Complexity of CEO Compensation Packages

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Abstract

This paper examines complexity in CEO compensation contracts. We develop a measure of compensation complexity and provide empirical evidence that complexity has increased substantially over time. We document that complexity results not only from factors reflecting efficient contracting, but also from external pressures from compensation consultants, institutional investors, proxy advisors, and attempts to benchmark to peers, with these external factors having greater impact in more recent years. Examining consequences of contract complexity, we find an association with lower future firm performance that is related to the influence of external factors on compensation design. We further find this relation is partially mitigated when a contract's performance metrics are more highly correlated, consistent with information processing costs hampering decision-making. Collectively, these findings confirm concerns raised by investors and the media regarding compensation complexity and can inform boards in their design of CEO pay packages.

Keywords: compensation, contracts, complexity, incentives, information processing costs

JEL Classifications: J33, M52

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1. Introduction

Executive compensation contracts reflect many considerations—among them motivating performance, inducing risk taking, and attracting and retaining executives. A byproduct of a board's attempts to balance these individual features can be complexity in the resulting contract. The financial press, whose role in monitoring and influencing executive compensation is well-documented (Core et al., 2008), as well as investors and academics, have expressed concerns that contracts for chief executive officers (CEO) have become too dense and detailed. For example, *The Financial Times* highlighted the complexity as "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" (Skapinker, 2015). Likewise, *The Wall Street Journal* stated: "The fad for stock awards with complex performance triggers has gone too far" (Wilmot, 2017). In his 2016 Nobel Prize address, Bengt Holmstrom argued that pay plans should be simplified (Kerber, 2016). In response to investors' concerns about contract complexity, some companies purposefully simplified contracts.[1] However, there is limited evidence of the extent to which the complexity of executive compensation contracts has increased, what factors are associated with this increase, and the implications for firms and their shareholders. We examine these issues.

In writing an efficient compensation contract, boards incentivize the CEO (the agent) to act in the best interests of the shareholder (the principal) and ensure that the CEO's pay meets her reservation wage. As a result, contracts may be more (or less) complex inasmuch as they try to address compatibility issues that arise from agency conflicts and the participation contraint.

[1] In responding to investors' calls for simpler metrics, Credit Suisse replaced the 28 performance metrics used to evaluate its top executives with a few measures tied to the bank's group-wide performance (Noonan, 2018). Unilever similarly redesigned its executive pay, citing simplicity as one of its lodestars. Unilever's 2019 remuneration policy for its CEO refers to simplicity as a guiding principle. See https://www.unilever.com/Images/updated-statement-on-unilevers-remuneration-policy_tcm244-530551_en.pdf

Efficient compensation contracts may also reflect the extent of organizational and operational complexity (e.g., Smith and Watts, 1992; Gaver and Gaver, 1993; Black et al., 2014) and CEO and governance characteristics (e.g., Hermalin and Weisbach, 1998; Core and Guay, 1999) and may allow for varying degrees of renegotiation. But, even in striving to write an efficient contract, boards may end up writing a complex one. Moreover, the presence of various institutions in the contracting process, such as compensation consultants, institutional investors, proxy advisors, and peer firms, can lead to additional complexity in compensation contracts for reasons that may not stem from a desire to write more efficient contracts. Survey evidence suggests that board members, in an effort to avoid controversies, include features in compensation contracts that may be suboptimal and that investors tolerate these decisions (Edmans et al., 2023).

In summary, potentially optimal individual decisions by a board can result in compensation contracts that, *in totality*, become too complex, and this complexity can be compounded by the inclusion of features to appease external party preferences (e.g., proxy advisors). This complexity can undermine CEO performance for two main reasons. First, for a rational and cognitively unconstrained CEO, complexity can result in contracts that are less efficient. The multiple objectives in a contract may conflict with each other (Holmstrom and Milgrom, 1991) and lead to suboptimal decision-making, as managers overemphasize easier-to-achieve measures and shy from harder ones. Or if external parties with idiosyncratic interests influence the compensation-setting process, they might introduce self-serving provisions into the contract that are not optimal to the firm. For instance, an investor may advocate for the inclusion of a performance metric unique to its own interests, but one that, if achieved, undermines performance. Second, if the CEO is cognitively constrained, then trying to optimize across multiple contract features may further hamper decision making. Limited attention theories in behavioral economics suggest that performance may suffer if too many competing cues distract a manager from attending to useful information (e.g., Kruschke and Johansen, 1999; Gigerenzer and Goldstein, 1996; DellaVigna, 2009). And rational inattention models show that individuals have limited capacity for processing information (e.g., Sims, 2003; Veldkamp, 2011). Blankespoor et al. (2020) likewise underscore the increased information processing costs that can arise from combining too many signals in decision-making. Collectively, these studies suggest a potential downside of higher complexity: it may impede efficient CEO decision-making and thus inhibit firm performance.[2]

The ability to study the existence and implications of compensation complexity has been hampered by a lack of usable measures. We develop empirical measures of compensation contract complexity based on details of compensation contracts from proxy statements. We define a contract as more complex when it contains more factors for the manager to consider. We incorporate four dimensions of contracts: (i) types of compensation (e.g., cash or equity); (ii) the number of performance metrics; (iii) the number of performance-measurement periods; and (iv) and the reference points for the measures (absolute and relative). We aggregate these features and define a contract as more (less) complex when it contains more (fewer) of these features.

Using a sample of firms from Incentive Lab from 2006–2019 and our measures of complexity, we document that the complexity of compensation contracts has increased substantially. Notably, our measures of complexity double over our sample period. This increase reflects more performance measures, more performance-measurement periods, and increased use of relative performance conditions. We further document (1) that complexity resides in the components of pay that are more heavily weighted in CEO compensation, and (2) a shift in weighting over time towards more complex types of compensation, suggesting a heightened

[2] We consider the complexity of compensation from the perspective of the manager. We acknowledge that contracts may be hard for investors to understand, which may have consequences for them, but that is not our focus.

economic exposure of CEOs to complexity. Ours is the first study to document empirically an increase in the complexity of compensation contracts in recent years.

In an attempt to understand the observed increase in complexity, we first develop a model of factors that explain complexity in the cross-section. Then, we use that model to examine factors contributing to the increase in complexity over our sample period. Cross-sectionally, we find that compensation complexity reflects boards' attempts to design efficient contracts, as it is related in predictable ways to firm, CEO, and governance characteristics that proxy for organization and operational complexity, and needs to address principal-agent conflicts. New to the literature, we find that compensation is more complex in firms that have less discretion in their contracts, consistent with attempts to specify more contingencies to limit renegotiations. Of particular interest, though, we find that complexity increases with the influence of certain external institutions; that is, it relates to the complexity of peer firms' contracts as well as a firm's use of compensation consultants, suggesting that contract provisions spill across the labor market, and is associated with institutional investors and with increased frequency of compensation-related terms in Institutional Shareholder Services (ISS) guidelines. Though not causal, this latter result may reflect attempts to secure ISS approval; this appears consistent with survey evidence of Edmans et al. (2023) suggesting that compensation design reflects boards' attempts to avoid controversy from proxy advisors, among others. Indeed, the addition of external factors into our model of compensation complexity increases the adjusted R^2 by over 50%. These latter results suggest that complexity in compensation is at least partially driven by factors beyond efficient contracting.

When examining the factors contributing to the increase in complexity over our sample period, we follow the methodology of Juhn et al. (1993) and find that both shifts in the observable characteristics (firm, CEO, governance, and renegotiation characteristics, along with external factors) and their corresponding weights in explaining complexity have played a role. In addition, our analysis to understand *which* factors have become economically more prominent in explaining complexity reveals that although the increase in complexity is partially associated with efficient contracting, external factors have gained prominence in explaining complexity in the most recent past compared to earlier periods.

These effects raise questions regarding the potential implications of the increase in complexity. Accordingly, we examine the association of complexity with future performance (measured using both accounting and stock returns) and find a negative relation. We find that this negative association lessens in firms with high correlations among their performance metrics, consistent with CEOs being less distracted when performance metrics all point the same way, as their actions to improve on one performance measure likely improve others. Although not causal, our evidence points to the potential inefficiencies stemming from overly complex contracts and highlights unintended consequences that can result.

We view our contributions as follows. First, we are the first paper to develop an empirical measure of compensation complexity. Second, we empirically document that CEO compensation complexity has increased over time, and shed light on the drivers of that increase. Third, we show the potential harms of overly complex contracts. Murphy and Sandino (2020) examine the association between the level of CEO pay and the use of compensation consultants, acknowledging that the pay premium associated with consultants may be driven by their layering on different forms of pay or different performance measures (their constructs for complexity). Kole (1997) studies whether the form of pay and vesting periods relate to firm characteristics using a sample of 371 firms in 1980. We extend these studies by empirically developing a measure of compensation complexity (versus examining a subset of compensation characteristics individually), documenting and exploring the reasons for its increase over time, and examining the implications of that complexity for firm performance. Critically, our study suggests that compensation contracts that include features that may be optimal individually can become suboptimal overall when many features are aggregated. Our study points to external institutional factors as a key driver of this unnecessary complexity. Finally, we provide a way to estimate compensation contract complexity, which can be applied in future research as academics explore compensation complexity more extensively. Our work also informs board members and compensation committees concerning the trade-offs between writing a complex contract and the potential inefficiencies of doing so.

Despite what we view as important contributions to the literature, we acknowledge endogeneity concerns, an issue common in compensation studies. Compensation contracts are the result of boards' decision-making so we caution against interpreting our evidence as causal. That said, we see our work as increasing our understanding of compensation complexity and opening avenues for future research.

2. Complexity of compensation contracts

2.1 Sample and data

Our sample includes all firms on the Incentive Lab database in 2006–2019 with data to compute the determinants of compensation contract complexity (1,307 unique firms, 9,679 firm-years). We obtain data for our study from Compustat, CRSP, ExecuComp, ISS Incentive Lab, ISS Directors, ISS Voting Analytics, SDC Platinum, Thomson Reuters Institutional (13f) holdings data, and annual ISS publications.

2.2 Measuring compensation contract complexity

Compensation contracts contain many attributes. Firms can compensate executives with salary, cash bonuses, and equity. Even within equity, firms have choices about the type to offer (e.g., stock or stock options). To assess managerial effort, firms use financial performance measures, such as accounting and stock returns (Lambert and Larcker, 1987; Sloan, 1993; Murphy, 2000; Bettis et al., 2018). Firms also frequently use nonfinancial performance measures when financial measures are noisy indicators of CEO effort and when they need to link performance measures to their strategy (Salter, 1973; Govindarajan and Gupta, 1985; Simon, 1987; Ittner and Larcker, 2002). The use of multiple measures is common, as the Informativeness Principle suggests firms should incorporate any measure that provides incremental information about managerial effort (Holmstrom, 1979; Banker and Datar, 1989; Feltham and Xie, 1994). To increase the informativeness of a measure, firms also include relative performance conditions to help insulate managers from factors beyond their control, thus better capturing managerial effort (Holmstrom, 1982; Holmstrom and Milgrom, 1987). And, because determining the appropriate benchmark to use in assessing relative performance can be difficult (Albuquerque, 2014), firms may opt for both absolute and relative performance conditions. Finally, firms may incorporate contract features that focus managerial attention on a longer time horizon to discourage managerial myopia (Dechow and Sloan, 1991; Jenter and Lewellen, 2015; Gopalan et al., 2014), which can be achieved through equity grants with longer term vesting provisions or performance metrics measured over multiple time horizons. Our proxy for compensation complexity considers the span of these attributes.

We use data from Incentive Lab to develop two measures of compensation complexity (see Appendix A Part 1 for details) that parsimoniously aggregate the many features of compensation contracts. We focus on four dimensions: form of pay, the use of both absolute and relative performance conditions, the number of performance measures, and the number of time horizons over which performance is measured.

Our first dimension captures the type of pay. Using four types of performance-based compensation (short- and long-term cash bonus, stock, and stock options), we count the number of types of pay. The second dimension is the use of absolute or relative performance measures or both. Within each type of pay, 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 completion of a merger), or a relative performance condition (e.g., ROA measured relative to the 75% of a peer's ROA).

The third dimension is the number of performance measures included in the contract. Within each of the two performance conditions (absolute and relative) and within each type of pay (short-term and long-term cash bonus, stock, and stock options), we assign a point for each unique (qualitative or quantitative) performance measure used. Our final dimension captures time periods. For each performance measure, we assign a point for each unique time period over which performance is measured (e.g., three points for RET measured over three years).

We construct two measures of complexity. First, *RAW_COMPL* is the sum of the all the points assigned within each of the four dimensions.[3] In Appendix A Part 2, we provide an example of this computation using excerpts from ConocoPhilips's fiscal year 2010 proxy statement. As the concept of compensation complexity is new, and the simultaneous aggregation of multiple features into an overall measure has not been considered before, we attempt to validate our measure using the receipt of SEC comment letters related to executive compensation issues in the proxy statement. We provide the details of our validation in Appendix A Part 3.

We derive our second measure of complexity (*WTD_COMPL*) by weighting the complexity score for each compensation component by the proportion of total pay that component represents. In computing weights, we use the target value of payouts for cash compensation and

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[3] This approach to construct a measure that is a linear aggregation of individual indicators for the presence of a characteristic resembles what others have done, for example, to capture the extent of voluntary disclosure (Botosan, 1997; Francis et al., 2008) or shareholder rights (Gompers et al., 2003).

the fair value of the grant for equity grants. Contracts may have high overall complexity scores but may not expose CEOs to complexity in a material way because different components of pay, with different scores, represent different proportions of compensation. For example, a contract can be complex based on the measure *RAW_COMPL*, but the high score can reside in a component that represents a small proportion of overall pay. That is, the level of complexity may not translate into economically material complexity that would impact CEO decision-making. This weighted complexity allows for the possibility that the CEO discounts complexity that derives from pay components that represent a small portion of her pay. Accordingly, we use *WTD_COMPL* as our primary measure of compensation complexity but also report results related to *RAW_COMPL*. Using *RAW_COMPL* can account, for example, for the possibility that the CEO might weight more heavily those pay components that are more easily achieved, despite being a smaller percentage of total pay.

Table 1 Panel A presents descriptive statistics related to our complexity measures as well as the inputs to the calculation of those measures. The mean (median) value of *RAW_COMPL* is 11.36 (11.00), with a standard deviation of 5.76. Its value at the first and 99th percentile is 0 and 29, respectively. In examining the inputs to the calculation of complexity, the mean (median) number of components of pay is 2.38 (2.00). The mean (median) number of performance measures is 5.18 (5.00). The mean (median) number of periods is 3.03 (3.00). And the proportion with both absolute and relative performance conditions is 41.7%. The mean (median) value of *WTD_COMPL* is 4.81 (4.34).[4] Note that both the complexity scores and the proportion of pay from short-term bonuses and stock awards are considerably higher than those for long-term bonuses and

[4] For *WTD_COMPL*, there are 686 observations with missing fair value for at least one grant. For these observations, we use the industry average weight to calculate *WTD_COMPL*.

stock options.[5] These statistics suggest that pay is skewed toward more complex types of pay, as it is the most complex components that comprise the largest proportion of CEO pay. Thus, *WTD_COMPL* of 4.81 is higher than a score of 2.83 (untabulated) that would result from an equal weighting of the complexity scores by pay type. Finally, the Pearson correlation coefficient between *WTD_COMPL* and *RAW_COMPL* is 0.79 (reported in Table 3).

Table 1 Panel B presents the mean values of both *WTD_COMPL* and *RAW_COMPL* by industry, and Panel C presents the mean values of the inputs to the calculation of these complexity measures by industry. Compensation complexity is highest in the utilities industry (Panel B), driven primarily by substantially more performance measures and periods and a reliance on both absolute and relative performance conditions (Panel C). The consumer discretionary industry has the lowest value of complexity (Panel B), driven primarily by fewer performance measures and less reliance on both absolute and relative performance conditions (Panel C).

2.3 Complexity of compensation over time

Figure 1 graphically presents our complexity measures by year over the sample period. Panel A (Panel B) presents the mean and one standard deviation from the mean values for *WTD_COMPL* (*RAW_COMPL*). The complexity of compensation packages increases steadily over the sample period. As an example, the mean score of *WTD_COMPL* increases from 2.98 in 2006 to 6.10 in 2019. To assess whether the increase in Figure 1 is statistically significant, we compare complexity over the period of 2006 to 2012 to its value over the 2013 to 2019 period. The mean values increase significantly for both measures from the earlier to the later period ($p < 0.01$) (untabulated). This trend is consistent with the popular perception that compensation contracts have become more complex.

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[5] Long-term bonuses are infrequently used by our sample firms (only 8.0% of our sample observations). For those observations, the mean (median) score is 4.79 (4.00), and the mean (median) weight is 0.22 (0.22).

Figure 2 shows trends in the inputs to the calculation of our complexity measure over the sample period. The number of types of pay is stable over the sample period, but the number of performance measures and periods as well as the proportion of observations with both absolute and relative conditions increases dramatically. This trend is consistent with research documenting an increased use of RPE and nonfinancial performance metrics in executive compensation (e.g., Bettis et al., 2014).

Figure 3 Panel A suggests that, over the sample period, the complexity scores for short-term bonuses and stock increase and that those for long-term bonuses and stock options decrease. Figure 3 Panel B shows that the weight placed on stock (a more complex component of pay) increases significantly over the sample period from 32% to 62%. Figure 3 Panel C shows that the proportion of firms offering more complex types of compensation (short-term bonuses and stock, according to statistics in Table 1) increases, while the proportion of firms offering less complex types of compensation (long-term bonuses and stock options) decreases.

Collectively, these data suggest that increased complexity is driven by firms incorporating more performance measures, more periods, and both absolute and relative performance conditions in later years, as well as a shift in proportions of incentive pay (weights) away from less complex forms of compensation (e.g., stock options and long-term bonuses) toward more complex stock awards and short-term bonuses (Guay et al., 2019).

3. Why are compensation contracts complex?

To understand the complexity of compensation, we first study factors that are associated with a firm's compensation complexity. We then use the insights gained in this section to understand why complexity has changed, in Section 4.

3.1 Factors contributing to compensation complexity

In the principal-agent problem, an agent's actions are unobservable, and her objective is not the same as that of the principal. One solution to this conflict of interest is for the principal to offer a compensation contract that ties the agent's payoff to observable measures of performance (Holmstrom 1979). In pursuit of this goal, firms may end up offering contracts that, depending on the characteristics of the contracting environment (firm, CEO and board characteristics), are complex. In addition, a firm's desire to appease institutional investors and proxy advisors, and imitate peers' practices can lead it to offer more complex (but less efficient) contracts.

Examining either the *level* or *type* of compensation, prior findings identify several characteristics that influence pay.[6] Less well understood, however, is the impact of the aggregation of these individual factors on the *complexity* of the compensation contract in total, as well as the impact of external forces such as consultants, proxy advisors, shareholders, and the practices of peers.

3.1.1 Efficient contracting

We consider firm, CEO, and governance characteristics that research suggests help determine levels and types of compensation, as well as the extent of discretion or renegotiation in the contract, which has been less studied. We conjecture that these characteristics may also contribute to increased complexity of the *overall* contract.

Firm characteristics – organizational and operational complexity. We include firm size, measured as the natural log of the market value of equity (*lnMV*), as larger firms may be more complex and harder to manage (Smith and Watts, 1992; Gaver and Gaver, 1993; Himmelberg et

[6] Contract complexity (the *totality* of the features of contracts defined in Section 2.2) differs from the level of pay. Our complexity measure captures features of the compensation contract ex ante, whereas CEO pay level (captured by data item *TDC1* in Execucomp) is an ex post measure that can understate the complexity of contracts, as it captures pay for actual performance only. For example, if the CEO is awarded stock or a bonus if certain performance thresholds are met and those are not achieved, total pay would not capture those features, whereas our complexity measure would, regardless of whether target performance metrics are achieved. Maybe not surprisingly, the correlations between total compensation and our complexity measures, *WTD_COMPL* and *RAW_COMPL*, are only 0.22 and 0.32, respectively, suggesting that complexity is a very different construct.

al., 1999) and more decentralized (Christie et al., 2003). We include operational complexity, measured as the proportion of revenues accounted for by each of the firm's segments (*SEGMTS_HH*), whether the firm has foreign operations (*PIFO*), and whether it has recent mergers or acquisitions (*M&A*). We include growth opportunities, measured 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*), as monitoring is harder because outsiders cannot easily observe the firm's investment opportunities (Smith and Watts, 1992). Research shows that nonfinancial performance measures are used to determine executive incentive pay when growth opportunities are larger, when innovation matters more, and when financial measures are noisier (e.g., Bushman et al., 1996; Ittner et al., 1997). We include the ratio of research and development expenses to the book value of assets (*R&D*); R&D intensive firms with longer investment horizons may link the performance measurement periods in contracts with the expected realization of project payoffs (Kole, 1997; Gopalan et al., 2014) by including more periods in those contracts. We include the volatility of operations, measured as the natural log of the standard deviation of monthly stock returns (*lnSTDRET*), as fluctuation in performance measures inhibits the monitoring of CEOs' actions (Demsetz and Lehn, 1985) and exposes CEOs to more performance shocks. To alleviate the monitoring risk imposed on a CEO due to noisier performance measures, firms in more volatile businesses may include more metrics or may add relative, in addition to absolute, performance conditions.

CEO and governance characteristics – addressing principal-agent conflicts. We include several CEO characteristics and governance characteristics, as addressing principal-agent conflicts may result in more complexity. Specifically, we include CEO tenure (*lnTENURE*), as long serving CEOs may be less subject to uncertainty about ability (Hermalin and Weisbach, 1998; Dikolli et al., 2014), resulting in less need for incentive pay. We include an indicator for whether the CEO is the company founder (*FOUNDER*), as founders have lower principal-agent conflicts due to their large undiversified equity positions and longer investment horizons (Anderson and Reeb, 2003; Brochet et al., 2015). We include proximity to retirement (*RETIRE*), as CEOs closer to retirement receive higher incentive pay to substitute for declining incentive alignment (Gibbons and Murphy, 1992). We include CEO ownership (*OWNSHIP*), as higher ownership may indicate better alignment between CEO and shareholder interests, reducing the need for multiple incentives. As governance characteristics, we include an indicator variable equal to one if the CEO also chairs the board (*CHAIR*), the percentage of independent directors (*IND_DIRECTOR*), the percentage of outside directors who hold three or more directorships (*BUSYNESS*), the percentage of board members appointed by the CEO (*COOPTED*), and the log dollar amount of perquisite income received by the CEO (*lnCEO_PERKS*).

Renegotiation. To capture whether the contract allows for renegotiation, we use instances of language in the CD&A indicating discretion, under the assumption that discretion at the end of the fiscal year is a form of renegotiation (*RENEG*). At one extreme, incomplete contract theory suggests that the more complex the environment, the more costly it is to write a contract; in this case, contracts should be simple but should include the possibility of renegotiation (e.g., Williamson, 1975; Segal, 1999). However, compensation contracts that allow for renegotiation weaken managerial incentives (Fudenberg and Tirole, 1990; Williamson, 1975).[7] At the other end of the spectrum, complete contracts incorporate all possible contingencies and foreclose the possibility of renegotiation. However, Grossman and Hart (1986) argue that, in practice, contracts will be incomplete because parties cannot foresee all possible contingencies. Armstrong et al. (2010) build on that argument and highlight that the CEO's relationship with the firm is highly

[7] Renegotiating compensation contracts may be undesirable for several reasons. First, changes to equity plans require shareholder approval. Second, renegotiations may be viewed unfavorably by proxy advisors (e.g., ISS recommends against repricings that aren't subject to shareholder vote) or shareholders. Ferri and Maber (2013) find that low pass Say-on-Pay votes in the U.K. are associated with the reduction or elimination of retesting provisions in performance vesting equity grants. Third, until 2018, Section 162(m) encouraged the use of performance measures and allowed negative but not positive discretion, an asymmetry imposed by the tax code that created friction for renegotiation.

complex, precluding the writing of a contract that considers all contingencies. If contracts allow for the possibility of renegotiation, we expect they will be simpler.

3.1.2 External factors

External pressure may induce firms to incorporate more factors into compensation contracts than is optimal, resulting in greater complexity. A growing literature offers evidence regarding the impact of consultants on the level of CEO pay (Cadman et al., 2010; Armstrong et al., 2012; Chu et al., 2018; Murphy and Sandino, 2010, 2020). These studies, however, do not examine their impact on the complexity of compensation. More recently, survey results in Edmans et al. (2023) suggest impacts from other external pressures. The authors find that more than 65% of directors are willing to sacrifice firm value that may result from compensation design to avoid controversies from investors, employees and proxy advisors. Over 70% of directors indicated that proxy advisors influenced pay more than they should and admitted offering what they considered an inferior pay structure for CEOs, which included using more performance conditions than they thought appropriate. Almost half of directors indicated they felt pressure to match peers' practices, an observation consistent with work on pay benchmarking (e.g., Cadman et al., 2021; Murphy and Zabojnik, 2007). Collectively, these results suggest that external pressures influence the design of CEO compensation and raise questions about their impacts on contract complexity.

We consider four sources of external pressure. First, we consider the number of compensation consultants providing services to the firm (*CONSULT*). Firms with greater operational complexity that require more complex contracts may be more likely to hire consultants, or consultants may design complex contracts to help justify the need for their services. Second, we expect that peers' compensation complexity will impact the firm's compensation complexity through benchmarking. Our proxy is the median value of compensation complexity for firms in the same industry and of similar size (Albuquerque, 2009), excluding the sample firm

(*IND_SIZE_COMPL*). Third, we consider institutional ownership. Firms may include more provisions in contracts to placate large investors and receive affirmative Say-on-Pay votes. Our proxy is the percentage of shares outstanding held by the top five institutional investors (*TOP5_INST_OWN*). Finally, we consider the role of proxy advisors. Specifically, we expect that greater coverage of compensation details in ISS's annual proxy voting guidelines may be reflected in contract complexity. Firms may include multiple features seeking to avoid an ISS "against" recommendation on their Say-on-Pay vote, as studies (e.g., Malenko and Shen, 2016) show that proxy advisor recommendations strongly impact Say-on-Pay voting outcomes.[8] Our proxy is the occurrences of keywords related to pay complexity in the compensation section of the ISS annual guidelines (*lnGUIDELINES_ISS*).

3.2 Multivariate regression

We estimate the following regression of complexity on firm, CEO, corporate governance characteristics, renegotiation provisions, and external factors:

$$\begin{aligned} COMPLEXITY_{jt} = {} & \alpha + \beta_1\, lnMV_{jt-1} + \beta_2\, MTBA_{jt-1} + \beta_3\, R\&D_{jt-1} + \beta_4\, lnSTDRET_{jt-1} \\ & + \beta_5\, SEGMTS\_HH_{jt-1} + \beta_6\, PIFO_{jt-1} + \beta_7\, M\&A_{jt-1} + \beta_8\, lnTENURE_{jt} \\ & + \beta_9\, RETIRE_{jt} + \beta_{10}\, FOUNDER_{jt} + \beta_{11}\, OWNSHIP_{jt} + \beta_{12}\, CHAIR_{jt} \\ & + \beta_{13}\, RENEG_{jt} + \beta_{14}\, IND\_DIRECTOR_{jt} + \beta_{15}\, BUSYNESS_{jt} + \beta_{16}\, COOPTED_{jt} \\ & + \beta_{17}\, COOPT\_MISSING_{jt} + \beta_{18}\, lnCEO\_PERKS_{jt-1} + \beta_{19}\, CONSULT_{jt} \\ & + \beta_{20}\, IND\_SIZE\_COMPL_{jt} + \beta_{21}\, Top5\_INST\_OWN_{jt} \\ & + \beta_{22}\, lnGUIDELINES\_ISS_{jt-1} + \beta_j\, IND_j + \beta_t\, YEAR_t + \varepsilon_{it}. \end{aligned} \tag{1}$$

We estimate the regression separately using *WTD_COMPL* and *RAW_COMPL* as the dependent variable. Details on how the variables are constructed are in Appendix B. We winsorize all the continuous variables (except logged variables) at the 1 and 99 percent levels to mitigate the

[8] Say-on-Pay is a non-binding advisory vote required with the adoption of the Dodd-Frank Wall Street Reform and Consumer Protection Act, passed in 2010. See https://www.sec.gov/news/press/2011/2011-25.htm. Section 951 of the Act stipulates that SoP votes must occur at least once every three years, starting with the first annual shareholders' meeting held on or after January 21, 2011.

influence of outliers.[9] We include industry and year fixed effects to capture trends in complexity that are common to all firms in an industry or over time.[10] We compute standard errors that are cluster-adjusted by firm.

3.3 Descriptive statistics and correlations

Table 2 presents descriptive statistics. Sample firms are larger (average market value of equity of $16 billion), with mean market-to-book ratio of assets of 1.99 and mean R&D expense scaled by total assets of 0.02. Firms have an average of 2.35 business segments and have completed an average of 3.93 mergers or acquisitions in the prior two years. Over half (64%) report pretax income from foreign operations. Our sample CEOs have an average tenure of 8.29 years, 12% are founders, and only 8% are approaching retirement. CEOs own an average of 1.51% of shares outstanding, and 55% also chair the board. Words related to renegotiation are 0.06% (average) of total CD&A words. The average firm has 1.08 compensation consultants and an average raw complexity score for its industry/size peers of 10.93. The five largest institutional shareholders own an average 30% of shares outstanding. On average, 195.4 keywords that we identify as related to compensation complexity are used in the ISS guidelines. Independent directors comprise, on average, 81% of the board, while co-opted directors comprise 21%. Only 9% of outside directors serve on three or more boards. Annual perquisites for our sample CEOs are, on average, $331,900.

[9] As compensation decisions are made prior to the beginning of the year, we measure firm characteristics at the beginning of the year (*t-1*). We measure CEO and corporate governance characteristics at time *t*, since we are interested in the compensation contract of the individual that is CEO during year *t*. The only exception is *lnCEO_PERKS*, which is measured at *t*-1 to avoid look-ahead bias, as information on compensation is only available ex post. However, the (untabulated) results are similar if we measure *lnCEO_PERKS* at *t*. Finally, we measure our proxies for external labor market pressure (*CONSULT*, *IND_SIZE_COMPL*, and *TOP5_INST_OWN*) in year *t* to match the contract being offered in the labor market at year *t*. The external factor *lnGUIDELINES_ISS* is measured at beginning of the year to capture information available to firms when designing compensation contracts.

[10] Following the methodology of Breuer and deHaan (2024), we find (untabulated) that a firm-fixed-effect model causes the within-firm standard deviations of the variables to be too restrictive for understanding the determinants of complexity. Accordingly, we do not include firm fixed effects in this analysis, as our interest is in understanding how firm characteristics are associated with complexity.

Finally, the one-year-ahead ROA (stock return) is 5% (7%), on average, for our sample firms.

Table 3 presents Pearson correlations. We observe that complexity is correlated with many of our independent variables. Among the larger correlations, complexity is positively correlated with firm size (*lnMV*), the complexity score of industry/size peers (*IND_SIZE_COMPL*), and the percentage of independent directors (*IND_DIRECTOR*). We also find that complexity is negatively correlated with the CEO ownership (*OWNSHIP*).

3.4 Regression results

Table 4 presents results from estimating Eq. (1) using *WTD _COMPL* (Columns 1 through 4) and *RAW_COMPL* (Columns 5 through 8) as the dependent variable. Columns 1 and 5 present results including in the regression only firm and CEO characteristics, the provision for contract renegotiation, and corporate governance characteristics. In Columns 2 and 6, we add variables that capture external factors that may influence complexity. Columns 3 and 7 include industry fixed effects, and Columns 4 and 8 include both industry and year fixed effects.[11]

In Column 1, consistent with our expectations, larger firms have more complex contracts, as evidenced by the positive and significant coefficient on *lnMV*, as do firms with more R&D. The latter finding may reflect that firms with high R&D require more performance measures and periods to align their CEOs' horizon with the horizons of the research pipeline. Interestingly, we find that higher *MTBA* firms have less complexity. One explanation is that the board relies primarily on equity pay to capture the effect of CEO performance in managing those unobservable

[11] In untabulated tests, we estimate Equation (1) using each of the four components of our complexity measure (form of pay, number of performance measures, number of performance-measurement periods, and use of both absolute and relative conditions) separately as the dependent variable. We observe that the results are not driven by any one component of complexity. As further robustness (untabulated), we alternatively define *COMPLEXITY* as low (assuming a value of 1), medium (value of 2), or high (value of 3) if complexity is in the bottom, middle, or top tercile of the sample distribution, respectively. We obtain similar results using this alternative measure.

opportunities, resulting in less complexity.[12] More volatile firms, captured by *lnSTDRET*, have less complexity. Finally, we find that more recent M&A relates to complexity but negatively, as does having foreign operations. While we expected that recent M&A and operating internationally complicates operations, our findings suggest that these firms simplify compensation.

Complexity is also impacted by efforts to address principal-agent conflicts. CEOs with higher ownership, where we would expect fewer agency conflicts, have less complex contracts. But interestingly, CEOs who also serve as chair of the board have less complex contracts. Firms that discuss renegotiation and discretion more frequently in their CD&As have less complex contracts, consistent with theoretical predictions that renegotiation may limit the need for contingencies. And firms with greater director independence have more complex contracts.

Results using *RAW_COMPL* as the dependent variable in Column 5 are generally consistent with those in Column 1, except the coefficients on *PIFO* and *CHAIR*, which are no longer associated with complexity, while the coefficients on *FOUNDER* and *LnCEO_PERKS* show an association.[13] Firm characteristics, CEO characteristics, the provision for contract renegotiation, and governance characteristics explain 12.34% and 17.49% of the variation in *WTD_COMPL* and *RAW_COMPL*, respectively (see adjusted R^2 in Columns 1 and 5).

The inclusion of variables capturing external factors that may influence complexity (Columns 2 and 6) has little effect on our inferences on other variables in the regression (*COOPTED* in Columns 2 and 6 and M&A in Column 2 are exceptions) but adds substantially to

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[12] 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 (75.2%) is significantly higher than for low MTBA firms (69.8%), p-value < 0.001. This is consistent with equity being used to align incentives of CEOs with those of investors in firms where monitoring of management is harder (Smith and Watts, 1992; Gaver and Gaver, 1993; Himmelberg et al., 1999).

[13] This slight difference in results between the two complexity measures likely results from the differing assumptions employed in their calculations. *RAW_COMPL* adds the unweighted scores across the different pay types, allowing the different pay components' scores to equally influence the complexity score. *WTD_COMPL*, on the other hand, places greater weight on the complexity score of stock compensation and substantially lower weight on the complexity score of bonus compensation, as stock compensation is more heavily weighted in the compensation package (see Table 1).

the model's explanatory power. Specifically, when using *WTD_COMPL* as the dependent variable, the adjust R^2 increases from 12.34% to 18.93%, and when using *RAW_COMPL* as the dependent variable, the adjusted R^2 increases to from 17.49% to 21.76%, when those factors are included. In particular, more discussion of complexity in ISS guidelines (*lnGUIDELINE_ISS*), greater complexity of peers' compensation (*IND_SIZE_COMPL*), and greater institutional ownership (*TOP5_INST_OWN*) are associated with greater complexity ($p < 0.01$ in columns 2 and 6).[14] The use of compensation consultants also relates positively to both measures of complexity (the coefficient on *CONSULT* is significant at $p < 0.05$ ($p < 0.01$) in Column 2 (6)).

The inclusion of industry fixed effects (Columns 3 and 7) has little impact on the model's explanatory power and the significance of the coefficients, except for the coefficients on *R&D* (Columns 3 and 6) and *PIFO* (Column 2), which become insignificant, and for the coefficient *LnCEO_PERKS*, which becomes significant (Column 3). After including year fixed effects, the relations between complexity and *TOP5_INST_OWN* and *GUIDELINE_ISS* are no longer positive and significant at conventional levels. The loss of significance of top five institutional ownership likely reflects that the year fixed effects capture their increase over time. The negative coefficient on ISS guidelines captures the fact that the trend in ever-increasing keyword coverage in ISS guidelines has decreased in the recent past, while complexity has continued to increase. That the relations between these external factors and complexity changes with the addition of year fixed effects suggests that these factors likely have an important role in explaining the increase in complexity over time. We explore this further with our analysis in Section 4.

[14] In a concurrent working paper, Cabezon (2024) finds that the distribution of total pay across six elements of pay (salary, bonus, non-equity incentives, stock, options and other) in S&P 1500 firms has become more similar over time. Using 32 standardized performance measures from Incentive Lab, he also finds increasing similarity in the types of performance measures used. Consistent with our findings that external forces influence pay practices, he finds that institutional investors and proxy advisors contribute to this increasing similarity. Our study focus on a distinct feature of compensation contracts: its complexity. Contracts can be more similar across firms while being more or less complex.

In summary, as expected, compensation complexity reflects the need for contracts that capture organizational and operational characteristics of firms and address agency conflicts associated with CEO characteristics. Our results also suggest compensation complexity reflects firms' interest in avoiding renegotiation of compensation. Finally, external pressure plays a notable role in explaining complexity, suggesting potential inefficiencies in compensation design.[15]

We acknowledge that results on some variables in our model may reflect correlations, rather than causal relations. For example, the positive relation between complexity and consultants may reflect that firms with more complex compensation are more likely to hire consultants, rather than the hiring of consultants leading to increased complexity. Likewise, greater compensation complexity may have led ISS to reference more features in their guidelines, rather their guidelines leading to more complex contracts. Even so, we view our results as an important step in the study of compensation complexity, and the question of causality an important one for future research.

4. Why has compensation changed over time?

To understand the factors driving the increase in complexity in Figure 1, we use our model from Section 3 to conduct three tests. First, we explore how each set of factors explains complexity over time, by relying on the adjusted R^2 from various estimations of Eq. (1).[16] Specifically, we estimate yearly regressions of Eq. (1), including each of the following sets of characteristics in separate estimations: (1) only firm characteristics, (2) only CEO characteristics, (3) only renegotiation, (4) only governance characteristics, (5) only external factors, (6) all factors without external factors, (7) all factors including external factors, and (8) all factors including industry fixed effects. Then, we compare the average adjusted R^2 from annual regressions over the first half

[15] In Section 6.2, we consider the possibility that complexity is an attempt to obfuscate high pay.
[16] Here, we do not include year fixed effects, as our interest is in understanding why complexity changes over time. Including year fixed effects would absorb part of the variation we are seeking to explain.

of our sample period ("earlier period", or 2007 – 2012) to that over the second half of our sample period ("later period", or 2013 – 2019) for each specification to understand the importance of each economic factor in explaining the increase in complexity over time.[17] Table 5 presents the results of this analysis.

We find that the explanatory power of Eq. (1) increases substantially from earlier to later in our sample period across all specifications. For example, when we include all characteristics in our model examining *WTD_COMPL*, the adjusted R^2 of the regression increases from an average of 9% in 2007 - 2012 (Column 1) to an average of 20% in 2013 – 2019 (Column 2). Notable, and consistent with observations from Table 4, is the increase in adjusted R^2 upon the inclusion of external factors in the model, particularly in the later part of the sample period. We find similar increases when using *RAW_COMPL* as the dependent variable in Columns 5 and 6. We also compare the adjusted R^2 from estimating the different specifications pooling all observations in 2007 – 2012 and in 2013 – 2019, separately (Columns 3, 4, 7, and 8). Our inferences are similar to those obtained from the average adjusted R^2 from the yearly regressions. These results help rule out the possibility that unobservable characteristics not captured by our model account for the increase in complexity. They also suggest that it is firm characteristics and external factors that show a substantially greater ability to explain complexity variation in the latter part of our sample.

Results from the analysis of adjusted R^2 show that the ability of the observable characteristics to explain complexity has increased over time. However, it is not clear whether the change in complexity over our sample period (Figure 1) comes from a change in the distribution of the characteristics themselves, or from an increase in the extent to which they explain complexity (their coefficients), or both. Adopting the methodology in Juhn et al. (1993) used to

[17] Because we have only 69 observations for fiscal 2006, which would lead to unstable coefficients for that year, we drop fiscal 2006 observations from this analysis.

explain changes in wage inequality over time, we are able to shed light on this. This approach decomposes the dependent variable (in our case, complexity) into the three pieces: the portions explained by (i) the vector of characteristics, (ii) the weights on those characteristics, captured by their coefficients, and (iii) the residual. By decomposing Y_{it} into these three components over time, we are able to speak to whether changes in complexity result from changes in the characteristics, changes in the weights on characteristics, or a greater unexplained portion.

We start with the basic model:

$$Y_{it} = \mathbf{X}_{it}\beta_t + u_{it}, \tag{2}$$

where Y_{it} is the complexity of compensation for CEO at firm i in year t, $\boldsymbol{X}_{it}$ is a vector of characteristics (firm, CEO, renegotiation, governance, external factors), β_t represents a vector of coefficients on each characteristic, and u_{it} is the residual, or the component of complexity unaccounted for by the observable characteristics in the model. We first estimate the model using a pooled regression to obtain coefficients on each independent variable ($\overline{\beta}$), which capture the average effect (weight) of each variable on complexity, and the distribution of the residuals, $\overline{F}^{-1}(\theta_{it}|\boldsymbol{X}_{it})$, which captures the average inverse cumulative residual distribution of complexity.

We then estimate the model for each year to obtain the yearly coefficients β_t and the residual term $F_t^{-1}(\theta_{it}|\boldsymbol{X}_{it})$ for each firm for each year. Using the coefficient estimates from the pooled and annual regressions, the vector of characteristics, and the residuals, we decompose Y_{it} for each firm into the sum of three components:

$$Y_{it} = \underbrace{[\, \boldsymbol{X}_{it}\overline{\beta} + \overline{F}^{-1}(\theta_{it}|\boldsymbol{X}_{it})\,]}_{(1)} + \underbrace{[\, \boldsymbol{X}_{it}(\beta_t - \overline{\beta})\,]}_{(2)} + \underbrace{[\, F_t^{-1}(\theta_{it}|\boldsymbol{X}_{it}) - \overline{F}^{-1}(\theta_{it}|\boldsymbol{X}_{it})\,]}_{(3)} \tag{3}$$

Component (1) of Eq. (3) is the portion of complexity due to the observable characteristics in the model. Component (2) is the portion of complexity due to the weights on the observable characteristics.[18] And component (3) is the portion of complexity that is not explained by the observable characteristics. We compute each of these components for each year for each firm.

To understand why complexity (*WTD_COMPL)* is changing over time, we plot the average of each of these components over the period 2007-2019 in Figure 4. Panel A plots *WTD_COMPL* over time (consistent with that plotted in Figure 1) for comparison. Panel B illustrates how complexity would have evolved over time due to changes in observable characteristics in our model. The figure suggests that changes in these characteristics over time impact the increase in complexity. Panel C shows changes in complexity resulting from changes in coefficients over time, relative to the average coefficients in the pooled sample, and suggests that changes in coefficients have also impacted complexity over time, in particular during the second half of the sample. Panel D shows changes in complexity due to changes in unmeasured coefficients and characteristics (i.e., complexity changes due to unobservables). This figure suggests that the overall increase in complexity over time is not the result of unobservable characteristics not included in our model.

Figure 4 Panel E quantifies the contribution of observed characteristics, coefficients and unobservables to the increase in complexity over time. Changes in characteristics contribute to 81% of the increase in complexity, whereas changes in coefficients account for only 19%, while unobservables account for 0% for the full sample. The increase in the first half of the sample period (2007 to 2013), 1.35, is slightly higher than that in the second half of the sample period (2013 to 2019), 1.19. However, while during the first half of the sample period changes in characteristics account for nearly all of the increase in complexity (93%), during the second half of the sample

[18] Juhn et al. (1993) compute the second component as the difference between computed complexity $Y2_{it} - Y1_{it}$, where $Y1_{it} = [\ \boldsymbol{X}_{it}\beta_t + \overline{F}^{-1}(\theta_{it}|\boldsymbol{X}_{it})\ ]$ and $Y2_{it} = [\ \boldsymbol{X}_{it}\overline{\beta} + \overline{F}^{-1}(\theta_{it}|\boldsymbol{X}_{it})\ ]$. This is equivalent to $[\boldsymbol{X}_{it}(\beta_t - \overline{\beta})\ ]$.

period, both changes in characteristics and coefficients contribute to the increase in complexity, with 67% attributed to changes in characteristics and 33% to coefficients.[19]

The above decomposition reveals that both changes in observable characteristics and changes in the weights on those characteristics contribute to the increasing complexity observed over our sample period. However, the preceding analysis lacks insight into *which* specific characteristics become *economically* more important in driving complexity. Therefore, we (1) examine the changes in the characteristics between the earlier and later periods, and (2) estimate Eq. (1) for the earlier and later periods separately to examine the changes in the coefficients on those characteristics. This exploratory analysis is meant to shed light on which characteristics have the largest impact on the increase in complexity.

Table 6 Panel A compares the mean values of the characteristics in the earlier versus later period. All but four variables are significantly different later relative to earlier. Assuming no change in the data generating process over time, these differences would lead to both increases and decreases in complexity. Table 6 Panel B (Panel C) presents the results of estimating the regression in earlier and later periods, with *WTD_COMPL* (*RAW_COMPL*) as the dependent variable, including a test of the difference in coefficients on each variable from the earlier to later period. We note that several coefficients are statistically different in the later period relative to the earlier period, both positive and negative. Thus, the collection of characteristics and the changes in the impact of those characteristics are contributing to both increasing and decreasing complexity.

As we are interested in what explains the net *increase* in complexity, we focus our discussion on those characteristics that have an unambiguously increasing effect. Characteristics

[19] Our inferences are similar if we perform this analysis on our raw complexity measure (untabulated).

that have a positive relation with complexity will contribute to an increase in complexity if their values *increase* significantly over time, or if their importance in determining complexity grows (i.e., their coefficient becomes significantly more *positive*) over time. Similarly, those characteristics that have a negative relation with complexity will contribute to an increase in complexity if their values *decrease* significantly over time, or if their importance in determining complexity grows (i.e., their coefficient becomes significantly more *negative*) over time.

From Table 6 Panel A, increases in *lnMV*, *IND_DIRECTOR*, *IND_SIZE_COMPL*, and *lnGUIDELINE_ISS* are in the direction that leads to an increase in complexity, as those variables are positively related to complexity. And decreases in *OWNSHIP* and *RENEG* are in the direction that leads to an increase in complexity, as those variables are negatively related to complexity.

As reported in Table 6 Panel B, when *WTD_COMPL* is the dependent variable, the coefficients on *lnMV* and *IND_DIRECTOR* become significantly more positive later relative to earlier. Given their positive relation with complexity, as these coefficients become increasingly positive, they contribute to a rising level of complexity. The coefficients on *OWNSHIP* and *RENEG* become significantly more negative later relative to earlier. Given their negative relation with complexity, as their coefficients become more negative, they also contribute to an increase in complexity.

Shifting to external factors, we find the curious result that the coefficient on *lnGUIDELINE_ISS* switches from positive and significant in the earlier period to negative and significant in the later period. A possible explanation for the negative coefficient is that, *within* the later period, the number of ISS guidelines decreases while complexity increases.[20] Our underlying

[20] This variable is calculated by calendar year, so for some firms with different fiscal year end months, the number of ISS guidelines can be different for the same fiscal year. The correlation between *lnGUIDELINE_ISS* and *WTD_COMPL* is 0.08 in the earlier period and -0.13 in the later period (p-value<0.01).

construct of interest is the extent to which firms may introduce features, increasing contract complexity, to avoid "against" recommendations and negative Say-on-Pay (SoP) voting outcomes. In the later period, an alternative way of studying this is to exploit information in SoP votes. SoP voting was implemented under the Dodd-Frank Act after 2011, precluding our ability to study this directly in the earlier period. But, for the later period, we are able to investigate whether receiving a negative SoP vote in the prior year is associated with a subsequent increase in complexity.

Columns (8) through (11) replicate the analysis in Columns (5) through (7), but replacing the variable *lnGUIDELINE_ISS* with the variable *SOP_LESS80.* This variable takes the value of one if SoP voting support at the preceding annual meeting is 80% or less, as SoP support below 80% is considered a negative vote (Ferri and Maber, 2013).[21] We also include an indicator for firm-year observations in which a SoP vote is not taken to allow for these observations to remain in our analyses. The results in Column (8) show a positive and statistically significant coefficient on *SOP_LESS80* (p-value < 0.01), indicating that firms with low SoP voting support have greater CEO pay complexity in the next period, potentially from making changes to align with proxy advisor recommendations. Interestingly, the coefficient on *Missing_SoP* is negative and significant (p-value < 0.05), suggesting that complexity tends to be higher following a SOP voting year. Despite not being able to study SoP voting outcomes in the earlier part of our sample period because there was no SoP requirement before 2011, our ability to investigate this in later years reveals that proxy advisors may play a role in increased compensation complexity. We find similar inferences in Panel C when we use *RAW_COMPL* as the dependent variable.

We analyze the economic impact of the external factors with significant association with complexity in the later period. The largest comes from *CONSULT*, for which a one-standard

[21] Our results remain similar if we consider support less than 70%.

deviation increase results in a 4.6% increase in *WTD_COMPL*.[22] For *TOP5_INST_OWN*, a one-standard deviation increase results in a 2.7% increase in *WTD_COMPL*. Neither of these variables had explanatory power in the earlier period. The economic significance of peer effects is similar across time, as a one-standard deviation in *IND_SIZE_COMPL* leads to an increase (percent increase) in *WTD_COMPL* of 0.13 (3.3%) in the earlier period, compared to 0.14 (2.5%) in the later period. Finally, we find the economic impact of *SOP_LESS80* to be 0.11 (2.0%) in the later period.

The economic impacts of these external factors are comparable to those of *lnMV*, *IND_DIRECTOR*, *OWNSHIP*, and *RENEG*. A one-standard deviation increase in *lnMV* and *IND_DIRECTOR* in the later period leads to an increase (percent increase) in *WTD_COMPL* of 0.44 (7.9%), and 0.25 (4.2%), respectively, which compares to 0.14 (3.5%) and 0.11 (2.7%) in the earlier period. A one-standard deviation decrease in *OWNSHIP* and *RENEG* in the later period leads to an increase (percent increase) in *WTD_COMPL* of 0.32 (5.6%) and 0.17 (3.1%), respectively, compared to 0.11 (2.7%) and 0.06 (1.5%) in the earlier period.

In combination, these results suggest that the observed increase in complexity over time is influenced by firms increasing in size and having more independent directors. At the same time, contracts are becoming more complex because CEO ownership is decreasing and renegotiation is less frequent, conditions that would lead to more provisions in the contract. Importantly, increased contract complexity is affected by external factors. The economic impact on contract complexity in the later period from consultants, institutional holdings, peer complexity and SoP voting are of

[22] We calculate the economic impacts using within-industry-fixed-effect standard deviation for each one of the independent variables used in the model following deHaan et al. (2024, Table OA1). The economic impact is calculated as the associated coefficients from Table 6 Panel B Column 1 (the earlier period) or Column 4 (the later period) multiplied by the within standard deviations for the respective periods obtained from Table 6 Panel A. The percentage increase in complexity is the economic impact divided by the mean of *WTD_COMPL* for the respective period. For example, 4.6% is computed as the coefficient on *CONSULT* of 0.562 times the mean value of 0.455, which equals 0.2557, divided by 5.619, the mean of *WTD_COMPL* in the later period.

magnitudes similar to the economic impacts from independent directors, ownership and renegotiation, suggesting that understanding the role of external factors is important.

5. The implications of compensation complexity

To this point, we document that compensation contract complexity has increased over time and the increased complexity is related to both features associated with organization characteristics and those associated with external forces. A logical next question is what effect does complexity have? In this section, we consider the implications of complexity for firm performance.

5.1 Complexity and future performance

If firm, CEO, and governance characteristics or the possibility of renegotiation explain the inclusion of features into the compensation contract to address particular organization complexity or principal-agent concerns, one could argue these features are optimal and should not impact performance or decision-making. However, complex contracts may introduce unintended complications for the firm. Balancing the many features and goals in the contract can present challenges for managers (Ittner and Larcker, 1998; Schick et al., 1990; Lipe and Salterio, 2000). Jensen (2010) argues that, because "it is logically impossible to maximize in more than one dimension, purposeful behavior requires a single-valued objective function." A clear goal enables agents to work efficiently (Holmstrom and Milgrom, 1991, 1994; Ittner and Larcker, 1998). Furthermore, if the CEO is cognitively-constrained, then limited attention or behaviorally biased (e.g., Kruschke and Johansen, 1999; Gigerenzer and Goldstein, 1996; DellaVigna, 2009) and rational inattention models (e.g., Sims, 2003; Veldkamp, 2011; Blankespoor et al., 2020) underscore the potential adverse effects of competing cues of complex contracts on firm performance compared to simpler contracts. If multiple contract features hamper a CEO's decision making, we expect to observe lower firm performance.

To consider the implications on firm performance, we examine whether complexity is associated with lower future performance. In our analyses, we first consider the association with complexity, controlling for determinants of firm performance. We then also include the determinants of complexity except for external factors, allowing us to explore the implications of complexity related to these factors specifically. External forces can lobby for provisions in the contract that may not be optimal for the firm given its contract environment, and if boards acquiesce (Edmans et al., 2023), it could harm future performance.

We estimate the following model of pay complexity and future firm performance:

$$FirmPerformance_{i,t+1} = \alpha + \gamma_i Complexity_{i,t} + \sum_k \beta_k Controls_{i,t} + \delta_i \, Firm_i + \alpha_t \, Year_t + \varepsilon_{i,t}. \quad (4)$$

We measure future firm performance using return on assets (*ROA*) and stock returns (*RET*) over the year ahead and the average of one and two years ahead. *ROA* is computed as net income divided by the average of total assets at the beginning and at the ending of the year. *RET* is measured as the 12-month buy-and-hold returns. We estimate Eq. (4) using OLS regressions and include firm and year fixed effects to account for both time-invariant firm characteristics associated with firm performance and unobservable macroeconomic factors that vary over time.[23] When performance is measured by *ROA* (*RET*), we follow Core et al. (1999) and include the natural logarithm of the standard deviation of *ROA* (*RET*) and the natural log of sales (natural log of market value and *MTBA*) as controls.[24] We also include the prior year *ROA* to control for its persistence. If contract complexity has undesireable consequences, we expect future performance to be lower for firms with higher complexity, predicting a negative relation between *COMPLEXITY* and future performance ($\gamma_j < 0$).

[23] In untabulated analyses, we address concerns that CEOs' differing abilities and perceptions of complexity may affect performance by replacing firm fixed effects with CEO-firm fixed effects; our conclusions examining subsequent year performance endure.
[24] *RET*, *lnMV*, *MTBA*, and *lnSTDRET* are all measured at *t*-1, because those variables are also included as economic determinants of complexity. We obtain similar results if those variables are measured at time *t* instead.

Table 7 presents the results. Panel A (B) reports the results using *WTD_COMPL* (*RAW_COMPL*) for *COMPLEXITY*. Columns 1–4 test the association between total complexity and future performance. In Panel A Column 1, the coefficient on *WTD_COMPL* is -0.091 (p-value < 0.05), suggesting that complexity is associated with lower one-year-ahead *ROA*. We find a similar result in Column 2 using the average ROA ($AvgROA_{t+1,t+2}$), where the coefficient on *WTD_COMPL* is -0.078 (p-value < 0.05). Results are even stronger when using *RAW_COMPL* (Panel B). In Column 3, the coefficient on *WTD_COMPL* is negative, though not significant at conventional levels; the coefficient on *RAW_COMPL* in Column 3 is negative and significant at p < 0.05 and in Column 4 is negative but not significant at conventional levels. The weaker association between complexity and future stock returns is expected (Core et al., 1999); in efficient markets, within two years, investors would fully price the cash-flow implications of contract complexity, such that these would not translate into differences in stock returns.

In Columns 5–8, we test the association between total complexity and future performance after including the determinants of pay complexity associated with firm and CEO characteristics, renegotiation, and governance. In these specifications, the coefficient on complexity can be interpreted as capturing the relation between *excess* complexity (the portion of complexity not explained by the economic determinants but associated with external factors) and performance (Chen et al., 2018).[25] We continue to find, albeit with weaker significance levels, a negative relation after controlling for these other characteristics. The signs of the coefficients on *RAW_COMPL* (Panel B) are generally consistent with those on *WTD_COMPL* (Panel A), but significance levels

[25] Examining the relation between complexity and subsequent performance while controlling for the economic determinants allows us to interpret the coefficient on complexity as the relation between performance and the portion of complexity not explained by the economic determinants. An alternative approach is to separate complexity into the portion explained (predicted) by economic determinants and the portion not explained by economic determinants (namely, the complexity due to external pressures, in addition to the residual complexity) and then examine the relation between unexplained complexity and performance. Both approaches yield the same coefficient estimates, but the latter approach requires adjusting standard errors (Chen et al., 2018).

are considerably stronger. This weaker significance of *WTD_COMPL* may be due to the fact that *WTD_COMPL* exhibits less dispersion. These results suggest that there are negative consequences to the firm from external factors influencing contract complexity.

A potential explanation for the negative relation between complexity and performance is that firms add performance measures when they anticipate poor performance. While this explanation seems unlikely, as it would require firms to know at the beginning of year t that year t+1 performance will be poor, we nonetheless rule it out by replacing our measure of complexity with one that excludes the number of measures and find similar results (untabulated). A second potential explanation is that complex contracts include more nonfinancial performance measures (e.g., ESG metrics), which may encourage actions that lower near-term financial performance. To ensure this is not driving our results, we partition the sample based on the percentage of nonfinancial measures above or below sample median and find the results (untabulated) exist in both subsamples with no significant difference between the two. That our conclusions endure suggests that the inclusion of performance measures that may reduce short-term performance does not explain our results. Finally, it is possible that our results could be attributed to an omitted variable that is correlated with both complexity and performance.[26] We include year and firm fixed effects to help address this concern, but we nonetheless acknowledge this possibility.[27]

5.2 Correlation among performance measures

The evidence above suggests that multiple signals in complex compensation contracts from different types of pay, numerous performance measures and measurement periods, and different ways of measuring (absolute versus relative) can have negative consequences for firm

[26] For example, as firms become larger, they may be more difficult to manage (Williamson, 1967), yet our inclusion of firm size and firm fixed effects may not capture a potential nonlinear relationship with firm performance.
[27] This concern is further mitigated with the cross-sectional test that follows, as the omitted variable would have to also be correlated with our partitioning variable to explain the results.

performance. In this section, we drill deeper into one mechanism. Research suggests that having multiple performance measures, in particular, has negative consequences for performance as managers might overly emphasize certain components of their firms' operations (e.g., Jensen, 2010). For example, if managers' compensation is based on several performance measures (as in a balanced scorecard framework), they may focus on the easiest measures to achieve and ignore the more difficult ones (Brickley et al., 1995). Contract features may also cancel each other out or interact in ways that lead to inefficiencies even for a rational and cognitively-unconstrained CEO. For example, if a contract includes both an EPS measure and nonfinancial measure encouraging sustainability investments, and the payoffs from those investments come in the future, actions to increase the nonfinancial measure can impair meeting the EPS target.

If multiple performance measures hamper a CEOs' decision-making, we expect to observe lower firm performance. However, the comovement of the multiple performance measures may mitigate this effect. If the performance measures used in the contract are more highly (positively) correlated, the CEO faces fewer potential trade-offs; actions taken that improve one performance measure will also improve others. But if they have low correlation, the CEO faces tougher choices and may have to forego improvements on some performance measures in favor of others. We predict that the negative impact of contract complexity will lessen when within-contract performance measures are more correlated.

To measure this correlation, we examine historical correlations of actual measures used in the contracts (e.g., correlation between *ROA* and *RET*). A challenge to this approach is that accounting-based measures are often adjusted to exclude items, making it costly to collect the actual outcome of each measure for each CEO-year. Thus, we rely on Packard (2018), who shows that target levels for earnings performance measures in the contract reflect expectations of actual earnings outcomes. Under this assumption, we use each of the threshold levels (minimum, target, and maximum) for each absolute performance measure in the contract and compute pair-wise correlations between all measures at each threshold to approximate the expected comovement in performance measures.[28] For grants with multi-year performance metrics and differing thresholds each year (e.g., EPS target is $1.1 for year 2006 and $1.2 for year 2007), we keep the threshold set for the first year of the performance period (i.e., 2006 in the example above). For each pair of performance measures, we calculate the correlation for each pair-wise observation by a threshold (minimum, target, and maximum) from 2006 to year *t*, to use the maximum amount of available data. For example, if a firm uses three performance measures in 2015 and has 10 years of data available, we compute 90 correlations (10 years x 3 pair-wise correlations x 3 thresholds (minimum, target, and maximum)).[29] Finally, for each firm-year, we obtain the median pair-wise correlation among all the performance measures and use this as our measure of correlation.

Table 8 Panel A (B) shows the results for *WTD_COMPL* (*RAW_COMPL)*. We continue to find that more complex contracts are associated with negative future performance, although the statistical significance of the results weakens when using the weighted complexity measure (*WTD_COMPL)*. However, consistent with our expectations, we find that this negative effect lessens when the performance measures in the contract are more highly correlated. With both measures of complexity, the coefficient on *COMPLX* * *High_Corr* is statistically positive for all performance measures, except the future two-year average stock returns (Column 8 in Panels A and B, where the coefficient is only significant using one-tail tests).[30] In summary, this evidence is consistent with negative consequences of complex contracts being mitigated when the within-contract performance metrics are more highly correlated. These findings establish that one channel

[28] We do not use performance metrics with relative performance conditions because the performance is tied to the ranking within the peer groups' future performance, which is unknown to us.
[29] In untabulated analyses, we limit our sample to only firm-years with a minimum of nine years of historical data to calculate the correlations, and we obtain similar results.
[30] We have fewer observations for this test, due to requiring the thresholds in the compensation contracts.

through which contract complexity has negative consequences is when provisions within the contract may conflict with each other and the CEO must balance many objectives; when there is less alignment (correlation) among the objectives, it is harder for the CEO to take actions that would improve multiple performance metrics, resulting in lower performance.

6. Additional analysis

6.1 Alternative measures of complexity

To ensure that our findings are not specific to our main measures of complexity, we consider three alternative measures.[31] First, while our measure captures complexity associated with flow compensation, *prior* grants may have vesting conditions that tie to performance measures over multiple periods. The CEO may then be influenced not only by the complexity of the current year's compensation but also by the complexity of prior year components that are still unresolved. We thus create a measure of equity and long-term cash bonus granted in the *prior* two years (*t*-1 and *t*-2), as the average horizon and vesting period is three years. We do not include the complexity score of the short-term cash bonus, as that component of pay does not carry over to subsequent periods. We replicate (untabulated) our analyses in Table 7 (columns 5–8 Panels A and B) with this new measure as an additional control variable and find that it is the current flow complexity that is significantly associated with lower future ROA and lower one-year-ahead stock returns, not the carryforward portion of the prior year's complexity.[32]

Second, our aggregation across dimensions could be adding noise to our proxy. To address this, we re-estimate (untabulated) the analyses in Table 7 (columns 5–8 of Panels A and B) using

[31] In untabulated analyses, we include the level of total compensation (log of *TDC1*) as an additional control variable, and our conclusions remain. This test provides some reassurance that the relation between compensation contract complexity and future performance is not driven by the level of compensation as a correlated omitted variable.
[32] For *WTD_COMPL*, we weight the complexity score for each form of pay by its proportion of the total of the three forms and then we sum the weighted scores for t-2 and t-1 to get the complexity of prior grants.

only the number of performance measures as our proxy for complexity. Being only one dimension of complexity, using this measure avoids concerns that aggregating multiple constructs introduces noise into the proxy. Using this alternative measure, our conclusions endure.

6.2 Potential Alternative Explanation

A potential explanation for the negative relation between contract complexity and future performance is that ("bad") firms have complex contracts to obscure high pay and it is the high pay that is associated with lower performance. Our analyses include governance characteristics, which helps capture "bad" firms, mitigating this as a concern. We also note our tests discussed in Footnote 31 that include the level of total compensation as an additional control variable and in which our conclusions endure. Nevertheless, we perform two additional untabulated tests to help rule out this potential explanation. First, we examine the payouts from annual bonus contracts relative to target amounts. If the aim of a complex contract is to hide high pay, we expect complexity to be positively associated with the ratio of the actual to target compensation that is paid to the CEO. This prediction assumes that firms disclose lower ex ante targets to portray that the CEO is receiving a reasonable level of pay, with contract complexity attempting to obfuscate how the actual higher payout was achieved. Inconsistent with this motive, we find no statistically significant association between this proxy for target difficulty and complexity.

Second, we examine FOG scores of the CD&A section of the proxy statement. If complexity stems from attempts to camouflage high pay, we expect that firms might use complex language to describe compensation to further obfuscate, suggesting a positive relation between CD&A FOG and complexity. We regress the FOG score of the CD&A on contract complexity and the log of the market value of equity, a proxy for size (Li, 2008), while including industry and year fixed effects. We further include the FOG score of the remainder of the proxy statement excluding the CD&A to control for the use of complex language related to business complexity. We find that contract complexity relates significantly negatively to the CD&A FOG score, which does not support an obfuscation motive.

In sum, our additional tests confirm that complexity relates negatively to future accounting and stock performance. Our findings are robust to other ways of measuring complexity and likely not simply due to obfuscation. They affirm concerns that executive pay packages may have become too complex to be effectively implemented and thus may impede efficient management.

7. Conclusion

Prior research has extensively examined the economic determinants of the level of executive compensation, as well as the economic determinants and effects of individual features of compensation contracts. That said, a byproduct of boards' attempts to write efficient contracts that reflect firm and CEO characteristics and address principal-agent conflicts is that the resulting contracts can become quite complex overall. Further, the presence of external factors that affect the contracting process may lead to additional complexity. Shareholders, the popular press, and academics have expressed concerns about an increase in complexity of CEO compensation and its potential impact. However, there is limited evidence that documents the extent to which the complexity of compensation has increased, what factors may help explain this increase, and the implications for firms and their shareholders.

We construct measures of complexity using details from proxy statements and document that complexity has, in fact, increased substantially over time. That increase stems from the use of more performance measures, more performance-measurement periods, and relative performance conditions. Importantly, complexity resides in the components of pay more heavily weighted in CEO contracts, and firms have placed greater weight on those more complex pay components in recent years.

Our model suggests that compensation complexity is predictably related to firm, CEO, and governance characteristics that proxy for organization and operational complexity, needs to address principal-agent conflicts, and the degree of discretion compensation contracts allow, all consistent with efficient contracting. However, we find that compensation complexity reflects the influence of external institutions – namely, peer firms' contracts, the use of compensation consultants, institutional investors, and proxy advisors; the addition of external factors into our model increases its explanatory power by more than half. These results suggest that complexity reflects factors beyond efficient contracting.

We find that changes over time in both the factors included in our model (firm, CEO, governance, and renegotiation characteristics) and their weights in explaining complexity are related to the increase in complexity over our sample period. Though this suggests the increase in complexity is partially associated with efficient contracting, the role of external factors becomes substantially greater over time, reflecting potential inefficiencies in compensation design.

Finally, we find that higher compensation complexity is associated with lower future firm performance and document that when within-contract performance measures are more highly correlated, the negative impact on performance is mitigated, consistent with distraction from conflicting objectives hampering CEO decision-making. While we cannot interpret the evidence as causal, it suggests potential unintended consequences of compensation complexity.

Our results should be interpreted with caution, as we cannot dismiss concerns regarding endogeneity, a common issue in compensation studies. Having said that, we view our development of a measure of compensation complexity and documenting and explaining the increase in that complexity over time as relevant contributions to the literature. Our study takes an important first step in what might be considered the beginning of a longer journey in studying the complexity of compensation. Future research might consider that complexity can come in many different forms (e.g., the level, slope, and convexity of incentive pay; complexity in short-term versus long-term compensation) and explore each. In addition, while we provide initial evidence on the implications of compensation complexity on future performance, there is more work to be done to determine the avenues through which this happens.

Appendix A

Part 1: Computation of Complexity

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 #
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*

Part 2: Example Calculation of Complexity

ConocoPhillips (CIK 1163165) has a score of 25 for the fiscal year ended 12/31/2010 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	3
	• Number time periods	1
	Has relative perf conds	1
	• Number of perf measures	4
	• Number time periods	1
LT Cash Bonus		0
Stock	Has time conditions	0
	Has absolute perf conds	1
	• Number of perf measures	2
	• Number time periods	3
	Has relative perf conds	1
	• Number of perf measures	3
	• Number time periods	3
Stock Options	Has time conditions	1
Total Score		25

Information from the Proxy Statement dated 03/31/2011 regarding **short-term cash bonus** is as follows:

"In determining award payouts under VCIP [the authors noted: Variable Cash Incentive Program] for 2010, the Committee considered the following performance criteria:

- Company Performance for 2010— In 2010, our 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> [the authors noted: BOE stands for barrel of oil extracted]compared with the same peer group noted above;*
- *Our <u>health, safety and environmental performance</u>; and*

- *Advancement and support of our key strategic initiatives and plans*.

- Business Unit Performance in 2010—In determining award unit performance [the authors noted: award unit here refers to business unit], management's determinations of performance by the Company's award units under their performance criteria were reviewed and approved by the Committee. Each executive participated in the operational and staff award units, respectively, over which they had responsibility, weighted to reflect their time of service within such units. The Committee determined that the combined corporate and award unit performance merited base awards of between 151% and 162% of target for each of our Listed Executive Officers, other than Mr. Mulva. As noted under "Business Unit Performance Criteria" beginning on page 37, Mr. Mulva's award, as CEO, is based on individual and overall Company performance.

- Individual Performance Adjustments—Finally, the Committee considered individual adjustments for each Listed Executive Officer's 2010 VCIP award based upon a subjective review of the individual's impact on the Company's financial and operational success during the year. The Committee considered the totality of the executive's performance in deciding the individual adjustments. Based on the foregoing, the Committee approved individual performance adjustments of between 10% and 30% for each of our Listed Executive Officers. The individual adjustments for these officers reflect the Committee's recognition of these individuals' contributions to the strong 2010 operational performance of their respective operating units.

Business Unit Performance Criteria

… Moreover, because our CEO is responsible for overall Company performance, his award is based solely on individual and overall Company performance.

Individual Performance Criteria

Individual adjustments for our Listed Executive Officers are approved by the HRCC, based on the recommendation of the CEO (other than for himself). The CEO's individual adjustment is determined by the Committee taking into account the prior review of the CEO's performance, which is conducted jointly by the HRCC and the Committee on Directors' Affairs."

ConocoPhillips 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 at the company level (relative annual total stockholder return, relative annual adjusted return on capital employed, relative annual adjusted cash return on capital employed, and relative adjusted cash contribution BOE), two absolute performance measures at the company level (health, safety and environmental performance and key strategic initiatives and plans), and one absolute performance measures at the individual level (individual performance). Hence, we further assign 7 points. We assign 2 more points since absolute performance is measured over one time period and relative performance is measured over one time period.

Information from the Proxy Statement regarding **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 [the authors noted: the Performance Share Program].

- *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."*

Stock options granted are just time vested and thus receive a score of one.

Information from the Proxy Statement regarding **stock** plans is as follows:

" Performance Share Program—The PSP rewards executives based on their <u>individual performances</u> and <u>the performance of the Company</u> over <u>a three-year period</u>. 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. Thus, in any given year, there are three overlapping performance periods. Use of a multi-year performance period helps to focus management on longer-term results.

Each executive's individual award under the PSP is subject to a potential positive or negative performance adjustment at the end of the performance period. Although the HRCC maintains final discretion to adjust compensation in accordance with any extraordinary circumstances that may arise, and has done so in the past, program guidelines generally result in an award range between 0 to 200 percent of target. Final awards are based on the Committee's subjective evaluation of <u>the Company's performance</u> relative to the established metrics (discussed below under the heading "Measuring Our Performance under Our Compensation Programs") and of each executive's <u>individual performance</u>. The Committee considers input from the CEO with respect to Senior Officers. Targets for participants whose salary grades are changed during a performance period are prorated for the period of time such participant remained in each relevant salary grade.

Measuring Our Performance Under Our Compensation Programs

For PSP, the criteria for the 2010 program year required that the Company meet one of the following measures as a threshold to an award being made to any Listed Executive Officer: (1) Top two-thirds of specified companies in improvement in <u>return on capital employed</u> (adjusted net income); (2) Top two-thirds of specified companies in <u>total stockholder return</u>; (3) Top two-thirds of specified companies in <u>cash per BOE</u>; or (4) <u>Cash from operations</u> (normalized for the impact of asset sales and assumptions made in our budgeting process as to price for oil equivalents and excluding non-cash working capital) of at least $30.7 billion."

The performance shares are granted based on both relative and absolute performance metrics, which again gives them 2 points. In addition, they have three relative performance measures at the company level (return on capital employed, total stockholder return, and cash per BOE), one absolute performance measure at the company level (cash from operations), and one absolute performance measure at the individual level (individual performance). Hence, we assign 5 more points. Finally, both absolute and relative performance is measured over 3 time periods, so we assign 3 points to each.

There is no time-vesting conditions for the stock granted and thus receive a score of zero.

Part 3: External Validation of Complexity Proxy

Because our construct for complexity is self-constructed, we attempt to provide some external validity. First, we note that our proxy is associated with variables that have been shown to be related to economic determinants of compensation contracts when the firm is complex. Documenting these relations provides some reassurance that our measure of contract complexity is economically sound. Nevertheless, we attempt to validate our proxy as follows. We examine whether changes in contract complexity prompt SEC comment letters. Underlying this test is the assumption that if a compensation contract increases in complexity, it has more elements described in the proxy statement. The more elements described (details with respect to performance metrics, time periods, relative performance benchmarks), the more pieces of information the SEC might seek clarification on. This leads to the issuance of comment letters related to executive compensation, as comment letters typically ask for more clarity or explanation.[33]

For our sample of firms, we use Audit Analytics to identify all comment letters issued between January 2006 and December 2020 that are related to the proxy statements. We further parse these comment letters into whether they relate specifically to executive compensation or some other aspect of the proxy statement. We then examine whether the change in complexity from fiscal year *t*-1 to year *t* is associated with the number of comment letters received related to executive compensation in the year *t* proxy statement. As an example, we are testing whether an increase in complexity from fiscal 2015 to fiscal 2016 is associated with receiving comment letters on the fiscal 2016 proxy statement.

To examine this, we regress the number of comment letters received that related to executive compensation on the percentage change in contract complexity after controlling for firm size (log of market value of equity) to control for business complexity and including industry and year fixed effects. In a separate regression, we also control for the number of comment letters received related to non-executive compensation issues in the same proxy statement to control for a firm's general tendency to receive comment letters. In both regresssions, we find that increases in complexity are positively ($p < 0.10$) related to the number of executive compensation comment letters. Then, as a falsification test, we replace the dependent variable of compensation related comment letters with the number of non-executive compensation comment letters. We find no evidence that increases in complexity are positively related to the number of non-executive compensation comment letters. This falsification test provides some comfort that business complexity, associated with both contract complexity and the likelihood of receiving a comment letter, is <u>not</u> driving the relation we document. Although imperfect, we believe these tests provide some assurance that our proxy captures some dimension of contract complexity.

[33] https://www.sec.gov/divisions/corpfin/guidance/execcompdisclosure.htm

Appendix B
Variable Definitions

Variable name (in alphabetical order)		Variable definition
$AvgRET_{jt+1,\ t+2}$	=	the average of RET_{jt+1} and RET_{jt+2}.
$AvgROA_{jt+1,\ t+2}$	=	the average of ROA_{jt+1} and ROA_{jt+2}.
$BUSYNESS_{jt}$	=	the percentage of outside directors that hold three or more directorships (i.e., are busy) (see Fich and Shivdasani, 2006).
$CHAIR_{jt}$	=	indicator variable equal to 1 if the CEO is also the chair of the board of directors.
$CONSULT_{jt}$	=	number of different compensation consultants providing services to the firm for the design of the compensation contract for year *t*.
$COOPT\_MISSING_{jt}$	=	indicator variable equal to 1 if *COOPTED* is missing and 0 otherwise.
$COOPTED_{jt}$	=	the fraction of directors appointed after the CEO takes office, weighted by tenure; zero if missing (Coles et al., 2014). This variable is obtained from Lalitha Naveen's website: https://sites.temple.edu/lnaveen/data/.
$FOUNDER_{jt}$	=	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.
$High\_Corr_{jt}$	=	a dummy variable set to one if the median correlation among the different performance metrics included a CEO's contract is above the sample median, and zero otherwise. The correlation is calculated in four steps. First, for each firm-year contract we identify all performance metrics used (e.g., EPS, Stock Returns, Sales Revenue). Second, we identify the minimum, target and maximum thresholds set for each performance metric. For grants with multi-year performance metrics and with different thresholds per year (e.g., EPS target is \$1.1 for year 2006, \$1.2 (\$1.3) for year 2007 (2008)), we keep the threshold set for the first year of the performance period. Third, for each pair of performance measure (e.g., EPS and stock returns, or EPS and Sales Revenue) we calculate the correlation of these pair-wise observations from 2006 up to year *t* by threshold (minimum, target and maximum). Fourth, for each firm-year, we calculate the median of the pair-wise correlations among all the pairs of performance measures. For example, the median of the pair-wise correlations for a firm that uses 3 performance measures in 2015 will be calculated using up to 90 observations (10 years * 3 pair-wise correlations * 3 different thresholds (minimum, target, maximum)).
IND_j	=	indicator variable for industry, based on Global Industry Classification codes for firm *j*.
$IND\_DIRECTOR_{jt}$	=	the percentage of board of directors that are independent for firm *j* in year *t*.
$IND\_SIZE\_COMPL_{jt}$	=	*IND_SIZE_WTD_COMPL* (*IND_SIZE_RAW_COMPL*), when the dependent variable for a regression is *WTD_COMPL* (*RAW_COMPL*), equals the median value of *WTD_COMPL* (*RAW_COMPL*) for firms in the same industry and size quartile as firm *j* (excluding the focal firm *j*) for year *t*.
$lnCEO\_PERKS_{jt-1}$	=	natural log of 1 plus other compensation of a CEO (*CEO_PERKS*) in year *t*-1, data from ExecuComp.
$lnGUIDELINES\_ISS_{t-1}$	=	natural log of *GUIDELINES_ISS*, which is the number of keywords related to components of compensation complexity in the guidelines issued by ISS in the previous calendar year (keywords are "bonus," "stock," "vesting," "vest," "vested," "period," "duration," "time," "metric," "performance," "goal," and "relative"). To ensure the

		keywords relate only to executive compensation, we exclude those relating solely to director or employee pay.
$lnMV_{jt-1}$	=	natural log of the market value of equity (*MV*) of firm *j* at the end of year *t*-1.
$lnSALE_{jt}$	=	natural log of the sales revenue (*SALE*) of firm *j* in year *t*.
$lnSTDRET_{jt-1}$	=	natural log of the standard deviation of monthly stock returns for firm *j* for the two years leading to the end of year *t*-1.
$lnSTDROA_{jt-1}$	=	natural log of the standard deviation of annual *ROA* for firm *j* for the five years leading to the end of year *t*-1.
$lnTENURE_{jt}$	=	natural log of the CEO tenure (in years, *CEOTENURE*) for firm *j* in year *t*.
$M\&A_{jt-1}$	=	the number of mergers and acquisitions the firm completed in year *t*-2 and *t*-1 (data from SDC Platinum).
$MTBA_{jt-1}$	=	(market value of equity plus book value of total liabilities)/ book value of assets of firm *j* at the end of year *t*-1.
$OWNSHIP_{jt}$	=	CEO total ownership of firm stock (ExecuComp variable *shrown_tot_pct*).
$PIFO_{jt-1}$	=	indicator variable equal to 1 if pretax foreign income for firm *j* in year *t*-1 is nonmissing, 0 otherwise.
$R\&D_{jt-1}$	=	research and development expenditures / total assets for firm *j* at the end of year *t*-1. If missing, we set it to 0.
RAW_COMPL_{jt}	=	index of compensation complexity computed from Incentive Lab data, as described in Section 3.2. Specifically, we sum up the complexity scores for each type of compensation.
$RENEG_{jt}$	=	the proportion of words in the CD&A related to renegotiation (keywords: "discretion," "discretionary" (excluding "negative discretion," "negative discretionary," "no discretion," and "no discretionary"), "renegotiate," "renegotiated," "renegotiating," "renegotiation," "retest," "retested," "retesting," and "subjective" (but only if "subjective" appears in the same sentence with "performance," "measures" or "adjustment(s)")).
RET_{jt+1}	=	12-month stock returns in year t+1.
$RETIRE_{jt}$	=	indicator variable equal to 1 if the CEO is older than 65 in year *t*.
ROA_{jt+1}	=	net income divided by average total assets in year t+1.
$SEGMTS\_HH_{jt-1}$	=	1 – (Herfindahl index computed based on the proportion of total revenues for firm *j* in year *t*-1 accounted for by each business segment). We use segment data from Compustat to calculate the proportion of revenues accounted for by each segment (see Godigbe et al., 2022).
$SOP\_MISSING_{jt-1}$	=	indicator variable equal to 1 if say-on-pay proposals for firm *j* in year *t*-1 are missing and 0 otherwise.
SOP_LESS80_{jt-1}	=	indicator variable equal to 1 if the percentage of votes cast FOR a say-on-pay proposal (# votes FOR/(# votes FOR + # votes AGAINST + # votes ABSTAIN)) for firm *j* in year *t*-1 is less than 80% and 0 otherwise.
$TOP5\_INST\_OWN_{jt-1}$	=	percentage of shares outstanding owned by the top five institutional investors in year *t*-1.
WTD_COMPL_{jt}	=	weighted average index of compensation complexity computed from Incentive Lab data, as described in Section 3.2. Specifically, we use the grant-date fair value of each type of compensation as a weight to calculate the average complexity.
$YEAR_t$	=	indicator variable for year *t*.

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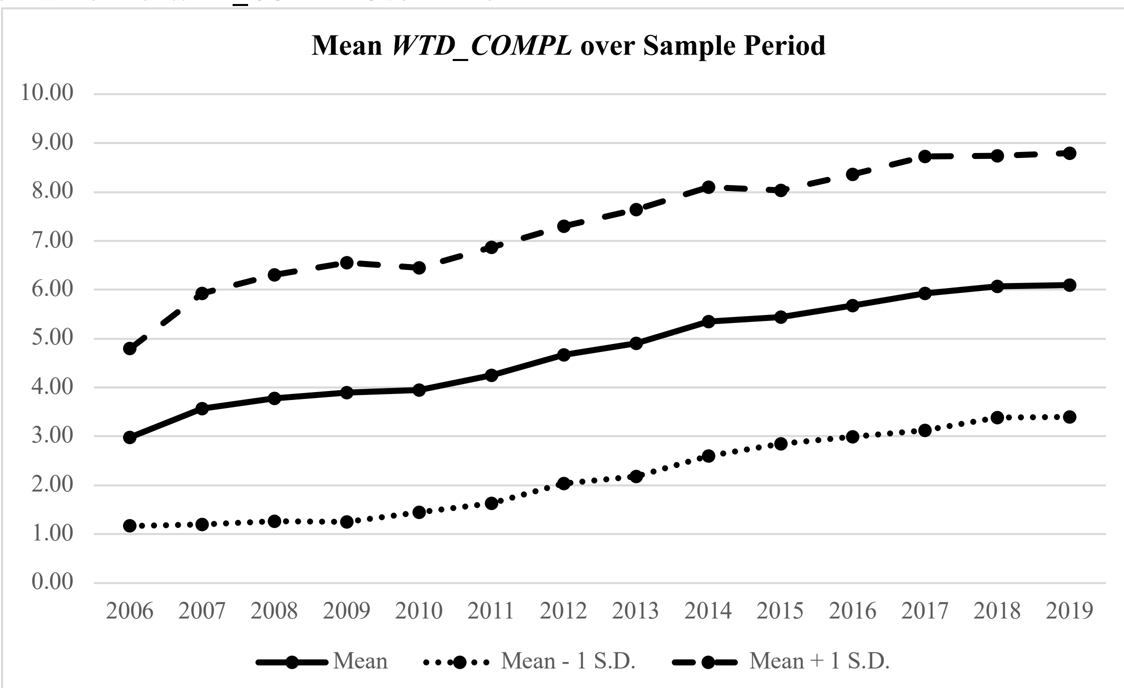
Figure 1
Measures of compensation complexity by year over the sample period 2006-2019

This figure plots the sample mean of the complexity measures over time. Panel A (B) presents the value of mean and one standard deviation from the mean for *WTD_COMPL* (*RAW_COMPL*).

Panel A. Mean of *WTD_COMPL* Over Time



Panel B. Mean of *RAW_COMPL* Over Time

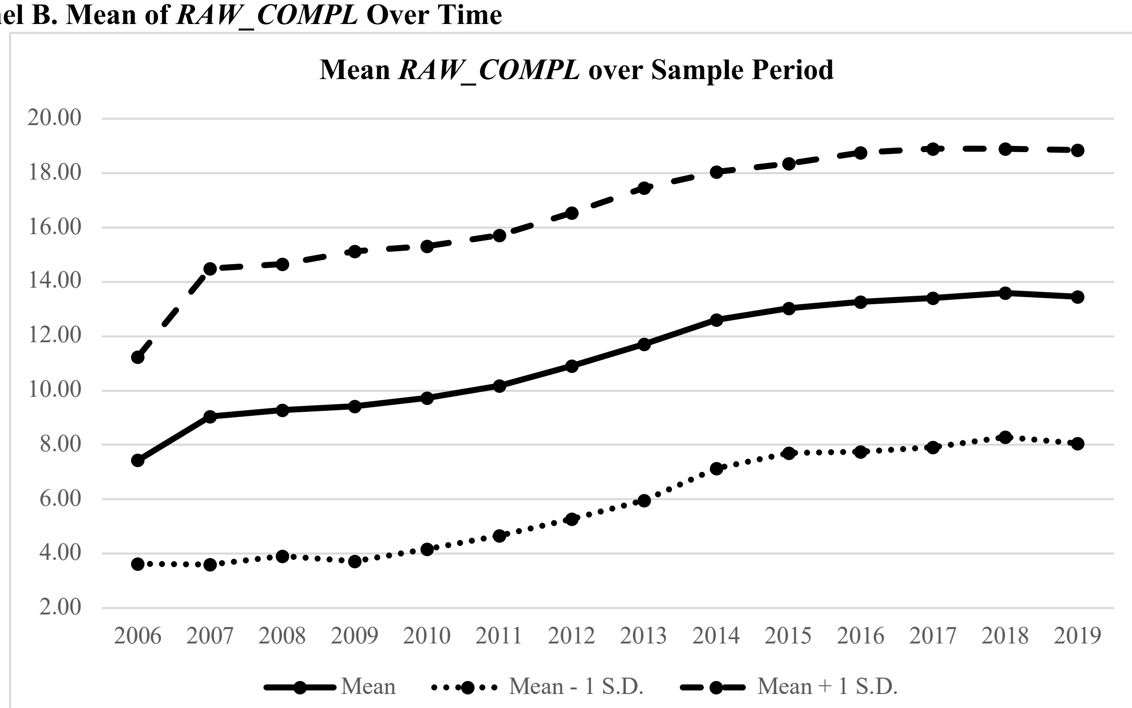


Figure 2
Inputs to the calculation of compensation complexity by year over the sample period 2006-2019

This figure plots the key elements in computing the compensation complexity score over time. The four key elements are: (1) the number of types of compensation; (2) the number of unique performance measures; (3) the number of unique performance periods; and (4) whether relative performance measures are used in addition to absolute measures. The mean value of each element in each year is plotted.

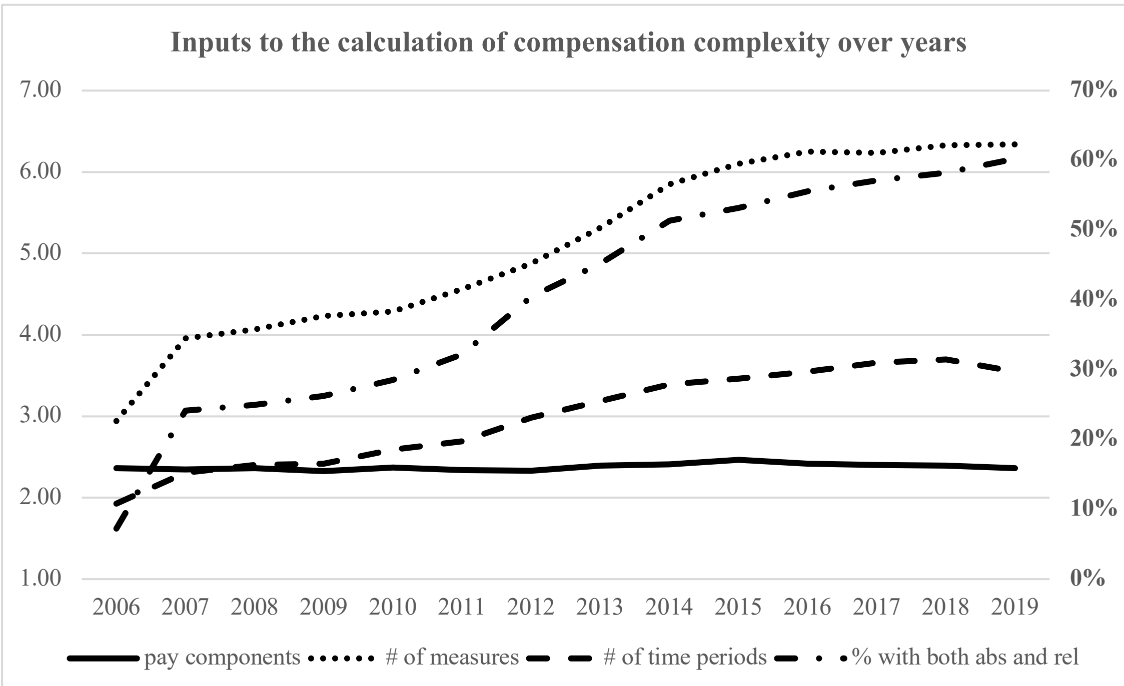
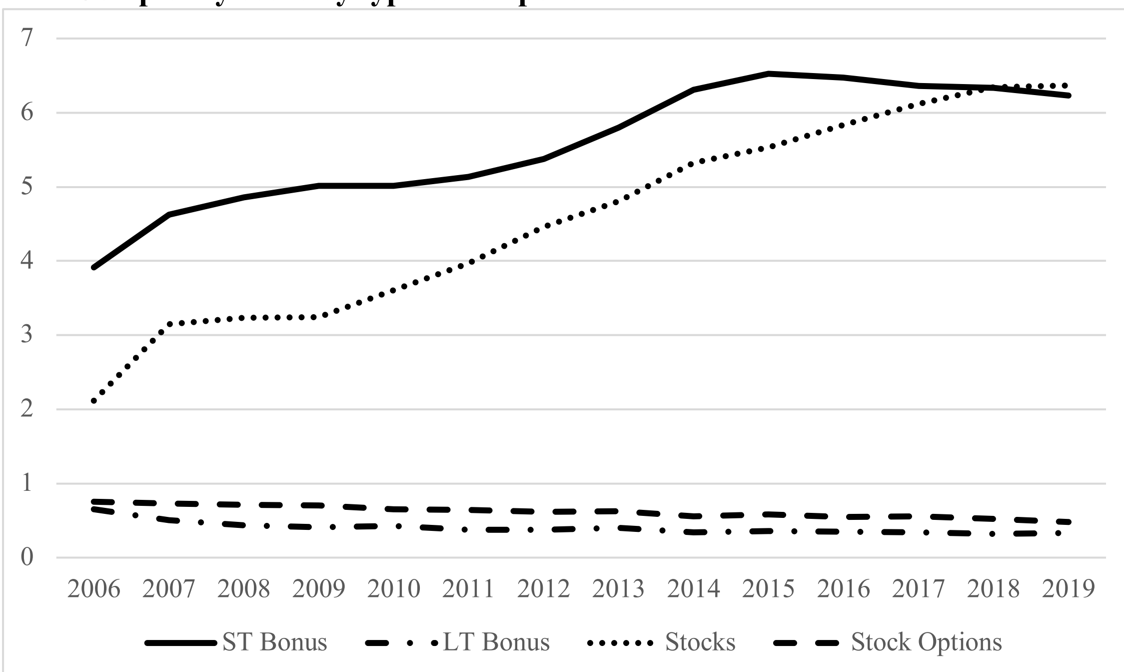


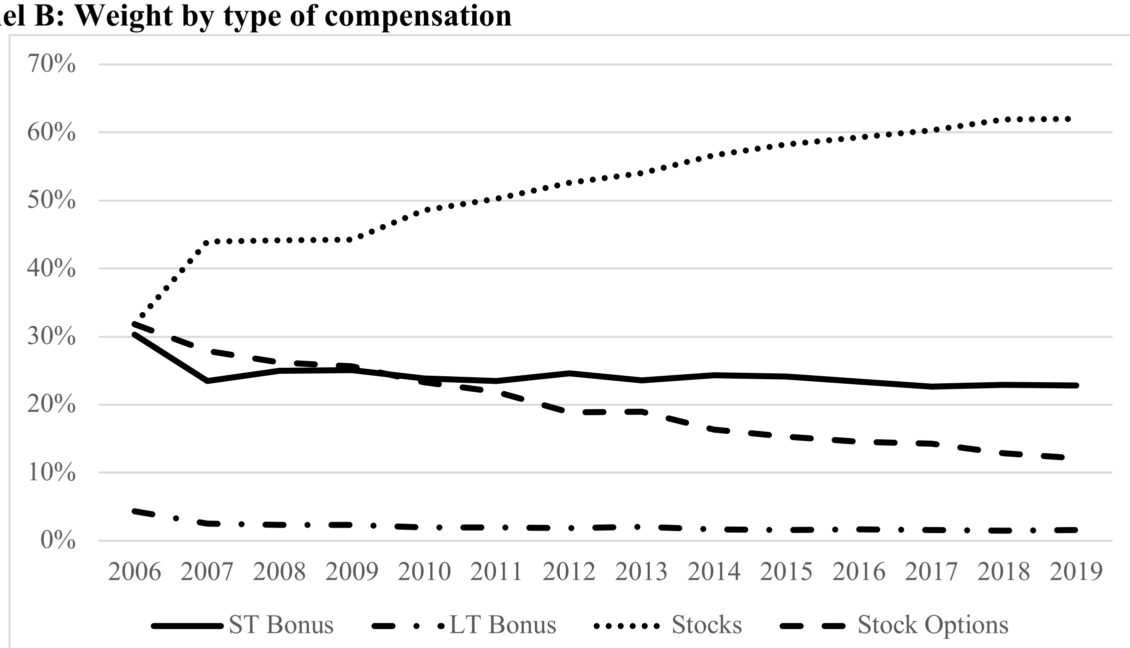
Figure 3
Complexity by type of compensation over the sample period 2006-2019

This figure plots the descriptive statistics on the four types of compensation (i.e., short-term bonus, long-term bonus, stocks, and stock options) over time. Panel A presents the average complexity score measure for each individual type of pay. Panel B plots the weight of expected payout on each form of pay. Panel C shows the proportion of firms offering each type of compensation.

Panel A: Complexity score by type of compensation



Panel B: Weight by type of compensation



Panel C: Proportion of firms offering type of compensation

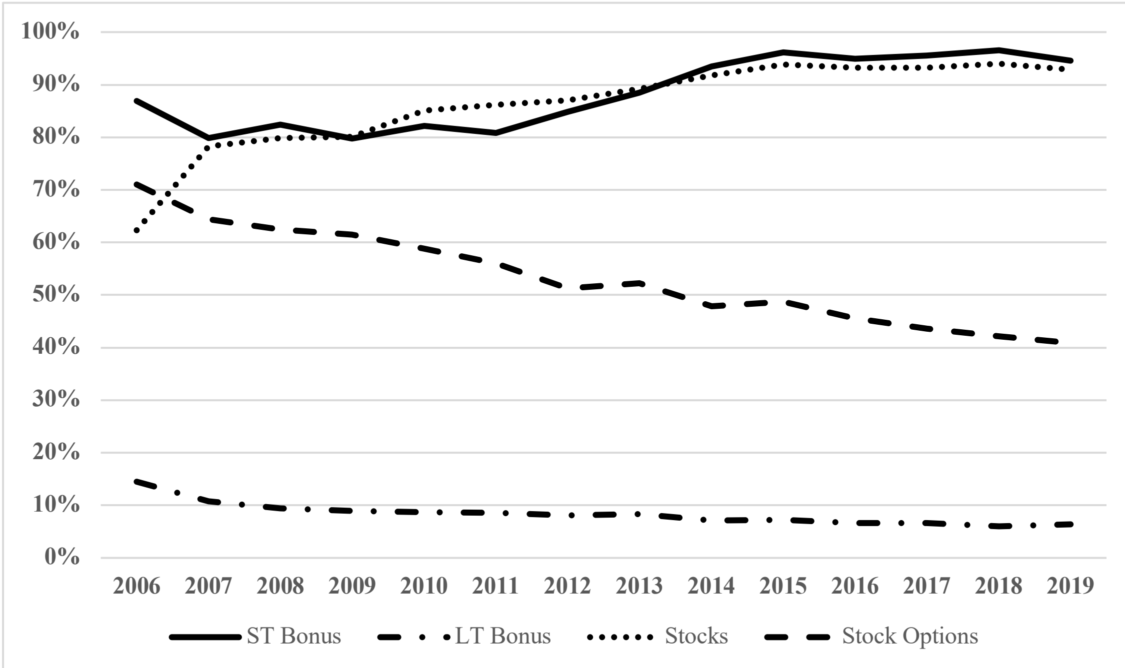
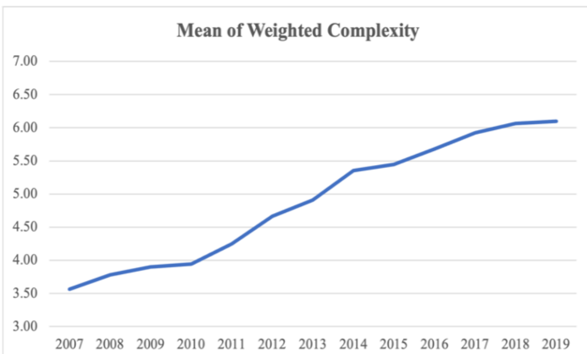
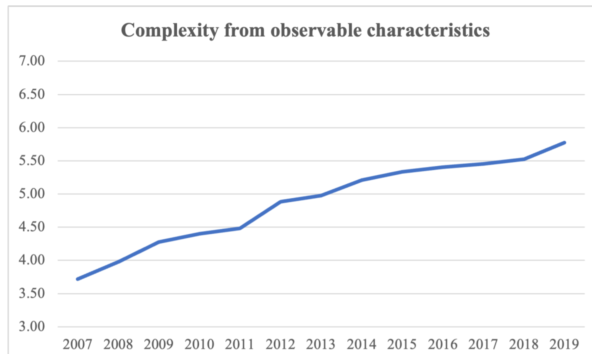


Figure 4
Observable and Unobservable Components of Changes in Weighted Complexity (*WTD_COMPL*)

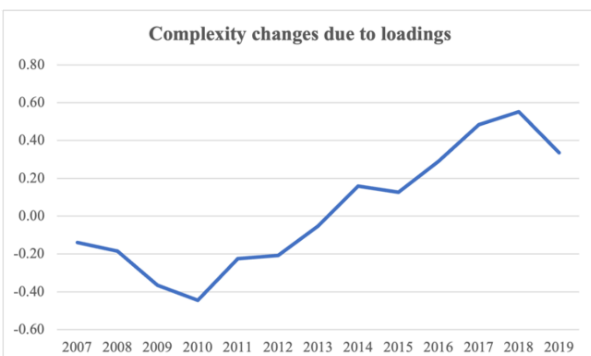
This figure plots the observable and unobservable components that explain the increase in compensation complexity over time. Panel A plots *WTD_COMPL* over time (consistent with that plotted in Figure 1) for comparison. Panel B shows the portion of complexity due to the observable characteristics over time (denoted component (1) in Eq. (3)). Panel C illustrates changes in complexity resulting from changes in coefficients over time, relative to the average coefficients in the pooled sample (denoted component (2) in Eq. (3)). Panel D shows changes in complexity due to changes in unmeasured coefficients and characteristics (i.e., complexity changes due to unobservables). Panel E quantifies the contribution of observed characteristics, coefficients and unobservables to the increase in complexity over time.



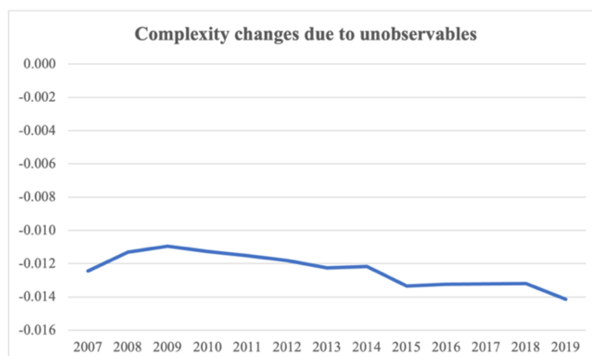
Panel A



Panel B



Panel C



Panel D

Panel E

Time period	Total Change in WTD_Complexity	Contribution of changes in Characteristics (Panel B)	Contribution of changes in Loadings (Panel C)	Contribution of changes in Unobserved Complexity (Panel D)
Full Sample (2007-2019)	2.532	2.059 (81%)	0.475 (19%)	-0.002 (0%)
2007-2013	1.346	1.258 (93%)	0.088 (7%)	0.000 (0%)
2013-2019	1.186	0.801 (67%)	0.387 (33%)	-0.002 (0%)

Table 1
Descriptive statistics for compensation complexity

This table provides descriptive statistics for our measure of compensation complexity, defined in Section 2.2, and the inputs to its calculation. Panel A reports overall statistics. Panels B and C report statistics related by industry where industry is defined as Global Industry Classification Sectors.

Panel A: Descriptive statistics for complexity

Variable	N	Mean	Std. Dev.	1%	25%	50%	75%	99%
WTD_COMPL	9,679	4.81	2.77	0.00	2.92	4.34	6.33	14.00
RAW_COMPL	9,679	11.36	5.76	0	7	11	15	29
# of pay components	9,679	2.38	0.73	1	2	2	3	4
# of measures	9,679	5.18	3.60	0	3	5	7	18
# of time periods	9,679	3.03	2.09	0	2	3	4	11
% with both abs and relative	9,679	41.70%	49.30%	0%	0%	0%	100%	100%
Score – Short Term Bonus	9,679	5.64	3.66	0.00	4.00	5.00	7.00	19.00
Score – Long Term Bonus	9,679	0.38	1.40	0.00	0.00	0.00	0.00	8.00
Score – Stock	9,679	4.66	3.53	0.00	1.00	4.00	7.00	15.00
Score – Stock Options	9,679	0.62	0.81	0.00	0.00	1.00	1.00	5.00
Weight – Short Term Bonus	9,679	0.24	0.20	0.00	0.14	0.21	0.28	1.00
Weight – Long Term Bonus	9,679	0.02	0.07	0.00	0.00	0.00	0.00	0.40
Weight – Stock	9,679	0.53	0.28	0.00	0.37	0.55	0.75	1.00
Weight – Stock Options	9,679	0.20	0.23	0.00	0.00	0.15	0.32	1.00

Table 1 (cont.)
Descriptive statistics for compensation complexity

Panel B: Complexity by Global Industry Classification (GIC) Sector

				WTD_COMPL			*RAW_COMPL*		
GIC Sector		**N**	**%**	**Mean**	**Median**	**Std. Dev.**	**Mean**	**Median**	**Std. Dev.**
10	Energy	640	6.61	4.88	4.69	2.82	12.16	12	6.78
15	Materials	565	5.84	5.08	4.48	2.71	12.57	12	5.51
20	Industrials	1,397	14.43	4.56	4.19	2.43	11.23	11	5.20
25	Consumer Discretionary	1,401	14.47	4.11	3.85	2.29	9.70	10	4.82
30	Consumer Staples	501	5.18	4.34	4.00	2.17	11.40	11	5.25
35	Health Care	1,020	10.54	4.24	4.01	2.35	11.57	12	5.16
40	Financial Services	1,263	13.05	5.05	4.74	2.84	11.11	11	6.15
45	Information Technology	1,507	15.57	4.74	4.29	2.86	10.85	11	5.48
50	Telecommunication Services	287	2.97	4.74	4.21	2.93	10.36	11	5.52
55	Utilities	474	4.90	7.18	6.99	2.86	16.05	15	5.97
60	Real Estate	624	6.45	5.91	5.76	3.59	11.73	11.5	6.80
	Total	9,679	100						

Panel C: Mean values of inputs to the calculation of complexity by GIC Sector

GIC Sector		**# of components of pay**	**# of measures**	**# of time periods**	**% with both abs and relative**
10	Energy	2.28	5.91	2.97	66%
15	Materials	2.60	5.56	3.40	54%
20	Industrials	2.54	4.94	3.03	38%
25	Consumer Discretionary	2.40	4.01	2.77	26%
30	Consumer Staples	2.60	5.25	2.89	37%
35	Health Care	2.58	5.51	2.81	32%
40	Financial Services	2.21	5.21	2.90	40%
45	Information Technology	2.30	4.59	3.25	32%
50	Telecommunication Services	2.21	4.83	2.68	33%
55	Utilities	2.27	8.36	4.08	89%
60	Real Estate	2.01	5.79	2.86	61%
	Total	2.38	5.18	3.03	42%

Table 2
Descriptive statistics

This table reports descriptive statistics for our dependent, explanatory and control variables. Variable definitions are in Appendix B.

Variable	N	Mean	Std. Dev.	25%	50%	75%
WTD_COMPL	9,679	4.81	2.77	2.92	4.34	6.33
RAW_COMPL	9,679	11.36	5.76	7.00	11.00	15.00
MV (in millions)	9,679	16,229.00	36,720.00	2,518.00	5,303.00	14,196.00
lnMV	9,679	22.54	1.30	21.65	22.39	23.38
MTBA	9,679	1.99	1.24	1.18	1.58	2.30
R&D	9,679	0.02	0.05	0.00	0.00	0.02
lnSTDRET	9,679	0.08	0.04	0.05	0.07	0.10
SEGMTS_HH	9,679	0.26	0.29	0.00	0.08	0.54
PIFO	9,679	0.64	0.48	0.00	1.00	1.00
M&A	9,679	3.93	5.17	1.00	2.00	5.00
CEOTENURE	9,679	8.29	7.12	3.33	6.17	10.92
lnTENURE	9,679	1.99	0.68	1.47	1.97	2.48
RETIRE	9,679	0.08	0.26	0.00	0.00	0.00
FOUNDER	9,679	0.12	0.32	0.00	0.00	0.00
OWNSHIP	9,679	1.51	3.59	0.16	0.41	1.10
CHAIR	9,679	0.55	0.50	0.00	1.00	1.00
RENEG	9,679	0.06	0.06	0.02	0.05	0.08
IND_DIRECTOR	9,679	0.81	0.10	0.75	0.85	0.90
BUSYNESS	9,679	0.09	0.11	0.00	0.08	0.14
COOPTED	9,679	0.21	0.29	0.00	0.07	0.30
COOPT_MISSING	9,679	0.26	0.44	0.00	0.00	1.00
CEO_PERKS (in thousands)	9,679	331.90	1,870.00	30.26	101.60	264.10
lnCEO_PERKS	9,679	4.48	1.63	3.44	4.63	5.58
CONSULT	9,679	1.08	0.50	1.00	1.00	1.00
IND_SIZE_WTD_COMPL	9,679	4.50	1.52	3.48	4.30	5.39
IND_SIZE_RAW_COMPL	9,679	10.93	3.04	9.00	11.00	13.00
TOP5_INST_OWN	9,679	0.30	0.09	0.24	0.30	0.36
GUIDELINES_ISS	9,679	195.40	33.80	192.00	200.00	215.00
lnGUIDELINES_ISS	9,679	5.26	0.20	5.26	5.30	5.38
ROA_{t+1}	9,962	0.05	0.07	0.02	0.05	0.09
RET_{t+1}	9,962	0.07	0.34	-0.09	0.11	0.27
$AvgROA_{t+1,t+2}$	9,962	0.05	0.07	0.02	0.05	0.09
$AvgRET_{t+1,t+2}$	9,962	0.08	0.23	-0.04	0.10	0.22
ROA_{t}	9,962	0.06	0.07	0.02	0.05	0.09
$lnSTDROA_{t-1}$	9,962	0.04	0.05	0.01	0.02	0.04
SALE (in millions)	9,962	11,420.00	26,175.00	1,552.00	3,755.00	10,102.00
lnSALE	9,962	22.11	1.41	21.16	22.05	23.04
$SOP\_MISSING_{t-1}$	4,409	0.06	0.23	0	0	0
SOP_LESS80_{t-1}	4,409	0.11	0.32	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 2.2. All other variables are defined in Appendix B. Significance at *p*-value < 0.05 is presented in bold.

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)
(1) *WTD_COMPL*	1																								
(2) *RAW_COMPL*	**0.79**	1																							
(3) *lnMV*	**0.15**	**0.21**	1																						
(4) *MTBA*	**-0.17**	**-0.12**	**0.17**	1																					
(5) *R&D*	**-0.06**	**-0.03**	**-0.07**	**0.36**	1																				
(6) *lnSTDRET*	**-0.13**	**-0.14**	**-0.40**	**-0.08**	**0.14**	1																			
(7) *SEGMENTS_HH*	**0.04**	**0.05**	**0.07**	**-0.14**	-0.01	-0.06	1																		
(8) *PIFO*	**-0.06**	0.00	**0.12**	**0.18**	**0.28**	**0.04**	**0.18**	1																	
(9) *M&A*	0.01	0.00	**0.41**	**-0.05**	-0.01	**-0.14**	**0.17**	**0.18**	1																
(10) *lnTENURE*	**-0.09**	**-0.12**	**-0.03**	**0.08**	**0.02**	**-0.04**	**-0.06**	**-0.07**	0.01	1															
(11) *RETIRE*	**-0.06**	**-0.09**	-0.02	0.00	**-0.03**	0.00	**-0.02**	**-0.03**	0.00	**0.31**	1														
(12) *FOUNDER*	**-0.12**	**-0.18**	**-0.07**	**0.14**	**0.09**	**0.08**	**-0.07**	-0.01	**-0.03**	**0.42**	**0.21**	1													
(13) *OWNSHIP*	**-0.2**	**-0.25**	**-0.15**	**0.09**	**0.06**	**0.07**	**-0.05**	0.02	**-0.04**	**0.39**	**0.25**	**0.41**	1												
(14) *CHAIR*	**-0.02**	**0.02**	**0.13**	**-0.07**	**-0.13**	**-0.07**	0.02	**-0.05**	**0.06**	**0.31**	**0.15**	**0.16**	**0.14**	1											
(15) *RENEG*	**-0.15**	**-0.19**	**-0.13**	**0.02**	-0.01	**0.10**	**-0.08**	**-0.07**	**-0.03**	**0.10**	**0.06**	**0.10**	**0.16**	0.01	1										
(16) *IND_DIRECTOR*	**0.19**	**0.27**	**0.16**	**-0.10**	0.01	**-0.08**	**0.12**	**0.09**	**0.08**	**-0.15**	**-0.17**	**-0.16**	**-0.23**	**0.14**	**-0.18**	1									
(17) *BUSYNESS*	**0.03**	**0.06**	**0.18**	0.00	**0.07**	0.02	**0.05**	**0.12**	**0.11**	**-0.06**	**-0.05**	**-0.03**	**-0.06**	0.01	**-0.02**	**0.09**	1								
(18) *COOPTED*	**-0.07**	**-0.05**	0.01	**0.08**	**0.07**	0.00	**-0.03**	**0.04**	**0.04**	**0.56**	**0.19**	**0.34**	**0.26**	**0.22**	**0.04**	-0.02	0.02	1							
(19) *COOPT_MISSING*	**0.04**	**-0.03**	**-0.08**	0.01	0.00	**0.07**	**-0.06**	**-0.09**	**-0.08**	0.01	-0.01	**0.04**	0.01	**-0.07**	**0.02**	**-0.06**	**-0.06**	**-0.43**	1						
(20) *lnCEO_PERKS*	**0.07**	**0.12**	**0.28**	**-0.17**	**-0.24**	**-0.14**	**0.08**	**0.03**	**0.12**	**-0.04**	**0.07**	**-0.07**	**-0.03**	**0.16**	**-0.06**	**0.09**	**0.06**	0.00	**-0.05**	1					
(21) *CONSULT*	**0.09**	**0.14**	**0.07**	**-0.09**	**-0.04**	0.02	**0.07**	0.02	**0.02**	**-0.11**	**-0.05**	**-0.06**	**-0.13**	**0.03**	**-0.10**	**0.15**	**0.04**	**-0.03**	**-0.04**	**0.11**	1				
(22) *IND_SIZE_WTD_COMPL*	**0.33**	**0.30**	**0.25**	**-0.02**	**-0.08**	**-0.26**	0.00	**-0.11**	-0.02	0.01	0.01	**-0.09**	**-0.12**	-0.01	**-0.12**	**0.14**	**-0.08**	**-0.09**	**0.10**	-0.01	-0.00	1			
(23) *IND_SIZE_RAW_COMPL*	**0.29**	**0.32**	**0.39**	**0.03**	**-0.02**	**-0.28**	**0.08**	0.01	**0.02**	**-0.03**	-0.01	**-0.12**	**-0.16**	0.02	**-0.16**	**0.20**	-0.01	**-0.07**	0.01	**0.07**	**0.02**	**0.78**	1		
(24) *TOP5_INST_OWN*	**0.05**	0.01	**-0.28**	**0.03**	**0.09**	**0.10**	**-0.10**	**-0.02**	**-0.18**	**0.03**	-0.02	**0.05**	**-0.02**	**-0.10**	0.00	-0.01	**-0.04**	**-0.02**	**0.14**	**-0.13**	**-0.02**	**0.06**	-0.01	1	
(25) *lnGUIDELINES_ISS*	**0.14**	**0.13**	0.02	**-0.05**	-0.01	**0.15**	-0.01	**0.06**	**-0.03**	**0.05**	**0.05**	-0.02	**-0.06**	0.01	**-0.05**	**0.06**	**-0.08**	0.02	0.00	**-0.03**	**0.03**	**0.29**	**0.27**	0.00	1

Table 4
Regression of compensation complexity on firm characteristics, CEO characteristics, and other factors

This table provides results of OLS regressions of compensation complexity on proxies for firm characteristics, CEO characteristics, renegotiation, corporate governance, and external factors. *WTD_COMPL$_t$*, defined in Section 2.2, is the average of complexity scores across different types of compensation, weighted by the grant-date fair value of each type in fiscal year *t*. *RAW_COMPL$_t$* is the sum of complexity scores across different types of compensation in fiscal year *t*. All the other variables are defined in Appendix B. Columns 1, 2, 5, and 6 do not include fixed effects. Columns 3 and 7 include industry fixed effects. Columns 4 and 8 include industry and year fixed effects. Standard errors are clustered by firm. Robust *t*-statistics are reported in parentheses. ***, **, and * indicate significance at *p*-value < 0.01, *p*-value < 0.05 and *p*-value < 0.10, respectively.

Dependent variables:	*WTD_COMPL*				*RAW_COMPL*			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<u>*Firm Characteristics*</u>								
lnMV $_{t-1}$	0.340***	0.210***	0.230***	0.174***	0.872***	0.539***	0.589***	0.542***
	(6.50)	(4.08)	(4.44)	(3.24)	(7.78)	(4.68)	(5.20)	(4.72)
MTBA $_{t-1}$	-0.429***	-0.375***	-0.319***	-0.353***	-0.645***	-0.568***	-0.494***	-0.573***
	(-10.23)	(-9.44)	(-8.00)	(-8.88)	(-7.16)	(-6.51)	(-5.80)	(-6.67)
R&D $_{t-1}$	2.265*	2.198*	1.515	2.434*	7.279**	6.234**	4.964	6.917**
	(1.70)	(1.71)	(1.06)	(1.68)	(2.55)	(2.28)	(1.57)	(2.17)
lnSTDRET $_{t-1}$	-4.711***	-2.772**	-2.186*	1.225	-7.656***	-6.428**	-5.158**	2.989
	(-4.11)	(-2.36)	(-1.86)	(0.92)	(-3.02)	(-2.47)	(-1.99)	(1.01)
SEGMENTS_HH $_{t-1}$	0.026	0.064	-0.018	-0.067	-0.054	-0.228	-0.386	-0.371
	(0.13)	(0.35)	(-0.10)	(-0.36)	(-0.14)	(-0.59)	(-0.99)	(-0.96)
PIFO $_{t-1}$	-0.301**	-0.212*	-0.032	-0.090	-0.153	-0.188	0.144	0.059
	(-2.43)	(-1.82)	(-0.27)	(-0.75)	(-0.59)	(-0.75)	(0.55)	(0.23)
M&A $_{t-1}$	-0.037***	-0.017	-0.018*	-0.011	-0.136***	-0.092***	-0.091***	-0.080***
	(-3.39)	(-1.57)	(-1.71)	(-1.08)	(-5.39)	(-3.89)	(-3.90)	(-3.47)
<u>*CEO Characteristics*</u>								
lnTENURE $_t$	0.015	-0.103	-0.113	-0.137	-0.117	-0.271	-0.262	-0.302
	(0.16)	(-1.06)	(-1.20)	(-1.46)	(-0.58)	(-1.36)	(-1.32)	(-1.53)
RETIRE $_t$	-0.056	-0.220	-0.157	-0.290*	-0.225	-0.467	-0.372	-0.673
	(-0.29)	(-1.20)	(-0.88)	(-1.65)	(-0.47)	(-1.01)	(-0.82)	(-1.52)
FOUNDER $_t$	-0.096	-0.049	-0.107	-0.062	-1.060**	-0.961**	-1.042**	-0.949**
	(-0.45)	(-0.24)	(-0.52)	(-0.31)	(-2.27)	(-2.08)	(-2.25)	(-2.09)
OWNSHIP $_t$	-0.085***	-0.066***	-0.059***	-0.057***	-0.213***	-0.173***	-0.158***	-0.158***
	(-4.99)	(-4.08)	(-3.66)	(-3.42)	(-5.60)	(-4.75)	(-4.37)	(-4.24)
CHAIR $_t$	-0.295***	-0.189*	-0.206*	-0.049	-0.002	0.114	0.041	0.355*
	(-2.63)	(-1.75)	(-1.93)	(-0.45)	(-0.01)	(0.54)	(0.19)	(1.66)
<u>*Renegotiation*</u>								
RENEG $_t$	-3.968***	-2.895***	-3.058***	-2.203**	-10.172***	-8.191***	-8.447***	-6.685***

	(-4.51)	(-3.32)	(-3.51)	(-2.46)	(-5.82)	(-4.72)	(-4.84)	(-3.75)
<u>*Governance*</u>								
IND_DIRECTOR $_t$	3.194***	2.101***	2.152***	1.732***	9.385***	7.227***	7.155***	6.266***
	(6.41)	(4.33)	(4.34)	(3.48)	(8.65)	(6.66)	(6.53)	(5.66)
BUSYNESS $_t$	-0.077	0.625	0.634	0.923**	0.467	1.403	1.427	2.128**
	(-0.17)	(1.38)	(1.44)	(2.09)	(0.48)	(1.47)	(1.52)	(2.28)
COOPTED $_t$	0.262	0.398*	0.439**	0.441**	0.798	1.011**	1.051**	1.037**
	(1.15)	(1.83)	(2.00)	(2.03)	(1.56)	(2.02)	(2.10)	(2.09)
COOPT_MISSING $_t$	0.445***	0.278**	0.262**	0.045	0.195	0.113	0.097	-0.397
	(3.59)	(2.32)	(2.30)	(0.33)	(0.78)	(0.46)	(0.41)	(-1.42)
lnCEO_PERKS $_{t-1}$	-0.004	0.043	0.073**	0.078**	0.116*	0.150**	0.192***	0.211***
	(-0.13)	(1.38)	(2.36)	(2.51)	(1.71)	(2.24)	(2.86)	(3.14)
<u>*External Factors*</u>								
CONSULT $_t$		0.225**	0.217**	0.253***		0.811***	0.795***	0.869***
		(2.35)	(2.29)	(2.63)		(3.78)	(3.72)	(4.07)
IND_SIZE_COMPL $_t$		0.448***	0.361***	0.099***		0.354***	0.276***	0.042
		(14.69)	(11.84)	(2.94)		(9.84)	(8.05)	(1.18)
TOP5_INST_OWN $_t$		1.867***	1.981***	0.708		2.891***	3.195***	0.593
		(3.82)	(4.05)	(1.40)		(2.99)	(3.30)	(0.60)
lnGUIDELINE_ISS $_t$		0.720***	0.899***	-1.029**		1.775***	2.089***	-1.282
		(4.73)	(5.93)	(-2.40)		(5.50)	(6.63)	(-1.44)
Observations	9,679	9,679	9,679	9,679	9,679	9,679	9,679	9,679
Adjusted *R*-squared	0.1234	0.1893	0.2005	0.2277	0.1749	0.2176	0.2258	0.2528
Ind FE	NO	NO	YES	YES	NO	NO	YES	YES
Year FE	NO	NO	NO	YES	NO	NO	NO	YES

Table 5
Adjusted R^2 from regressions of complexity on determinants

This table reports the adjusted R^2 of different versions of Eq. (1) estimated during the earlier period (2007-2012) and later period (2013-2019). Compensation complexity is regressed on (i) only firm characterstics, (ii) only CEO characteristics, (iii) only contract renegotiation, (iv) only corporate governance characteristics, (v) only external factors, (vi) all determinants without external factors (i.e., firm, CEO, renegotiation, and governance characteristics), (vii) all determinants (i.e., firm, CEO, renegotiation, governance characteristics, and external factors), and (viii) all determinants with industry fixed effects. Specifications (i) through (vii) are estimated without industry fixed effects. Columns (1) through (4) report results using *WTD_COMPL*. Columns (5) through (8) report results using *RAW_COMPL*. Columns (1), (2), (5), and (6) report the average of adjusted R^2 of yearly estimates of Eq. (1). Columns (3), (4), (7), and (8) reports the adjusted R^2 of Eq. (1) estimated using pooled regressions.

	WTD_COMPL				*RAW_COMPL*			
Determinants	Earlier Period	Later Period	Earlier Period	Later Period	Earlier Period	Later Period	Earlier Period	Later Period
	Average of R^2 of annual regressions		R^2 from pooled regressions		Average of R^2 of annual regressions		R^2 from pooled regressions	
N=	4,754	4,856	4,754	4,856	4,754	4,856	4,754	4,856
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(i) ONLY Firm Chars	4%	10%	4%	10%	4%	10%	5%	10%
(ii) ONLY CEO Chars	3%	5%	3%	5%	7%	8%	7%	8%
(iii) ONLY Contract Renegotiation	1%	2%	1%	2%	2%	3%	2%	3%
(iv) ONLY Governance	2%	4%	2%	5%	6%	9%	6%	9%
(v) ONLY External Factors	3%	7%	4%	9%	4%	7%	5%	9%
(vi) Firm + CEO + Regegotiation + Governance	6%	15%	6%	15%	12%	18%	12%	19%
(vii) Firm + CEO + Regegotiation + Governance + External Factors	7%	17%	8%	19%	12%	20%	14%	22%
(viii) Firm + CEO + Regegotiation + Governance + External Factors with Industry fixed effects	9%	20%	11%	22%	13%	23%	15%	25%

Table 6
Determinants of complexity during
the earlier (2007-2012) and later (2013-2019) periods

This table provides descriptive statistics and results of OLS regressions of compensation complexity on all the determinants during the earlier (2007-2012) and later (2013-2019) periods. Panel A reports the number of observations, mean values and within-industry-fixed-effects standard deviations for our dependent variable and determinants during the earlier and later periods. The last column of Panel A reports the difference in means and its statistical significance. Panel B provides results of OLS regressions of compensation complexity WTD_COMPL_t on proxies for firm characteristics, CEO characteristics, renegotiation, governance characteristics, and external factors. $WTD\_COMPL_{t,}$ is the average of complexity scores across different types of compensation, weighted by the grant-date fair value of each type, in fiscal year *t*. All the other variables are defined in Appendix B. Column 1 (2, 4) reports coefficients on the determinants of complexity and the *t*-statistics estimated during the earlier (later) period. Columns 3 and 5 report the difference in coefficients between the later and earlier periods and its statistical significance. Panel C provides results of the same regressions using *RAW_COMPL* as the dependent variable. Standard errors are clustered by firm. Robust *t*-statistics are reported in parentheses. ***, **, and * indicate significance at *p*-value < 0.01, *p*-value < 0.05 and *p*-value < 0.10, respectively.

Panel A – Descriptive statistics and differences

	Earlier Period (2007-2012)			Later Period (2013-2019)			Later minus Earlier Period
Variables	N	Mean	Within FE S.D.	N	Mean	Within FE S.D.	Mean Diff
WTD_COMPL	4,754	4.019	2.497	4,856	5.619	2.614	1.600***
RAW_COMPL	4,754	9.761	5.426	4,856	12.980	5.278	3.219***
lnMV	4,754	22.239	1.232	4,856	22.847	1.251	0.608***
MTBA	4,754	1.864	1.026	4,856	2.109	1.245	0.246***
RD	4,754	0.024	0.037	4,856	0.021	0.035	-0.003***
lnSTDRET	4,754	0.098	0.046	4,856	0.072	0.029	-0.027***
SEGMENTS_HH	4,754	0.262	0.279	4,856	0.264	0.277	0.002
PIFO	4,754	0.608	0.413	4,856	0.663	0.399	0.055***
MA	4,754	3.990	5.211	4,856	3.877	4.886	-0.113
lnTENURE	4,754	1.981	0.658	4,856	2.000	0.685	0.019
RETIRE	4,754	0.062	0.240	4,856	0.087	0.280	0.025***
FOUNDER	4,754	0.139	0.339	4,856	0.092	0.284	-0.046***
OWNSHIP	4,754	1.843	3.925	4,856	1.168	2.991	-0.675***
CHAIR	4,754	0.590	0.476	4,856	0.501	0.489	-0.089***
RENEG	4,754	0.072	0.062	4,856	0.053	0.052	-0.020***
IND_DIRECTOR	4,754	0.802	0.101	4,856	0.826	0.093	0.024***
BUSYNESS	4,754	0.096	0.111	4,856	0.081	0.098	-0.015***
COOPT	4,754	0.224	0.288	4,856	0.189	0.270	-0.035***
COOPT_MISSING	4,754	0.218	0.382	4,856	0.311	0.441	0.093***
lnCEO_PERKS	4,754	4.458	1.575	4,856	4.496	1.523	0.038
CONSULT	4,754	1.097	0.528	4,856	1.070	0.455	-0.026***
IND_SIZE_WTD_COMPL	4,754	3.640	1.021	4,856	5.374	1.058	1.733***
IND_SIZE_RAW_COMPL	4,754	9.316	2.18	4,856	12.57	2.117	3.254***
TOP5_INST_OWN	4,754	0.285	0.086	4,856	0.311	0.091	0.027***
lnGUIDELINE_ISS	4,754	5.202	0.256	4,856	5.329	0.052	0.128***
SOP_MISSING				4,409	0.058	0.229	
SOP_LESS80				4,409	0.113	0.315	

Table 6 (cont.)
Determinants of complexity during
the earlier (2007-2012) and later (2013-2019) periods

Panel B – Regression results using *WTD_COMPL* as dependent variable

	Earlier Period (2007-2012)		Later Period (2013-2019)		(2) vs. (1)	Later Period (2013-2019)		(4) vs. (1)
VARIABLES	(1)		(2)		(3)	(4)		(5)
lnMV	0.112*	(1.71)	0.270***	(4.01)	0.158**	0.355***	(5.22)	0.243***
MTBA	-0.248***	(-5.00)	-0.403***	(-8.12)	-0.154**	-0.384***	(-7.53)	-0.136**
RD	0.335	(0.23)	4.256**	(2.01)	3.921*	2.467	(1.19)	2.132
lnSTDRET	-1.139	(-0.89)	3.993**	(1.96)	5.132**	5.366**	(2.46)	6.505***
SEGMENTS_HH	0.216	(0.96)	-0.325	(-1.38)	-0.541**	-0.386	(-1.56)	-0.602**
PIFO	-0.026	(-0.19)	-0.117	(-0.73)	-0.091	-0.027	(-0.16)	-0.001
MA	-0.016	(-1.15)	-0.013	(-0.94)	0.003	-0.025*	(-1.80)	-0.009
lnTENURE	-0.154	(-1.22)	-0.091	(-0.80)	0.063	-0.089	(-0.76)	0.065
RETIRE	-0.426*	(-1.83)	-0.161	(-0.81)	0.264	-0.138	(-0.74)	0.288
FOUNDER	-0.340	(-1.47)	0.245	(0.90)	0.585*	0.131	(0.49)	0.471
OWNSHIP	-0.027	(-1.48)	-0.117***	(-5.43)	-0.090***	-0.108***	(-5.25)	-0.081***
CHAIR	-0.017	(-0.12)	-0.091	(-0.68)	-0.074	-0.174	(-1.28)	-0.157
RENEG	-1.174	(-1.22)	-3.974***	(-3.11)	-2.800**	-3.359**	(-2.48)	-2.185
IND_DIRECTOR	1.052*	(1.77)	2.384***	(3.57)	1.332*	2.551***	(3.66)	1.499*
BUSYNESS	0.439	(0.85)	1.276**	(2.01)	0.836	0.924	(1.38)	0.485
COOPT	0.456	(1.61)	0.402	(1.46)	-0.054	0.222	(0.80)	-0.234
COOPT_MISSING	0.158	(0.96)	-0.032	(-0.24)	-0.190	0.155	(1.17)	-0.003
lnCEO_PERKS	0.089**	(2.32)	0.057	(1.47)	-0.032	0.072*	(1.79)	-0.017
CONSULT	0.041	(0.39)	0.562***	(3.95)	0.521***	0.562***	(3.80)	0.521***
IND_SIZE_COMPL	0.130***	(3.26)	0.073	(1.58)	-0.058	0.132***	(2.90)	0.002
TOP5_INST_OWN	1.027	(1.50)	0.388	(0.63)	-0.639	1.680***	(2.67)	0.653
lnGUIDELINE_ISS	0.769***	(4.60)	-5.789***	(-6.38)	-6.557***			
SOP_MISSING						-0.498**	(-2.00)	
SOP_LESS80						0.357***	(2.81)	
Observations	4,754		4,856			4,409		
Adjusted R-squared	0.1061		0.2171			0.2287		
Ind FE	YES		YES			YES		
Year FE	NO		NO			NO		

Table 6 (cont.)
Determinants of complexity during
the earlier (2007-2012) and later (2013-2019) periods

Panel C – Regression results using *RAW_COMPL* as dependent variable

	Earlier Period (2007-2012)		Later Period (2013-2019)		(2) vs. (1)	Later Period (2013-2019)		(4) vs. (1)
VARIABLES	(1)		(2)		(3)	(4)		(5)
lnMV	0.399***	(2.86)	0.795***	(5.53)	0.396**	0.930***	(6.32)	0.531***
MTBA	-0.380***	(-2.91)	-0.658***	(-6.88)	-0.277**	-0.661***	(-6.63)	-0.281*
RD	2.879	(0.88)	10.750**	(2.57)	7.871**	9.109**	(2.16)	6.23
lnSTDRET	-1.918	(-0.67)	8.137*	(1.82)	10.055**	12.041**	(2.46)	13.959***
SEGMENTS_HH	0.099	(0.20)	-0.728	(-1.61)	-0.827	-0.744	(-1.56)	-0.843
PIFO	0.082	(0.27)	0.143	(0.42)	0.061	0.177	(0.50)	0.095
MA	-0.086***	(-3.06)	-0.090***	(-3.07)	-0.004	-0.116***	(-3.84)	-0.030
lnTENURE	-0.508*	(-1.92)	-0.053	(-0.22)	0.455	0.009	(0.04)	0.517
RETIRE	-1.466***	(-2.85)	-0.085	(-0.16)	1.381**	-0.127	(-0.24)	1.339**
FOUNDER	-1.479***	(-2.98)	-0.353	(-0.58)	1.126*	-0.524	(-0.85)	0.955
OWNSHIP	-0.104***	(-3.00)	-0.259***	(-4.60)	-0.154***	-0.251***	(-4.41)	-0.147***
CHAIR	0.386	(1.37)	0.243	(0.92)	-0.143	0.125	(0.46)	-0.261
RENEG	-5.168***	(-2.68)	-9.348***	(-3.68)	-4.180	-8.381***	(-3.13)	-3.213
IND_DIRECTOR	4.714***	(3.64)	7.659***	(5.40)	2.945*	7.892***	(5.22)	3.178**
BUSYNESS	1.660	(1.44)	1.909	(1.45)	0.249	1.144	(0.82)	-0.516
COOPT	1.396**	(2.17)	0.673	(1.15)	-0.723	0.302	(0.50)	-1.094
COOPT_MISSING	-0.174	(-0.50)	-0.517**	(-1.98)	-0.342	-0.268	(-1.02)	-0.094
lnCEO_PERKS	0.193**	(2.36)	0.213***	(2.65)	0.020	0.229***	(2.74)	0.036
CONSULT	0.540**	(2.46)	1.405***	(4.37)	0.865***	1.372***	(4.03)	0.832**
IND_SIZE_COMPL	0.061	(1.32)	-0.023	(-0.48)	-0.084	0.002	(0.03)	-0.059
TOP5_INST_OWN	0.890	(0.69)	0.093	(0.08)	-0.797	2.293*	(1.78)	1.403
lnGUIDELINE_ISS	1.418***	(4.07)	-8.626***	(-4.78)	-10.044***			
SOP_MISSING						-1.005**	(-1.98)	
SOP_LESS80						0.039	(0.14)	
Observations	4,754		4,856			4,409		
Adjusted R-squared	0.1511		0.2464			0.2554		
Ind FE	YES		YES			YES		
Year FE	NO		NO			NO		

Table 7
Effects of compensation complexity on future performance

This table presents the OLS regression results of the effect of compensation complexity on future financial performance using the following equation: $DV = b_0 + b_1 COMPLEXITY_t + Controls + Year\ Fixed\ Effects + Firm\ Fixed\ Effects + e$, where DV takes the form of ROA_{t+1}, RET_{t+1}, $AvgROA_{t+1,t+2}$, or $AvgRET_{t+1,t+2}$. ROA_{t+1} is measured as net income for fiscal year t+1 divided by the average of total assets at the beginning and at the ending of fiscal year $t+1$. $AvgROA_{t+1,t+2}$ is the average of ROA_{t+1} and ROA_{t+2}. RET_{t+1} is the annual stock returns for fiscal year $t+1$. $AvgRET_{t+1,t+2}$ is the average of RET_{t+1} and RET_{t+2}. Panel A (B) reports the results when *COMPLEXITY* takes the value of WTD_COMPL_t (RAW_COMPL_t). WTD_COMPL_t, defined in Section 2.2, is the average of complexity scores across different types of compensation, weighted by the grant-date fair value of each type, in fiscal year *t*. RAW_COMPL_t is the sum of complexity scores across different types of compensation, in fiscal year *t*. WTD_COMPL_t and RAW_COMPL_t are divided by 100 to ease interpretation of the coefficients. All regressions include firm and year fixed effects. Standard errors are clustered by firm. Robust *t*-statistics are reported in parentheses. ***, **, and * indicate significance at p-value < 0.01, p-value < 0.05 and p-value < 0.10, respectively, for two-sided tests. # indicates significance at p-value < 0.10 for one-sided tests.

Panel A. *WTD_COMPL*

VARIABLES	Pred. Sign	(1) ROA_{t+1}	(2) $AvgROA_{t+1,t+2}$	(3) RET_{t+1}	(4) $AvgRET_{t+1,t+2}$	(5) ROA_{t+1}	(6) $AvgROA_{t+1,t+2}$	(7) RET_{t+1}	(8) $AvgRET_{t+1,t+2}$
WTD_COMPL_t	–	-0.091**	-0.078**	-0.186	0.043	-0.061*	-0.049#	-0.109	0.109
		(-2.46)	(-2.31)	(-1.08)	(0.34)	(-1.68)	(-1.47)	(-0.67)	(0.89)
Control for performance included		YES	YES	YES	YES	YES	YES	YES	YES
Determinants of complexity (excluding external factors) included		NO	NO	NO	NO	YES	YES	YES	YES
Observations		9,962	9,962	9,962	9,962	9,962	9,962	9,962	9,962
Adjusted R-squared		0.5202	0.5753	0.3723	0.4675	0.5338	0.5932	0.3351	0.4165
Firm and Year FE		YES	YES	YES	YES	YES	YES	YES	YES

Panel B. *RAW_COMPL*

VARIABLES	Pred. Sign	(1) ROA_{t+1}	(2) $AvgROA_{t+1,t+2}$	(3) RET_{t+1}	(4) $AvgRET_{t+1,t+2}$	(5) ROA_{t+1}	(6) $AvgROA_{t+1,t+2}$	(7) RET_{t+1}	(8) $AvgRET_{t+1,t+2}$
RAW_COMPL_t	–	-0.048***	-0.047***	-0.205**	-0.057	-0.036**	-0.035**	-0.197**	-0.046
		(-2.84)	(-2.99)	(-2.40)	(-0.88)	(-2.19)	(-2.23)	(-2.51)	(-0.75)
Control for performance included		YES	YES	YES	YES	YES	YES	YES	YES
Determinants of complexity (excluding external factors) included		NO	NO	NO	NO	YES	YES	YES	YES
Observations		9,962	9,962	9,962	9,962	9,962	9,962	9,962	9,962
Adjusted R-squared		0.5202	0.5755	0.3727	0.4676	0.5338	0.5934	0.3355	0.4165
Firm and Year FE		YES	YES	YES	YES	YES	YES	YES	YES

Table 8
The Relation Between Complexity and Performance for Firms with High Correlation Among Different Performance Measures

This table presents the results of estimating the differential effect of complexity on firm performance when a firm uses different performance measures with high or low correlation using the following regression: $DV = b_0 + b_1 COMPLEXITY_t + b_2 COMPLEXITY_t \times High\_Corr_t + Controls + Year\ Fixed\ Effects + Firm\ Fixed\ Effects + e$, where *DV* takes the form of ROA_{t+1}, RET_{t+1}, $AvgROA_{t+1,t+2}$, or $AvgRET_{t+1,t+2}$. ROA_{t+1} is measured as net income for fiscal year *t*+1 divided by the average of total assets at the beginning and at the ending of fiscal year *t+1*. $AvgROA_{t+1,t+2}$ is the average of ROA_{t+1} and ROA_{t+2}. RET_{t+1} is the annual stock returns for fiscal year *t+1*. $AvgRET_{t+1,t+2}$ is the average of RET_{t+1} and RET_{t+2}. Panel A (B) reports the results when *COMPLEXITY* takes the value of WTD_COMPL_t (RAW_COMPL_t). WTD_COMPL_t, defined in Section 2.2, is the average of complexity scores across different types of compensation, weighted by the grant-date fair value of each type, in fiscal year *t*. RAW_COMPL_t is the sum of complexity scores across different types of compensation, in fiscal year *t*. WTD_COMPL_t and RAW_COMPL_t are divided by 100 to ease interpretation of the coefficients. $High\_Corr_t$ is a dummy variable set to one if the median correlation among the different performance metrics included a CEO's contract is above the sample median, and zero otherwise. The correlation is calculated in four steps. First, for each firm-year contract we identify all performance metrics used (e.g., EPS, Stock Returns, Sales Revenue). Second, we identify the minimum, target and maximum thresholds set for each performance metric. For grants with multi-year performance metrics and with different thresholds per year (e.g., EPS target is $1.1 for year 2006, $1.2 ($1.3) for year 2007 (2008)), we keep the threshold set for the first year of the performance period. Third, for each pair of performance measure (e.g., EPS and stock returns, or EPS and Sales Revenue) we calculate the correlation of these pair-wise observations from 2006 up to year *t* by threshold (minimum, target and maximum). Fourth, for each firm-year, we calculate the median of the pair-wise correlations among all the pairs of performance measures. For example, the median of the pair-wise correlations for a firm that uses 3 performance measures in 2015 will be calculated using up to 90 observations (10 years * 3 pair-wise correlations * 3 different thresholds (minimum, target, maximum)). Remaining control variables are defined in Appendix B. All regressions include firm and year fixed effects. Standard errors are clustered by firm. Robust *t*-statistics are reported in parentheses. ***, **, and * indicate significance at p-value < 0.01, p-value < 0.05 and p-value < 0.10, respectively.

Panel A. *WTD_COMPL*

	Pred. Sign	(1) ROA_{t+1}	(2) $AvgROA_{t+1,t+2}$	(3) RET_{t+1}	(4) $AvgRET_{t+1,t+2}$	(5) ROA_{t+1}	(6) $AvgROA_{t+1,t+2}$	(7) RET_{t+1}	(8) $AvgRET_{t+1,t+2}$
WTD_COMPL_t	–	-0.065	-0.120*	-0.724*	-0.445*	-0.057	-0.116*	-0.601*	-0.299
		(-0.90)	(-1.87)	(-1.93)	(-1.69)	(-0.80)	(-1.87)	(-1.65)	(-1.11)
$High\_Corr_t * WTD\_COMPL_t$	+	0.175**	0.181**	1.317***	0.624**	0.177**	0.188**	1.182***	0.436#
		(2.04)	(2.38)	(3.39)	(2.20)	(2.06)	(2.49)	(3.18)	(1.52)
Control for performance included		YES	YES	YES	YES	YES	YES	YES	YES
Determinants of complexity included		NO	NO	NO	NO	YES	YES	YES	YES
Observations		4,015	4,015	4,015	4,015	4,015	4,015	4,015	4,015
Adjusted R-squared		0.5095	0.6125	0.3414	0.4583	0.5269	0.6280	0.2971	0.3952
Firm and Year FE		YES	YES	YES	YES	YES	YES	YES	YES

Panel B. *RAW_COMPL*

	Pred. Sign	(1) ROA_{t+1}	(2) $AvgROA_{t+1,t+2}$	(3) RET_{t+1}	(4) $AvgRET_{t+1,t+2}$	(5) ROA_{t+1}	(6) $AvgROA_{t+1,t+2}$	(7) RET_{t+1}	(8) $AvgRET_{t+1,t+2}$
RAW_COMPL_t	–	-0.059#	-0.074**	-0.438**	-0.193#	-0.056#	-0.073**	-0.400**	-0.143
		(-1.63)	(-2.14)	(-2.33)	(-1.45)	(-1.58)	(-2.17)	(-2.20)	(-1.05)
$High\_Corr_t * RAW\_COMPL_t$	+	0.079*	0.068*	0.594***	0.275*	0.072*	0.066*	0.549***	0.206#
		(1.89)	(1.76)	(2.93)	(1.87)	(1.72)	(1.73)	(2.81)	(1.39)
Control for performance included		YES	YES	YES	YES	YES	YES	YES	YES
Determinants of complexity included		NO	NO	NO	NO	YES	YES	YES	YES
Observations		4,015	4,015	4,015	4,015	4,015	4,015	4,015	4,015
Adjusted R-squared		0.5093	0.6122	0.3409	0.4579	0.5265	0.6276	0.2968	0.3950
Firm and Year FE		YES	YES	YES	YES	YES	YES	YES	YES

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