contracting. We also test whether an increase in complexity is associated with lower earnings manipulation, as the incentives to manage a single short-term performance metric for personal gain decreases as CEOs are evaluated based on a multitude of different performance metrics over several periods while benchmarked to the peer's performance.

3. Research Design

3.1 Sample and data

Our sample includes all firms on the Incentive Lab database in 2006 - 2016 with sufficient data to compute the variables in our regression of the determinants of compensation contract complexity (991 unique firms; 7,366 firm-years). We begin 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, CEO compensation and consultant data from ExecuComp and Incentive Lab, institutional holdings data from Thomson Reuters Institutional (13f) holdings data, data on shareholder proposals from ISS Voting Analytics, and data on ISS guidelines from annual ISS publications.

3.2 Methodology

3.2.1 Measure of compensation contract complexity

Using data from Incentive Lab, we construct a measure of the complexity of compensation contracts (see Appendix A for details). First, 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 assign a point for each unique (qualitative or quantitative) performance measure used and for each unique time period over which performance is measured (e.g., 3 points for RET measured over a 3-year period). Thus far, the simultaneously aggregation of these features has not been considered in the literature related to compensation contract complexity.[5] The index then adds all the points to get an overall measure of contract complexity.[6] Because these measures are computed using compensation characteristics from which realizations will be computed, these are ex-ante measures of complexity.

Table 1 presents descriptive statistics related to our measure of the complexity of compensation contracts. As shown in Table 1 Panel A, the mean (median) value of COMPLEXITY 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. In looking at the components of complexity, the mean (median) number of components of pay is 2.42 (2.00); mean (median) number of measures is 4.92 (4.00); the mean (median) number of time periods is 2.90 (2.00); and the proportion with both absolute and relative performance conditions is 37%.

Figure 1 graphically presents our measure by year over the sample period. The complexity of compensation packages increases steadily over the sample period, consistent with claims advanced in the popular press. COMPLEXITY increased from 9.95 in 2006 to 15.11 in 2016. To assess whether the increase is statistically significant, we compare the complexity value 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 of COMPLEXITY from the earlier

[5] By adding a point for each additional year in the performance period, this measure captures the added complexity of overlapping measurement periods that a CEO faces in the contract.
[6] Our approach to self-construct a measure that sum individual indicators for the presence of a characteristic is similar to what others have done (for example, to capture extent of voluntary disclosure as in Botosan, 1997 and Francis, Nanda, and Olsson, 2008).

to the later period. The increase in complexity is driven by significant increases in the number of performance measures (mean of 4.17 to 5.72), number of time periods (mean of 2.44 to 3.39), and proportion with both absolute and relative performance conditions (25% to 49%).

Panel C presents the mean values of our complexity measure by industry, and Panel D presents the mean values of the components of complexity by industry. Compensation complexity is highest in the Utilities industry, driven by a substantially higher number of performance measures, number of time periods, and reliance on both absolute and relative performance conditions. The Financial Services and Consumer Discretionary industries have the lowest values of complexity. The lower complexity in the financial services industry is driven primarily by the number of pay components, and less so by the number of measures and time periods. The lower complexity in the Consumer Discretionary industry is driven by the use of fewer measures, fewer time periods, and lower reliance on both absolute and relative performance conditions.

3.2.2 Determinants of compensation contract complexity

We examine several possible economic drivers of compensation contract complexity, including both firm and CEO characteristics as well as external forces that place pressure on firms that leads to firms having complex contracts.

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 less complex compensation packages, relying primarily on equity pay to capture the effect of the CEO's performance in managing those unobservable investment opportunities. However, if investment opportunities are measureable, as may be the case with research and development intensive firms, compensation contracts may increase in complexity. Indeed, 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, contract length may vary for firms with greater research and development intensity if compensation contracts tie the time period over which performance is measured to the expected realization of project payoffs (Kole, 1997; Gopalan, Milbourn, Song and Thakor, 2004). If so, firms' use of more performance measures over more time periods will result in more complex compensation contracts. 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*).[7]

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 CEOs' 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 the 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,

[7] We set missing observations for R&D expenses to zero.

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 to. Alternatively, these firms may opt to decrease the CEO's exposure to risk by decreasing (increasing) relative pay at risk (fixed pay), which may result in a compensation contract seemingly less complex. 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 may have more complex compensation packages to match their business complexity. As firms with more business segments, firms with foreign operations, or firms undergoing a merger or acquisition potentially operate in more complex environments, we use business segments, the presence of foreign income, and the completion of a merger or acquisition 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*).[8,9] Most firms in our sample provide segment data based on business lines. In addition, 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*). Finally, we include an indicator variable equal to 1 if a firm completed a merger or acquisition in the current or prior year. We expect that firms that have more complex operations (greater *SEGMTS_HH*, *PIFO* = 1, or M&A = 1) have more complex compensation plans.

[8] 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 on a segment basis, based on the segments used for the internal management of operations.

[9] 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.

3.2.2.2 CEO characteristics

We include several characteristics of the CEO that have been shown to affect compensation contracting. First, we include CEO tenure (*lnTENURE*) at the firm, as prior studies suggest that longer serving CEOs may be less subject to uncertainty about ability (Hermalin and Weisbach, 1998; Dikolli, Mayew, and Nanda, 2014). We expect long tenured CEOs to have less need for incentive pay and complex contracts as the board is more certain of their ability. Second, we include an indicator of whether the CEO is the company founder (*FOUNDER*), as prior studies show that founders have lower principal-agent conflicts due to their large undiversified equity position, ability to control and monitor management and directors, and their longer investment horizon (Anderson and Reeb, 2003, Brochet, Loumioti and Serafeim 2014).[10] Given that founders interest are better aligned with those of shareholders we hypothesized that founders require less incentive pay and complex contracts. Third, we include CEO ownership (*OWNSHIP*), as CEOs with higher ownership in the firm in general have interests that are more aligned with shareholders and thus lower agency conflicts and less need for incentive pay and complex contracts. However, prior studies show that as managerial ownership becomes too large it can actually lead to greater agency conflicts again (and lower performance) (see Morck et al., 1988 and McConnell and Servaes, 1990). Thus, we do not make any prediction regarding the level of contract complexity and CEO ownership. Fourth, we include proximity to retirement (*RETIRE*), 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. Finally, we include an indicator variable equal to one if the CEO is also chairman of the board (*CHAIR*) to allow for the possibility that assuming that additional responsibility increases the complexity of the CEO's compensation

[10] Other studies also find that founder CEOs have greater risk tolerance (e.g. Stewart and Roth, 2001).

contract. Alternatively, CHAIR is also associated with potential agency conflicts and greater need for incentive pay. The need for greater incentive pay may be or may not be achieved by more complex contracts; thus we do not make any prediction regarding the association between *RETIRE* and *CHAIR* and compensation contract complexity.

3.2.2.3 Outside factors

We include several additional factors that capture outside pressure on compensation contract complexity. We count the number of compensation consultants providing services to the firm in that year (*CONSULT*).[11] If consultants design more complex contracts, either because firms hire consultants to help them design complex contracts or consultants design them to justify the need for their services, we expect contract complexity to increase with the number of consultants used by the firm. We include the median value of compensation contract complexity for firms in the same industry and of the similar size, excluding the sample firm (*IND_SIZE_COMPL*). We expect that peers' level of compensation complexity impacts the firm's complexity through benchmarking. We measure institutional ownership as the percent of shares outstanding held by the top 5 institutional investors in that year. Finally, we count the number of counts the number of recommended guidelines in the Compensation section of the ISS annual Summary Proxy Voting Guidelines for each year (*GUIDELINES_ISS*). We hypothesize that firms with greater institutional ownership, and years with greater number of compensation guidelines by ISS, are associated with greater complexity as firms respond to outside pressure to avoid a negative say on pay vote.

3.2.3 Multivariate regression

We estimate the following regression of compensation complexity on firm characteristics,

[11] We exclude consultants that merely provide survey data.

CEO characteristics, and outside factors.[12]

$$COMPLEXITY_{jt} = \alpha + \beta_1\, lnMV_{jt-1} + \beta_2\, MTBA_{jt-1} + \beta_3\, R\&D_{jt-1} + \beta_4\, lnSTDRET_{jt} + \beta_5\, SEGMTS\_HH_{jt-1} + \beta_6\, PIFO_{jt} + \beta_7\, M\&A_{jt} + \beta_8\, lnTENURE_{jt} + \beta_9\, RETIRE_{jt} + \beta_{10}\, FOUNDER_{jt} + \beta_{11}\, OWNSHIP_{jt} + \beta_{12}\, CHAIR_{jt} + \beta_{13}\, CONSULT_{jt} + \beta_{14}\, IND\_SIZE\_COMPL_{jt} + \beta_{15}\, Top5\_INST\_OWN_{jt} + \beta_{16}\, GUIDELINES\_ISS_{jt-1} + \beta_j\, IND_j + \beta_t\, YEAR_t + \varepsilon_{it} \quad (1)$$

Where:

$COMPLEXITY_{jt}$	=	index of compensation complexity computed from Incentive Lab data, as described in Section 3.2.1.
$lnMV_{jt-1}$	=	natural log of the market value of equity of firm *j* at the end of year *t-1*
$MTBA_{jt-1}$	=	(market value of equity plus book value of total liabilities)/ book value of assets of firm *j* at the end of year *t-1*
$R\&D_{jt-1}$	=	research and development expenditures / total assets for firm *j* at the end of year *t-1*
$lnSTDRET_{jt}$	=	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
$M\&A_{jt}$	=	indicator variable equal to 1 if the firm completed at least one M&A in year *t* or *t-1*.
$POOR\_PERF_{jt-1}$	=	indicator variable equal to 1 if the firm's stock return performance at time *t*-1 was below the peers in the same industry-size quartile.
$lnTENURE_{jt}$	=	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. We obtain information about whether the CEO is the founder either by extracting that information from the title of the CEO on Execucomp or by conducting a Google search by using the firm's and the CEO's name and the word "founder" to determine who founded the firm.
$OWNSHIP_{jt}$	=	CEO total ownership of firm stock (Execucomp variable "shrown_tot_pct"
$CHAIR_{jt}$	=	indicator variable equal to 1 if the CEO is also the chair of the board of directors

[12] In additional analyses we also include the percentage of votes in favor on executive pay packages following say on pay votes and estimate this regression model for the period of 2010-2016 after the enactment of the Dodd-Frank Act. Because we need vote information a firm-year observation only enters the sample when it first has a vote. If there is no vote information after the first vote, the prior vote is assumed. This variable is however not significantly associated with complexity, maybe due to the samller sample size. Sample size per year: 2007 - 2; 2008 – 9; 2009 - 21; 2010 - 647; 2011 -628 ; 2012 - 629; 2013 - 673; 2014 - 629; 2015 - 576; 2016 – 563.

$CONSULT_{jt}$	= number of different compensation consultants providing services to the firm
$IND\_SIZE\_COMPL_{jt}$	= median value of COMPLEXITY for firms in the same industry and size quartile as the firm, excluding the sample firm.
$Top5\_INST\_OWN_{jt}$	= percentage of shares outstanding owned by the top 5 institutional investors in year *t.*
$GUIDELINES\_ISS_{t-1}$	= number of guidelines issued by ISS on compensation issues for the year, excluding those relating solely to director pay.
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 winsorize *COMPLEXITY* at the 1 and 99 percent level to avoid biasing the results due to coding errors. 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. Forty-nine percent of sample firms completed a merger or acquisition in the current or prior year.

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. CEOs own an average (median) of 1.37% (0.32%) of shares outstanding. Fifty-three percent of firms have CEOs who are also the chairman of the board of the directors.

The average (median) firm has 1.14 (1.00) compensation consultants. The average (median) complexity score for firms' industry/size peers is 4.84 (5.00). On average (at the median), there are 38 (36) ISS guidelines outstanding. The five largest institutional shareholders own an average (median) of 29% (28%) of shares outstanding

4.2 Pearson correlations

Table 3 presents Pearson correlations among our independent variables. We observe that size (*lnMV*)) and the relative dominance of any segments (*SEGMTS_HH*) are positively correlated with complexity, while the market-to-book ratio of assets (*MTBA*) and volatility of returns (*lnSTDRET*) are negatively related to compensation complexity.

Considering CEO characteristics, we find that longer tenure (*lnTENURE*), being a founder (*FOUNDER*), share ownership (*OWNSHIP*) are each negatively correlated with complexity. The correlations are consistent with CEO characteristics that result in lower agency conflicts or higher uncertainty about performance being negatively related to complexity of the CEO's compensation contract.

The number of consultants (*CONSULT*), complexity score of industry/size peers (*IND_SIZE_COMPL*) and number of ISS guidelines (*GUIDELINES_ISS*) are positively correlated with complexity, while higher ownership by the firm's five largest institutional investors is negatively correlated with complexity. These correlations suggest that factors from external parties may be responsible for at least a portion of the complexity of compensation contracts.

While several of the correlations among the independent variables are significant, there are a few notable correlations. Firm size is positively correlated with industry/size peer complexity (0.35) and negatively correlated with volatility in returns (-0.47) and institutional ownership (-0.32). Not surprisingly, CEO tenure is positively correlated with being a founder CEO (0.42) and being also the chairman of the board (0.33). Founder CEO is also positively correlated with ownership (0.33). Finally, industry/size peer complexity is positively associated with the number of ISS guidelines (0.48).

4.3 Multivariate regression

Table 4 presents results from estimating our regression. We estimate the regression including firm characteristics (Column 1), including both firm and CEO characteristics (Column 2), including firm characteristics, CEO characteristics, external factors that may influence complexity (Column 3), and industry and year fixed effects (Column 4). Table 5 presents results from estimating equation (1) with four different components of complexity included as dependent variables: (1) number of pay components, (2) number of performance measures, (3) number of time periods, and (4) inclusion of both absolute and relative conditions.

Table 4 shows that larger firms have more complex compensation contracts (the coefficient on *lnMV* is positive in all columns, although significant in Columns (1), (2) and (4) only). This result is consistent with large firms being more complex, more difficult to manage, and being more difficult to monitor managers. Results in Table 5 suggest that the greater complexity of compensation in larger firms is reflected through the use of more performance measures and a greater tendency to incorporate relative performance measures (the coefficient *lnMV* in Columns (2) and (4) are positive and significant at $p < 0.01$).

We find evidence that firms with greater growth opportunities have less complex contracts (the coefficient on *MTBA* in Table 4 is negative and significant a $p < 0.01$ in all regressions). This result is due to these firms using a large proportion of equity compensation. A univariate comparison of the proportion of pay from equity for high (above sample median) and low (below sample median) MTBA firms in our sample (not tabulated) shows that the proportion of pay from equity for high MTBA firms (50%) is significantly higher than for low MTBA firms (44%). This is 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). In addition, results in Table 5 show a negative and significant ($p < 0.01$) relation between *MTBA* and the number of performance measures (Column (2)), number of time periods (Column (3)), and tendency to use both absolute and relative conditions (Column (4)). These statistics suggest that firms with high growth opportunities resort to simpler compensation arrangements that rely primarily on equity.

We find that firms with high R&D have more complex contracts, with the coefficient on *R&D* in Table 4 positive and significant in all regressions. At first glance, this result seems counterintuitive, given the results on *MTBA*. However, high R&D firms are a specific type of growth firm, and they likely use different metrics, such as number of patents and FDA approval metrics, than other non-R&D intensive growth firms, which increases the complexity of their compensation contracts. Results in Table 5 show a positive (although not significant at conventional levels) relation between *R&D* and the number of performance measures (Column (2), but additional analysis (not tabulated) reveals that R&D firms use significantly more qualitative measures (average of 1.15) than for non-R&D firms (average of 0.99). In addition, results in Table 5 show a positive and significant ($p < 0.05$) relation between *R&D* and the number of time periods used in those contracts, perhaps reflecting higher R&D firms' attempts to align their CEOs' horizon with the research horizon of the firms' potential project pipeline.

We find that firms with greater volatility in stock returns have lower complexity; the coefficient on *lnSTDRET* in Table 4 is negative and significant at $p < 0.05$ in Columns (1) and (2).[13] This result suggests that when it is hard to predict the different states of the world, simpler

[13] We note that this result becomes insignificant when external factors are included in the regression in Columns (3) and (4).

contracts may be optimal. Grossman and Hart (1986) suggest that writing complete contracts is prohibitively costly. In fact, Anderson (1999) finds that debt contracts for Brazilian firms during periods of high economic volatility become simpler (without covenants). Interestingly, results in Table 5 show a negative and significant ($p < 0.05$) relation between *lnSTDRET* and the tendency to use both absolute and relative conditions; this result is not consistent with firms' using relative conditions in an attempt to insulate CEOs from factors beyond their control, given the volatility of returns. Additional analysis, however, reveals that the proportion of total pay in the form of salary for these firms (not tabulated) is significantly higher (29.8%) than for firms with lower (below sample median) stock return volatility (22.6%). These results are consistent with volatile firms' attempting to insulate these CEOs for the greater risk associated with those firms through fixed pay rather than through relative performance conditions.

Interestingly, we find little evidence that our other proxies for operational complexity are incrementally associated with greater complexity of compensation contracts. In Table 4, we observe no significant relation between complexity and either *SEGMTS_HH* or *PIFO*.[14] We find some evidence that having completed a recent merger or acquisition results in lower complexity of compensation (the coefficient on M&A is negative and significant in Columns (1) and (2)). The results in Table 5 suggest that CEOs involved in M&A are rewarded based on fewer performance metrics, possibly because bonuses and equity pay are related to the successful completion of a merger, and use less relative performance conditions.[15]

We find that characteristics of CEOs that suggest less need for incentive pay (longer tenure,

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[14] Results in Table 5 show a positive and significant coefficient on PIFO in Column (1), but a negative and significant coefficient on that variable in Columns (2) and (4). These different signs for the coefficient on PIFO for different components of complexity suggest offsetting effects of increased number of pay components, but fewer performance measures or relative performance conditions, likely resulting in the lack of significance of the coefficient on that variable in the Table 4 results.

[15] We note that this result becomes insignificant when external factors are included in the regression in Columns (3) and (4).

founder status, and ownership) generally have less complex compensation packages (the coefficients on these variables in Columns (2) through (4) are negative and typically significant), consistent with less uncertainty about their ability serving to mitigate potential agency conflicts, and, in turn, resulting in less complex compensation arrangements. We also find that CEOs closer to retirement have less complex contracts, despite a potentially greater need for horizon alignment (the coefficient on *RETIRE* is negative and significant in Columns (3) and (4)). A univariate comparison of firms whose CEOs are closer to retirement and firms whose CEOs are further from retirement reveal that those closer to retirement receive a larger proportion of their compensation from short-term cash bonuses. Table 5 suggests that compensation for CEOs closer to retirement relies on fewer components, fewer measures, fewer time periods, and a lower tendency to include relative performance conditions. And firms with CEOs with longer tenure and founder status tend to use significantly fewer compensation components. We find that firms with CEOs that also serve as chairman of the board have higher compensation complexity (Columns (2) through (4)). This may be due to the additional difficulty of assuming both roles resulting in more complex contracts. Indeed, Table 5 shows a positive and significant ($p < 0.01$) relation between serving in both roles and the number of pay components (Column (1)), the number of performance measures (Column (3)), and the use of relative performance conditions (Column (4)).

In addition to the effects of economic determinants (i.e., firm and CEO characteristics) on compensation complexity, we find that several external forces influence the complexity of compensation contracts. In particular, we find a positive relation between compensation complexity and the number of compensation consultants a firm retains ($p < 0.01$), the complexity of compensation at its peer firms ($p < 0.01$), and the number of ISS guidelines related to compensation that have been issued ($p < 0.10$ to $p < 0.01$ depending on the specification). We find no evidence that greater institutional holdings is associated with overall contract complexity, but we find some evidence that it is associated with the use of fewer time periods (a negative and significant coefficient in Table 5 Column (3)).

In sum, the results in this section suggest that compensation contract complexity is explained partially by organizational complexity. Large firms and high R&D firms have more complex contracts. Having completed a merger or acquisition is associated with lower compensation complexity, perhaps as post-merger integration efforts involve a review process that simplifies the combined contracts. Interestingly, though, we observe little relation between other measures of organizational complexity, like business segments and international operations, and the complexity of compensation contracts. It is possible that size serves as a comprehensive proxy for organizational complexity to capture its effect on compensation complexity. We find that firm characteristics that imply difficulty in monitoring (growth firms) or an imposition of risk on the CEO (volatility) affect compensation complexity; growth firms, which rely heavily on equity, and high volatility firms, which rely more on fixed pay, have less complex contracts.

The inclusion of CEO characteristics in our model modestly increases its explanatory power; the adjusted R^2 increases by 2% between Columns (1) and (2). The results in Columns (2) suggest that more complex contracts may be intended to address potential agency concerns that arise based on certain CEO characteristics, as CEOs with longer tenure, founder status, high ownership have less complex compensation contracts. Finally, our results suggest that external factors also impact the complexity of compensation. Notable is the increase in the adjusted R^2, which increases substantially (by 13%) between Columns (2) and (3), after including external factors in the model. Compensation complexity is positively related to more compensation guidelines issued by ISS, greater complexity of peer firms' compensation contracts, and the use of more compensation consultants.

4.4 Changes in contract complexity

Next, we estimate the model in a changes specification including the changes in all variables in equation (1),[16] adding four variables that capture external shocks that can lead to a change in complexity of compensation contracts. Specifically, we include an indicator variable equal to one if the CEO is new to the firm (*NEW_CEO*), an indicator variable equal to one if the firm's stock returns in the prior year was in the bottom half of the firm's industry and same size quartile (*POOR_PERF*), an indicator variable equal to one if the firm had an increase in shareholder proposal related to compensation issues in the prior year (*ΔPROPOSAL*), and an indicator variable equal to one if a firm experiences a decrease in say on pay votes in favor of executives compensation packages in the prior's year (*PASSRATE_DECR*).

Table 6 presents the results. Complexity increases in firms with a new incoming CEO (the coefficient on *NEW_CEO* is positive and significant), with prior year's poor stock returns performance (the coefficient on *POOR_PERF* is positive and significant), suggesting that firms change compensation contracts after hiring a new CEO and respond to poor performance by changing compensation arrangements in ways that increase their complexity. Similar to Table 4, we find that complexity decreases in growth opportunities and volatility (the coefficients on *ΔMTBA* and *ΔlnSTDRET* are negative and significant). Finally, we find that complexity of a firm's compensation follows the trend of the complexity of its industry/size peers (the coefficient on *ΔIND_SIZE_COMPL* is positive and significant at $p < 0.01$), again suggesting a potential contagion effect among peers in the increase in compensation complexity.

4.5 Analysis over time

[16] We do not include the change in TENURE or RETIRE because the change is equal to 1 for all observations, unless a CEO leaves the firm, the effect of which is captured by the variable NEW_CEO. We also do not include the change in FOUNDER or CHAIR because those changes equal zero.

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 have an equal number of years capturing the early and later time periods. That year (2011) also captures the first year implementing say-on-pay voting under Dodd-Frank, reflecting a potential regime shift in contract complexity.

Table 7 presents the results. Column (1) presents results for 2006-2010 and Column (2) presents results for 2012-2016. The results show that the ability of the model to explain contract complexity increased considerably from the earlier to the later period (the adjusted R^2 increases from 0.1647 in Column (1) to 0.2265 in Column (2)).

The greater explanatory power appears to come from the importance of firm characteristics in the later period. Our findings from Table 4 seem to be driven by the later period as firm characteristics are generally unrelated to contract complexity prior to 2011. Interestingly, CEO characteristics tend to lose their significance in the later time period, although only the role of ownership is significantly different from the earlier period.

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 contract complexity

In this subsection, we explore implications of compensation contract complexity on CEO compensation, firm performance, and earnings management. These analyses are intended to further our understanding of contract complexity.

5.1 Impact of a change in unexplained complexity on excess pay

We first consider whether changes in unexplained complexity (i.e., changes unrelated to changes in firm and CEO characteristics) are associated with changes in unexplained (or excess)

CEO compensation. We focus on the impact of *changes* in unexplained complexity, instead of its *level*, to diminish the impact of any potential bias associated with the fact that the level of unexplained complexity may capture an omitted economic determinant. We exclude external factors from the explained complexity model to capture the optimal complexity level as determined by the firm and CEO characteristics only. We considerar external factors as exogeneous factors that can drive complexity away from its optimal level (e.g., ISS push for more pay for performance for all firms can lead firms to implement more performance metrics than what would be optimal for the firm). If contract complexity makes compensation less transparent to shareholders, it may be a vehicle through which firms can increase CEO compensation.[17] Complex contracts, possibly with multiple performance measures across many time horizons that are easily achieved, may give the impression that the CEO's pay is strongly tied to performance when, in fact, it is not (Bebchuk and Fried, 2004). An experimental study by Gillenkirch, Hendriks, and Welker (2014) also suggests that shareholders are better able to anticipate the incentive effects of compensation when compensation packages are less complex.

We first 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.[18]

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[17] A potential alternative explanation from standard agency models for a positive association between excess contract complexity and excess pay is that more complex incentive pay packages impose greater performance risk on CEOs, for which they need to be compensated. Albuquerque et al. (2018) empirically test, and find supporting evidence, that CEOs demand higher pay for riskier pay packages. However, it is not clear whether a more complex contract leads to more or less risky pay packages. By using different performance metrics and time horizons the pay risk imposed on the CEO can actually decrease if the performance metrics measured over different time horizons are not perfectly correlated. In addition, the purpose of RPE conditions is to insulate the CEO from systematic risk. Thus whether complex pay packages imposes more or less risk on CEO is an interesting empirical question, but not the focus of this paper.

[18] 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 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

We then estimate the association between changes in excess pay and changes in complexity. We include the changes in firm and CEO characteristics as economic determinants of contract complexity from Equation (1) so that the coefficient on ΔCOMPLEXITY can be interpreted as the marginal effect of a change in unexplained complexity on a change in excess pay. We also include the first stage determinants of compensation from Core et al. (2008) to ensure correct inferences (Chen, Hribar, and Melessa, 2017) and year and industry fixed effects. Finally, we include 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 CEO characteristic could explain excess compensation. [19]

Table 8 presents the results. We find that an increase in unexplained component of complexity is positively related to an increase in *EXCESSPAY* (the coefficient on Δ*COMPLEXITY* is positively and significant at $p < 0.01$ in Column 1), consistent with an increase in unexplained (excess) contract complexity being associated with greater excess CEO pay or additional pay to compensate the CEO for bearing increased compensation risk. In Column 2, we separate the Δ*COMPLEXITY* into complexity increase (Δ*COMPLEXITY_POSTV*) and complexity decrease (Δ*COMPLEXITY_NEGTV*) and test its separate effect on excess pay. The results are consistent with those in Column 1 and show that an increase (decrease) in excess complexity is associated with an increase (decrease) in excess pay. Overall, these associations are consistent with either an attempt to mask greater CEO pay from shareholders or a reward for risk, if more complex contracts

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ratio, leverage, and industry fixed effects. The Larcker et al. (2011) excess pay measure is the 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.

[19] It is possible that our proxy for excess pay contains 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 from the estimated compensation model. In robustness tests, we control for the number of qualitative performance measures and obtain similar results.

impose extra risk on CEOs. We attempt to disentangle these explanations next.

5.2 Impact of a change in unexplained complexity on firm performance

We examine the relation between a change in unexplained contract complexity and future performance. If a change in unexplained complexity (that is not associated with firm or CEO characteristics) reflects unnecessary complexity that either reflects rent extraction or distracts the CEO from value-added decision making, we predict a negative relation between an increase in unexplained complexity and future performance when those actions are reflected into performance. On the other hand, if the change in unexplained complexity is idiosyncratic across firms and possible captures compensation for risk, it will be unrelated to firm future performance.

We consider four measures of future performance: change in accounting performance (*ΔROA*), future stock returns (*RET),* change in operating cash flows (*ΔOCF*), and sales growth (*FutureΔSales*). *ΔROA* is the change in operating income before depreciation (Compustat item OIBDP) scaled by total assets in year *t*. *RET* is the annual stock return including dividends. Change in operating cash flows is measured as change in operating cash flows from year *t* to *t*+1 scaled by total assets in year *t*. Sales growth is measured as the change in sales from year *t* to *t*+1 scaled by sales in year *t*. For each performance measure, we include control variables appropriate for that measure.[20] As above, we include the change in firm and CEO characteristics as determinants of contract complexity change (from Equation 1). Thus, the interpretation of the coefficient on Δ*COMPLEXITY* captures the marginal effect on future performance from a change in unexplained complexity.[21]

Columns 3 through 8 of Table 8 present the results. With the exception of *ΔOCF*, we

[20] For example, following Core, Holthausen and Larcker (1999), we include control variables related to ROA following their specification.
[21] According to the Frisch-Wald-Lovell theorem the coefficient on complexity captures the impact of the error term because all determinants of complexity are included simultaneously in the model.

generally find no relation between a change in unexplained complexity and future performance. We do find that an increase in unexplained complexity is associated with a decrease in OCF_{t+1} (coefficient on ΔCOMPLEXITY in Column 7 is negative and significant at $p < 0.10$). It is possible that the lack of significance on ΔCOMPLEXITY is due to the fact that the inclusion of the year fixed effects absorb part of the effect of change in complexity, as Figure 1 shows that on average complexity increases steadly throught our sample period. In untabulated tests, when we omit the year fixed effects, we find that not only an increase in unexplained complexity is associated with a decrease in OCF_{t+1} (coefficient on ΔCOMPLEXITY is negative and significant at $p < 0.05$), but when we consider increases and decreases in unexplained complexity separately, we also find that an increase in unexplained complexity is associated with worse future performance for both future stock returns and *ΔOCF* (the coefficient on ΔCOMPLEX is negative and significant at $p < 0.05$). We do not find that a decrease in unexplained complexity is associated with future performance, whether we include or exclude year fixed effects. Together, the results offer limited evidence that an increase in unexplained compensation contract complexity is associated with worse future firm performance.

5.3 Impact of a change in unexplained complexity on earnings management

Finally, we explore how contract complexity is associated with a CEO's incentives to engage in short-term earnings management. CEOs with more complex contracts, with multiple earnings and non-earnings performance metrics, longer time horizons over which performance is measured, and RPE conditions have less incentives to manage a single short-term performance metric for personal gain. CEOs with simplier contracts that focus on fewer metrics (with one being earnings-based), shorter time horizons, and no RPE conditions have more to gain from engaging in earnings management to meet a target performance metric. Thus, we examine whether increases (decreases) in contract complexity are associated with less (more) earnings management.

We estimate discretionary accruals following Dechow et al. (2003) and measure the extent of earnings management as the abnormal value of discretionary accruals. We then estimate the association between the absolute value of discretionary accruals and changes in complexity. As before, we include the first stage determinants of total accruals to ensure correct inferences (Chen et al., 2017). In addition, we include industry and year fixed effects. Finally, and following prior studies (Kothari et al, 2005; Chen et al., 2017), we add as additional controls firm size ($LnMV_{t-1}$), BTM_{t-1}, ROA_{t}, $LEVERAGE_{t-1}$, and operating cash-flow scaled by total assets (OCF_TA_{t}).[22]

Table 9 presents the results. Column 1 and 3 (2 and 4) show the results without (with) additional controls. We find that an increase in complexity is associated with a decrease in the absolute value of discretionary accruals (coefficient on *ΔCOMPLEXITY* is negative and significant at $p < 0.10$ in columns 1 and 2), which is consistent with an increase in contract complexity being associated with lower level of earnings management. In Columns 3 and 4, we separate Δ*COMPLEXITY* into complexity increase (Δ*COMPLEXITY_POSTV*) and complexity decrease (Δ*COMPLEXITY_NEGTV*). We find that an increase in unexplained complexity is not statistically significantly associated with earnings management, but a decrease in unexplained complexity is negatively associated with discretional accruals (the coefficient on (Δ*COMPLEXITY_POSTV* is negative and significant at $p < 0.01$ in Columns 3 and 4), consistent with an decrease in excess contract complexity leading to more earnings management. Including fewer metrics, shorter time horizons, and less RPE conditions allows the CEO to gain more from engaging in earnings management to meet a target performance metric.

[22] As a robustness test and following Zhang (2012, Equation 7), we include as control variables the $LnMV_{t-1}$, BTM_{t-1} and ROA_{t} all measured as deviations to their industry-year means and obtain similar results.

6. 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, the form of pay that will result if targets are achieved, and whether performance metrics are benchmarked, we construct a novel measure of compensation contract complexity and examine its economic determinants and implications on firm behavior.

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 contracts, contrary to our expectations, 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 find that CEOs closer to retirement, with longer tenure and higher ownership, and founder CEOs have less complex contracts. We also find that complexity is driven by external forces. Specifically, the number of compensation consultants retained by the firm, ISS compensation guidelines, and the complexity of peers' pay packages are all positively associated with higher levels of complexity. We provide statistical evidence to validate anecdotal evidence that contract complexity has steadly increased over time. Finally, we document that increases in complexity are driven by the arrival of a new CEO, past poor performance, and an increase in peer firms' pay complexity.

We then examine the implications of contract complexity on firm performance, earnings management, and its association with excess CEO compensation. We find that an increase in excess complexity is related to higher excess compensation. While this could result as an attempt to obfuscate excess pay, it more likely reflects compensation to CEOs for bearing more incentive pay risk, since we find limited evidence that excess complexity is associated with poor future performance. Finally, we find that firms with more complex contracts have lower discretionary accruals, consistent with more complex contracts reducing the incentives to manipulate one particular performance measure.

Our findings should be of interest to compensation committees, regulators, and academics. We are among the first to document statistically what market observers have alleged, that contracts have become increasingly complex. First, compensation committees, which may tend to rely on compensation consultants to structure CEO contracts, should consider that the reliance on consultants may result in unnecessary complexity. Second, 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. Finally, our findings suggest that academics should consider the multiple dimensions of compensation packages rather then focusing on a single pay contract characteristic. As an example, Gopalan et al. (2004) shows that firms with longer pay duration engage in less earnings management, but a similar result can be obtained for firms with multiple performance metrics. The extent to which duration of pay packages is a substitute or a complement to the use of different performance metrics is an interesting topic for future research.

Appendix A

Pay Component	Characteristics	COMPLEXITY Score
Short Term Cash Bonus	Has time conditions	1
	Has absolute performance conditions	1
	• Number of performance measures	Actual #
	• Number time periods	Actual #
	Has relative performance conditions	1
	• Number of performance measures	Actual #
	• Number time periods	Actual #
Long Term Cash Bonus	Has time conditions	1
	Has absolute performance conditions	1
	• Number of performance measures	Actual #
	• Number time periods	Actual #
	Has relative performance conditions	1
	• Number of performance measures	Actual #
	• Number time periods	Actual #
Restricted Stock	Has time conditions	1
	Has absolute performance conditions	1
	• Number of performance measures	Actual #
	• Number time periods	Actual #
	Has relative performance conditions	1
	• Number of performance measures	Actual #
	• Number time periods	Actual #
Stock Options	Has time conditions	1
	Has absolute performance conditions	1
	• Number of performance measures	Actual #
	• Number time periods	Actual #
	Has relative performance conditions	1
	• Number of performance measures	Actual #
	• Number time periods	Actual #
	Potential Total Score	*N/A*

Appendix B

ConocoPhilips has a score of 23 for fiscal year of 2010 using our COMPLEXITY measure. Below, we provide details regarding how the information from the proxy statement (DEF 14A) about incentive contracts is used to calculate the score.

Summary:

Component	Characteristics	COMPLEXITY
ST Cash Bonus	Has absolute perf conds	1
	• Number of perf measures	2
	• Number time periods	1
	Has relative perf conds	1
	• No. of perf measures > 1	
	• Number of perf measures	4
	• Number time periods	1
LT Cash Bonus		0
Restr Stock	Has absolute perf conds	1
	• Number of perf measures	3
	Has relative perf conds	1
	• Number of perf measures	4
	• Number time periods	3
Stock Options	Has time conditions	1
Total Score		23

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 <u>relative annual total stockholder return</u> 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 <u>relative annual adjusted return on capital employed</u> compared with the same peer group noted above;*
- *Ranking 3rd in percentage and absolute change in <u>relative annual adjusted cash return on capital employed</u> compared with the same peer group noted above;*
- *Ranking 2nd in <u>relative adjusted cash contribution BOE</u> compared with the same peer group noted above;*
- *Our <u>health, safety and environmental performance</u>; and*
- *<u>Advancement and support of our key strategic initiatives and plans</u>."*

Note that BOE stands for <u>barrel of oil extracted.</u>

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 6 points since each absolute (relative) performance measure has four metrics. We assign an additional 2 points since absolute performance is measured over one time period and relative performance is measured over one time period.

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 assign an additional 7 points. Finally, relative performance is measured over 3 time periods, so we assign an additional 3 points.

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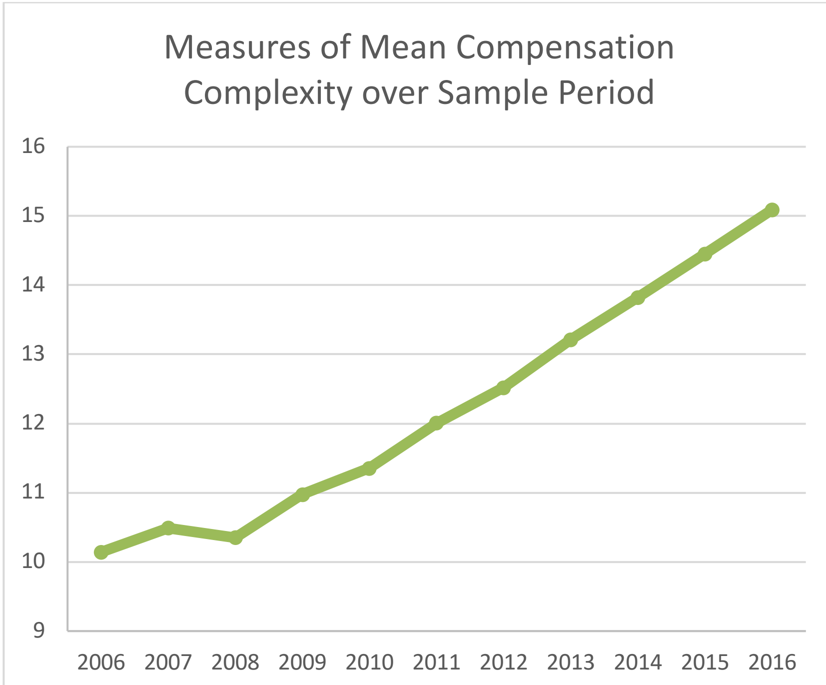
Figure 1
Measures of compensation complexity and total pay by year over the sample period 2006-2016



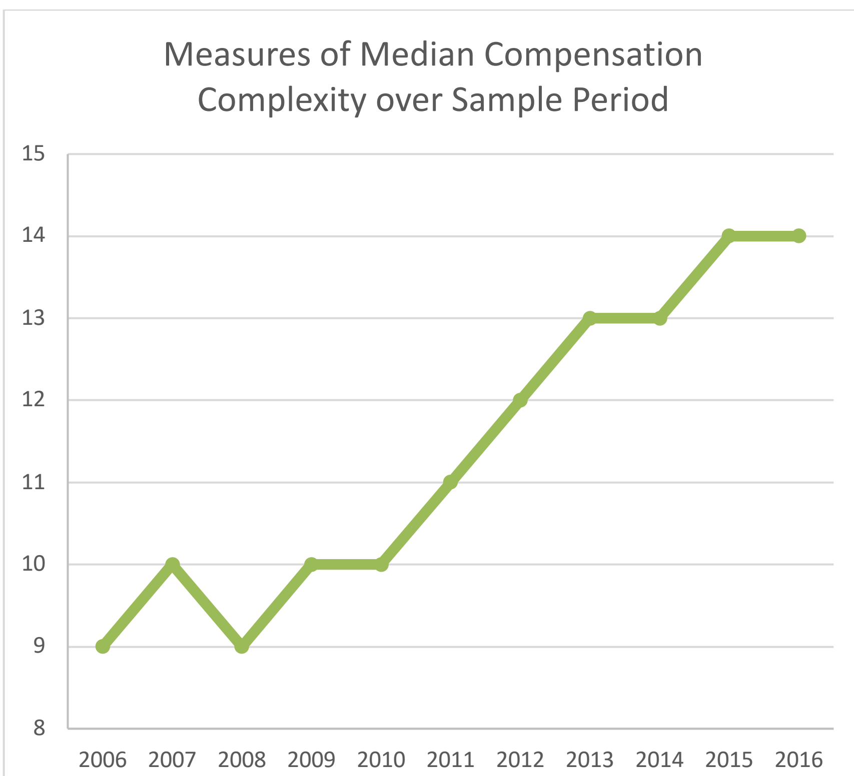


Table 1
Descriptive statistics for measures of contract complexity

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, total compensation, and components of complexity

Variable	N	Mean	Std. Deviation	1%	25%	50%	75%	99%
COMPLEXITY	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	10,066.0	33,972.0
# of components of pay	7,366	2.42	0.78	1	2	2	3	4
# of measures	7,366	4.92	3.85	0	2	4	7	18
# of time periods	7,366	2.90	2.24	0	1	2	4	10
% with both abs and relative	7,366	0.37	0.48	0	0	0	1	1

Panel B: Contract complexity measures, total compensation, and components of complexity over time

	Pre-Period (2006-2010)			Post-Period (2012-2016)			Difference	
Variable	N	Mean	Median	N	Mean	Median	Mean *t*-value	Median *p*-value
COMPLEXITY	3,373	10.70	9	3,289	13.67	13	19.24	0.00
TDC1	3,373	7,195.5	5,298.6	3,289	8,009.8	6,218.3	9.94	0.00
# of components of pay	3,373	2.39	2	3,289	2.45	2	3.57	0.94
# of measures	3,373	4.17	3	3,289	5.72	5	16.93	0.00
# of time periods	3,373	2.44	2	3,289	3.39	3	17.84	0.00
% with both abs and relative	3,373	0.25	0	3,289	0.49	0	21.23	0.00

Table 1 (continued)
Descriptive statistics for measures of contract complexity

Panel C: Mean values of complexity variables by Global Industry Classification code

GIC Sector		N	%	COMPLEXITY Mean	COMPLEXITY Median
10	Energy	530	7.2%	12.92	13
15	Materials	419	5.7%	13.23	12
20	Industrials	1,091	14.8%	11.84	11
25	Consumer Discretionary	1,093	14.8%	10.05	10
30	Consumer Staples	362	4.9%	12.29	11.5
35	Health Care	837	11.4%	13.14	13
40	Financial Services	664	9.0%	10.98	10
45	Information Technology	1,487	20.2%	11.31	11
50	Telecommunication Services	95	1.3%	12.94	14
55	Utilities	401	5.4%	17.96	17
60	Real Estate	387	5.3%	12.56	11
	Total	7,366	100%		

Panel D: Mean values of complexity components by Global Industry Classification code

GIC Sector		# of components of pay	# of measures	# of time periods	% with both abs and relative
10	Energy	2.40	**5.46**	2.86	0.62
15	Materials	**2.64**	5.40	**3.30**	0.46
20	Industrials	2.57	4.71	2.92	0.33
25	Consumer Discretionary	2.40	3.83	2.50	0.23
30	Consumer Staples	**2.65**	4.92	2.98	0.30
35	Health Care	2.61	5.42	2.68	0.28
40	Financial Services	2.22	4.28	2.75	0.34
45	Information Technology	2.32	4.33	2.97	0.26
50	Telecommunication Services	2.28	5.31	2.83	0.41
55	Utilities	2.39	**9.08**	**4.13**	**0.87**
60	Real Estate	2.01	5.29	2.76	**0.57**
	Total	2.42	4.92	2.90	0.37

Table 2
Descriptive statistics

This table reports descriptive statistics for our explanatory and control variables. Variable definitions are included in Appendix C.

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
M&A	7,366	0.49	0.50	0	0	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
OWNSHIP	7,185	1.34	3.70	0.07	0.32	1.13
CHAIR	7,366	0.53	0.50	0	1	1
CONSULT	7,050	1.14	0.49	1	1	1
IND_SIZE_COMPL	7,366	4.84	1.11	4	5	6
Top5_INST_OWN	6,683	0.29	0.09	0.23	0.28	0.33
GUIDELINES_ISS	6,861	38.05	7.33	30	36	46
NEW_CEO	7,366	0.06	0.23	0	0	0
POOR_PERF	7,366	0.50	0.50	0	0	1
PROPOSAL	6,861	0.05	0.22	0	0	0

Table 3
Pearson correlations

This table reports the Pearson correlations of our measures of compensation complexity, firm, and CEO characteristic variables. Complexity is defined in Section 3.2.1. All other variables are defined in Table 2. * indicates significance at $p < 0.05$.

		1	2	3	4	5	6	7	8	9	10	11	12	3	14	15	16	17	18
1	COMPLEXITY	1.00																	
2	TDC1	0.14*	1.00																
3	lnMV	0.20*	0.53*	1.00															
4	MTBA	-0.07*	0.04*	0.18*	1.00														
5	R&D	0.01	-0.01	-0.08*	0.31*	1.00													
6	lnSTDRET	-0.14*	-0.15*	-0.47*	-0.10*	0.13*	1.00												
7	SEGMTS_HH	0.05*	0.13*	0.15*	-0.22*	-0.13*	-0.12*	1.00											
8	PIFO	-0.02	0.08*	0.07*	0.16*	0.30*	0.04*	0.15*	1.00										
9	M&A	-0.02	0.15*	0.20*	0.06*	0.06*	-0.13*	0.09*	0.19*	1.00									
10	LnTENURE	-0.07*	0.08*	0.01	0.07*	0.00	-0.04*	-0.06*	-0.05*	0.04*	1.00								
11	RETIRE	-0.07*	0.03*	-0.02	0.03	-0.03	-0.04*	-0.02	-0.04*	-0.03*	0.25*	1.00							
12	FOUNDER	-0.12*	0.04*	-0.08*	0.09*	0.04*	0.08*	-0.13*	-0.05*	0.01	0.42*	0.17*	1.00						
13	OWNSHIP	-0.16*	0.00	-0.15*	0.06*	0.00	0.04*	-0.06*	0.00	-0.04*	0.27*	0.19*	0.33*	1.00					
14	CHAIR	0.06*	0.13*	0.17*	-0.06*	-0.17*	-0.10*	0.07*	-0.05*	0.00	0.33*	0.12*	0.14*	0.09*	1.00				
15	CONSULT	0.09*	0.07*	0.08*	-0.07*	-0.03	0.01	0.07*	-0.02	0.01	-0.07*	-0.01	-0.07*	-0.09*	0.02	1.00			
16	IND_SIZE_COMPL	0.37*	0.17*	0.35*	0.03	0.04*	-0.30*	0.14*	0.12*	0.05*	-0.02	-0.00	-0.12*	-0.14*	0.01	0.04*	1.00		
17	Top5_INST_OWN	-0.08*	-0.14*	-0.32*	0.03	0.10*	0.18*	-0.15*	-0.03	-0.07*	0.03	-0.03	0.08*	0.04*	-0.05*	-0.02	-0.13*	1.00	
18	GUIDELINES_ISS	0.20*	0.10*	0.16*	0.03	-0.03	-0.27*	0.02	0.04*	-0.02	0.03	0.05*	-0.06*	-0.05*	-0.03	-0.02	0.48*	-0.07*	1.00

Table 4

Regression of compensation complexity on firm characteristics, CEO characteristics, and external factors

This table provides results of OLS regressions of compensation complexity on proxies for firm characteristics, CEO characteristics, and external factors. The dependent variable, complexity, is defined in Section 3.2.1; independent variables are defined in Section 3.2.2. 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.

VARIABLES	(1)	(2)	(3)	(4)
Firm Characteristics				
lnMV	1.12***	0.96***	0.24	0.29*
	(8.19)	(6.93)	(1.64)	(1.95)
MTBA	-0.93***	-0.80***	-0.45***	-0.42***
	(-6.51)	(-5.38)	(-2.96)	(-2.76)
R&D	11.50***	12.33***	7.45**	7.11*
	(3.40)	(3.59)	(2.20)	(1.83)
lnSTDRET	-9.47***	-9.17**	-0.51	3.29
	(-2.72)	(-2.52)	(-0.15)	(0.86)
SEGMENTS_HH	0.26	-0.13	-0.36	-0.49
	(0.45)	(-0.22)	(-0.61)	(-0.81)
PIFO	-0.40	-0.51	-0.29	0.01
	(-1.14)	(-1.46)	(-0.83)	(0.04)
M&A	-0.80***	-0.83***	-0.28	-0.27
	(-3.52)	(-3.74)	(-1.29)	(-1.26)
CEO Characteristics				
lnTENURE		-0.34	-0.36*	-0.40*
		(-1.62)	(-1.77)	(-1.95)
RETIRE		-1.03	-1.25**	-1.16*
		(-1.62)	(-2.07)	(-1.92)
FOUNDER		-1.33**	-0.61	-0.66
		(-2.27)	(-0.96)	(-1.04)
OWNSHIP		-0.17***	-0.12***	-0.11***
		(-4.56)	(-3.21)	(-2.97)
CHAIR		0.96***	0.94***	0.94***
		(3.20)	(3.05)	(2.99)
Outside Factors				
CONSULT			0.70***	0.73***
			(2.61)	(2.71)
IND_SIZE_COMPL			0.76***	0.71***
			(16.10)	(14.43)
Top5_INST_OWN			-0.97	-1.21
			(-0.67)	(-0.84)
GUIDELINES_ISS			0.03*	0.06***
			(1.86)	(2.73)
Constant	5.37***	7.30***	1.25	-0.79
	(4.13)	(5.32)	(0.77)	(-0.46)
Observations	7,641	7,185	5,853	5,853
Adjusted R-squared	0.0701	0.0956	0.2198	0.2228
Industry FE	No	No	No	Yes
Year FE	No	No	No	Yes

Table 5
Regression of compensation complexity on firm characteristics, CEO characteristics, and external factors

This table provides results of OLS regressions of components of compensation complexity on proxies on firm characteristics, CEO characteristics, and external factors. Independent variables are defined in Section 3.2.2. 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.

VARIABLES	(1) Number of pay components	(2) Number of measures	(3) Number of time periods	(4) Absolute and relative conditions
Firm Characteristics				
lnMV	0.01	0.24***	0.01	0.04***
	(0.53)	(2.71)	(0.18)	(3.89)
MTBA	-0.00	-0.31***	-0.17***	-0.07***
	(-0.08)	(-3.45)	(-3.91)	(-7.02)
R&D	-0.40	2.24	2.59**	0.32
	(-1.15)	(1.33)	(2.15)	(1.45)
lnSTDRET	0.43	-2.41	-0.11	-0.58**
	(0.90)	(-1.20)	(-0.08)	(-2.31)
SEGMENTS_HH	0.10	-0.42	0.15	0.06
	(1.33)	(-1.27)	(0.78)	(1.34)
PIFO	0.16***	-0.58***	-0.08	-0.11***
	(3.44)	(-2.68)	(-0.77)	(-4.10)
M&A	0.05*	-0.39***	-0.05	-0.08***
	(1.73)	(-2.92)	(-0.69)	(-4.99)
CEO Characteristics				
lnTENURE	-0.08***	-0.14	-0.07	-0.01
	(-3.22)	(-1.17)	(-0.81)	(-0.52)
RETIRE	-0.14*	-0.66*	-0.32*	-0.14***
	(-1.96)	(-1.87)	(-1.93)	(-3.53)
FOUNDER	-0.27***	-0.34	-0.16	-0.06
	(-3.96)	(-0.95)	(-0.82)	(-1.60)
OWNSHIP	-0.01	-0.05**	-0.03***	-0.01***
	(-1.57)	(-2.44)	(-3.10)	(-2.80)
CHAIR	0.20***	0.62***	0.09	0.08***
	(5.14)	(3.47)	(0.77)	(3.36)
Outside Factors				
CONSULT	0.13***	0.22	0.26**	0.05**
	(3.74)	(1.51)	(2.28)	(2.46)
IND_SIZE_COMPL	0.14***	1.01***	0.45***	0.09***
	(8.27)	(11.88)	(10.86)	(9.56)
Top5_INST_OWN	-0.18	-0.44	-1.26***	-0.03
	(-0.94)	(-0.49)	(-2.83)	(-0.28)
GUIDELINES_ISS	-0.01***	0.01	0.03***	0.01***
	(-3.93)	(1.36)	(5.25)	(5.94)
Constant	1.77***	-1.13	0.15	-0.50***
	(8.54)	(-1.12)	(0.27)	(-4.12)
Observations	5,853	5,853	5,853	5,853
Adjusted R-squared	0.1179	0.1533	0.1056	0.1839

Table 6
Regression of changes in compensation complexity on changes in firm characteristics, CEO characteristics, and external factors

This table provides results of OLS regressions of changes in compensation complexity on changes in firm characteristics, change in CEO characteristic share ownership percentage (the remaining CEO characteristics are dropped from the analysis when reported in changes), changes in external factors, and the variables NEW_CEO, POOR_PERF, ΔPROPOSAL, and PASSRATE_DECR. Dependent variables are defined in Section 3.2.1; independent variables are defined in Section 3.2.2. 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.

VARIABLES	ΔCOMPLEXITY
NEW_CEO	0.70**
	(2.10)
POOR_PERF	0.34**
	(2.10)
ΔPROPOSAL	0.07
	(0.21)
PASSRATE_DECR	0.17
	(0.94)
ΔlnMV	-0.15
	(-0.70)
ΔMTBA	-0.26
	(-1.53)
ΔR&D	-1.59
	(-0.27)
ΔlnSTDRET	-5.33*
	(-1.72)
ΔSEGMENTS_HH	1.43
	(1.54)
ΔPIFO	0.21
	(0.53)
ΔM&A	-0.05
	(-0.39)
ΔOWNSHIP	-0.05
	(-0.80)
ΔCONSULT	-0.10
	(-0.45)
ΔIND_SIZE_COMPL	0.38***
	(7.31)
ΔTop5_INST_OWN	-1.39
	(-1.09)
ΔGUIDELINES_ISS	0.01
	(0.94)
Constant	0.08
	(0.66)
Observations	4,282
Adjusted R-squared	0.0450

Table 7
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. We leave 2011 out to have balanced sub-periods. Compensation complexity is defined in Section 3.2.1; independent variables are defined in Section 3.2.2. 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.

VARIABLES	2006 - 2010	2012 - 2016	Difference (*p*-value)
Firm Characteristics			
lnMV	0.15	0.50***	**0.09**
	(0.79)	(2.70)	
MTBA	-0.08	-0.90***	**0.00**
	(-0.38)	(-5.30)	
R&D	0.77	10.43*	**0.10**
	(0.16)	(1.86)	
lnSTDRET	2.00	3.68	0.80
	(0.40)	(0.59)	
SEGMTS_HH	0.09	-1.34*	**0.09**
	(0.12)	(-1.89)	
PIFO	0.14	-0.14	0.65
	(0.30)	(-0.26)	
M&A	-0.59*	-0.12	0.23
	(-1.80)	(-0.45)	
CEO Characteristics			
lnTENURE	-0.56*	-0.14	0.23
	(-1.82)	(-0.59)	
RETIRE	-1.36	-0.93	0.69
	(-1.55)	(-1.26)	
FOUNDER	-1.34*	-0.14	0.12
	(-1.94)	(-0.17)	
OWNSHIP	-0.07*	-0.18***	**0.10**
	(-1.92)	(-2.82)	
CHAIR	1.22***	0.77**	0.28
	(3.12)	(2.14)	
Outside Factors			
CONSULT	0.51	1.07***	0.25
	(1.31)	(3.13)	
IND_SIZE_COMPLEXITY	0.73***	0.66***	0.53
	(9.91)	(9.20)	
INST_OWN	0.60	-2.97	0.14
	(0.30)	(-1.63)	
GUIDELINES_ISS	0.02	0.03	0.93
	(0.29)	(0.23)	
Industry FE	Yes	Yes	
Year FE	Yes	Yes	
Observations	2,335	2,910	
Adj. R-squared	0.1647	0.2265	

Table 8

The impact of changes in compensation complexity on excess pay and future performance.

This table provides results of OLS regressions of change in excess pay and future performance on change in contract complexity. All regressions include the change in the economic determinants of complexity (firm and CEO characteristics) from Column 2 of Table 4, and industry and year fixed effects. Following Core, Guay, and Larcker (2008) (CGL), 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. Columns 1 and 2 include the economic determinants of compensation from CGL as additional controls. *ΔROA* is the change in operating income before depreciation (Compustat item OIBDP) scaled by total assets in year *t*. *RET* is the annual stock return including dividends. Change in operating cash flows is measured as change in operating cash flows from year *t* to *t*+1 scaled by total assets in year *t*. Sales growth is measured as the change in sales from year *t* to *t*+1 scaled by sales in year *t*. Compensation complexity is defined in Section 3.2.1. We exclude firm-year observations with new incoming CEOs.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)	(9)	(10)
VARIABLES	ΔExcess Pay_t		ΔROA_{t+1}		RET_{t+1}		ΔOCF_{t+1}		$\Delta SalesGrowth_{t+1}$	
$\Delta COMPLEXITY_t$	0.02***		-0.00		-0.00		-0.00*		-0.00	
	(8.48)		(-1.29)		(-0.48)		(-1.95)		(-0.07)	
$\Delta COMPLEXITY\_POSTV_t$		0.02***		-0.00		-0.00		-0.00		0.00
		(6.49)		(-0.27)		(-0.92)		(-1.64)		(0.52)
$\Delta COMPLEXIT\ \_NEGTV_t$		0.02***		-0.00		0.00		-0.00		-0.00
		(6.66)		(-1.47)		(0.36)		(-0.85)		(-0.63)
ΔROA_t			-0.15***	-0.15***						
			(-5.59)	(-5.57)						
$LogSales_t$			-0.00	-0.00						
			(-0.62)	(-0.67)						
$LogSTDROA_t$			0.11**	0.11**						
			(2.18)	(2.15)						
$LnMV_t$					-0.03***	-0.03***				
					(-5.80)	(-5.74)				
$LogSTDRET_t$					0.03	0.03				
					(0.17)	(0.22)				
BTM_t					0.06***	0.06***				
					(2.68)	(2.72)				
ΔOCF_t							-0.23***	-0.23***		
							(-11.98)	(-11.98)		
$\Delta SalesGrowth_t$									0.12***	0.12***
									(3.74)	(3.77)
Constant	0.03	0.04	-0.01	-0.01	0.35***	0.34***	-0.01**	-0.01**	0.06***	0.06***
	(1.11)	(1.26)	(-1.38)	(-1.41)	(5.54)	(5.54)	(-2.19)	(-2.08)	(2.79)	(2.70)
First stage variables from CGL	Yes	Yes	No	No	No	No	No	No	No	No
ΔEcon. Determinants of Complexity (Col. 2 in Table 4)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5,346	5,346	4,534	4,534	5,191	5,191	4,846	4,846	4,540	4,540
Adjusted R-squared	0.0451	0.0451	0.0855	0.0855	0.3151	0.3150	0.0745	0.0743	0.1673	0.1672

Table 9

The impact of changes in compensation complexity on earnings management.

This table provides OLS regression results of earnings management on change in contract complexity. We estimate discretionary accruals following Dechow et al. (2003) and measure earnings management as the abnormal value of discretionary accruals. Discretionary accruals are the residuals from estimating the following model by industry-year: $Total\ Accruals_{it} = \alpha + \beta_1 ((1+\kappa)\Delta Sales_{it} - \Delta REC_{it}) + \beta_2 PPE_{it} + \beta_3 LagTA_{it} + \beta_4 GR\_Sales_{it} + \varepsilon_{it}$. The model estimated includes the first stage determinants of total accruals [$((1+\kappa)\Delta Sales_{it} - \Delta REC_{it})$, *PPE, LagTA* and *GR_Sales*] as controls. We regress the abnormal value of discretionary accruals on change in complexity in Columns 1 and 2. In Colums 3 and 4, we decompose the Δ*COMPLEXITY* into complexity increases (Δ*COMPLEXITY_POSTV*) and complexity decreases (Δ*COMPLEXITY_NEGTV*). All regressions include the change in the economic determinants of complexity (firm and CEO characteristics) from Column 2 of Table 4, and industry and year fixed effects. Compensation complexity is defined in Section 3.2.1. We exclude firm-year observations with new incoming CEOs. 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		Abs_DiscAccruals		
ΔCOMPLEXITY	-0.00*	-0.00*		
	(-1.94)	(-1.76)		
ΔCOMPLEXITY _POSTV			0.00	0.00
			(0.75)	(0.99)
ΔCOMPLEXITY _NEGTV			-0.00***	-0.00***
			(-3.04)	(-2.94)
lnMV		-0.01***		-0.01***
		(-7.71)		(-7.78)
BTM		0.00		0.00
		(0.59)		(0.44)
ROA		0.05		0.05
		(1.35)		(1.38)
LEVERAGE		0.01		0.01
		(1.55)		(1.39)
OCF_TA		-0.14***		-0.14***
		(-3.40)		(-3.42)
Constant	0.06***	0.12***	0.06***	0.12***
	(10.86)	(11.62)	(10.46)	(11.65)
First stage variables from Dechow et al. (2003)	Yes	Yes	Yes	Yes
Δ Economic Determinants of Complexity (Col. 2 in Table 4)	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	6,301	5,642	6,301	5,642
Adjusted R-squared	0.13	0.14	0.13	0.14