The dynamic role of earnings and returns in executive contracting

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ABSTRACT: Prior literature theorizes variation in firm's use of accounting and market measures of performance based on the underlying informativeness of each measure. Empirical tests utilizing cross-sectional variation in firm traits associated with the relative informativeness of these measures document expected variation in the relative contracting weights of earnings and returns. The focus of our study, however, is on whether firms alter the weights on these measures as their informativeness shifts over time. We use the firm life cycle hypothesis to identify shifts in the informativeness of performance measures and examine whether firms adjust compensation for changes in the signal and noise of both accounting and market-based measures of performance. We document changes in the weights on performance as firms move forward and backwards across life cycle stages. Further, in cross-sectional tests, we document differences in the transition effect based on CEO power, CEO firm-related wealth, and monitoring. Lastly, we verify our results are distinct from other firm changes that may accompany life cycle stage shifts, including changes in institutional ownership.

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1. Introduction

Recently, academic literature on executive compensation acknowledges the important role time-series dynamics may play in contract design and effectiveness (e.g., Edmans and Gabaix 2016; Edmans, Gabaix, Sadzik, and Sannikov 2012; Zhu 2018).While the valuation literature has recently extended to understand the dynamic characteristics that earnings play in firm valuation (Aharony, Falk, and Yehuda 2006; Anthony and Ramesh 1992; Dickinson 2011; Vorst and Yohn 2018), it is less understood in compensation contracting. As Edmans and Gabaix (2016) argue, to better understand the manager's role in value maximization, we must better understand the evolution of pay over time. Answering the call for empirical evidence on how within a firm both the level of pay and incentive design evolve over time, we examine whether the role of earnings for contracting varies over the life of the firm. Using a research design that allows us to systematically identify discernable within firm shifts in the informativeness of performance measures as a firm evolves over time, we examine whether firms adjust contracts in response to shifts in the signal and noise of accounting and market metrics. Specifically, we test whether the weights, both implicit and explicit, placed on returns and accounting performance vary across the life of the firm and how firms adapt compensation structures to changes in informativeness of performance measures over time.

Extant contracting literature on the role of accounting and market measures of performance posits differential weights based on their informativeness with respect to manager effort (e.g., Banker and Datar 1989; Lambert and Larcker 1987; Sloan 1993), as well as their ability to signal where manager effort is most valuable (Datar, Kulp, and Lambert 2001). From a theoretical perspective, the informativeness of a given measure is a function of both its

sensitivity(signal) to managerial effort as well as the impact of factors other than effort on the outcome measure, it precision(noise) (Banker and Datar 1989; Lambert and Larcker 1987; Sloan 1993). However, in practice managerial effort is unobservable making the direct measurement of signal and noise difficult. To address this problem, empirical studies on the role of earnings and returns in contracting typically rely on observable firm characteristics expected to capture differences in the informativeness of earnings and market measures (e.g., Baber, Kang, and Kumar 1998; Banker, Huang, and Natarajan 2009; Jayaraman and Milbourn 2012; Lambert and Larcker 1987). Using cross-sectional specifications these studies document variation in the weights on these two performance measures consistent with variation in their underlying informativeness. However, this specification may not capture dynamic variation within the same firm. Over the sample period, the partitioning variable may classify all years of a single firm into a single cross-section, in which case differences across the groups may capture a "time-invariant" trait and not differences in the weights over time within the same firm. Thus, while there is considerable evidence of cross-sectional variation in the weight on earnings and returns, we argue these studies do not provide evidence on the dynamic weighting of these measures within a single firm over time.

Prior research in the valuation domain documents that earnings and other measures of accounting performance have differential value relevance (to investors) across the life of the firm (e.g., Anthony and Ramesh 1992; Aharony et al. 2006). To the extent the differential value relevance also reflects differential quality with which the earnings signal can reflect underlying manager effort, we would expect changes in compensation contracts to reflect evolution in the sensitivity and precision of the metric. In addition, prior research suggests that the weight on earnings and returns may also be a function of the board signaling where the manager's effort is

most valuable. Both practitioner guides and academic evidence argue that the drivers of firm value, and thereby tasks required to foster value creation, change as a firm evolves (Aharony et al. 2006; Anthony and Ramesh 1992; Koller, Goedhart, and Wessels 2010). Given recent valuation literature which shows a changing role for earnings in the valuation process, and the differential tasks required to create firm value as the firm evolves, we argue that earnings and returns may be differentially informative of manager effort and/or differentially beneficial as signals for effort direction over the life of the firm.

While the theoretical literature would predict contract adjustments in response to firm evolution, in practice we may not observe these contracting changes. First, firms may have difficulty assessing shifts in the informativeness of performance metrics. Further, firms face contracting frictions (including strong CEO preferences, blockholder monitoring, long-term pay structures, etc.) that may impede a firm's ability to respond. Although there is limited academic research examining evolutionary changes in compensation contracting, the findings are consistent with the lack of timely contract adjustments. For example, Richardson and Gordon (1980) show that even in the arguably simplified contracting setting of a single product, firms fail to alter contracting as different metrics become more informative of manager effort over the life of the product. Further, anecdotal evidence suggests that firms often adopt a single static compensation strategy, even when it is not the best fit for the firm (Freeman 2017). Sharpening this critique, a report from BCG consulting cites firms for continually relying on earnings as a performance measure even when its relation to firm value changes over time (Hansell, Luther, Plaschke, and Schatt 2009). Thus, it is an open question as to whether and to what extent firms alter the weights on accounting and market metrics in response to discernable shifts in the informativeness of these metrics.

Holmström (1979) shows that an additional performance signal is useful in contracting if it provides information about manager effort beyond existing signals. As a firm evolves over time, accounting earnings may provide more or less information incremental to the returns signal because of its conservative properties and historical focus. For example, Lambert and Larcker (1987) refer to early (later) stages of investment when current accounting earnings may not (may) reflect managers' contributions to firm value, altering the signal-to-noise of these two metrics. However, it is difficult to measure the sensitivity and precision of a metric directly (and thereby discernable shifts in the metric's relative informativeness). We attempt to circumvent that problem by using firm life cycle stage as a single, comprehensive, but dynamic, measure of firm evolution to predict the informativeness of these measures of accounting and market metrics.

To test our hypothesis that boards alter the weights on performance measures over the firm's evolution, we first use the IncentiveLab (IL) database to construct a sample of 7,479 firm-year observations with data on explicit contracting terms including the weight on individual performance metrics in cash bonus contracts. Because of the limited sample size and timespan of the IL data, and for consistency with prior research, we also test the implicit weighting of earnings and returns using Execucomp data. We construct a sample of 24,624 firm-year observations for which compensation payouts and the associated economic determinants of pay are available. We modify the life cycle proxy from Dickinson (2011) and categorize firm-years into Early, Mature, and Late stages and begin by documenting differences in the explicit weights placed on accounting and market metrics across the life cycle stages in the IL sample. Further, using traditional executive compensation models (as in Graham, Li, and Qiu (2012)), we document significant differences in the implicit weights on both metrics across life cycle stages

in the Execucomp sample. Specifically, in both samples, we find that executive compensation is most sensitive to accounting measures of performance (i.e., return on assets) in the mature stage when the correlation between accounting performance and long-term profitability are likely highest. In contrast, we find that boards more heavily weight forward-looking market measures of performance (i.e., annual returns) in the early and late stages of a firm's life cycle when historical accounting performance measures are less timely and relevant and market measures of performance more fully capture current manager effort.

Next, we test for changes in the weight on earnings and returns in response to shifts in the firm's life cycle stage. Because of the limited time series availability of IL data, we begin with quasi-shift tests, identifying all firms with firm years in at least two stages (e.g., early and mature, mature and late, etc.), and include all years of the transitioning firm from either life cycle stage (whether or not they border the change in stage). Using both explicit and implicit weights on earnings and returns, the results of these tests are consistent with firms altering their contracting practices in line with changes in the informativeness of these metrics. To more specifically test for evidence of a contracting adjustment concurrent to the life cycle stage shift, using the Execucomp sample we identify all transitions between life cycle stages and isolate the firm years immediately preceding and following the shift. Using a within-firm test of the effects of the life cycle transition and controlling for evolution along several observable dimensions (e.g., firm size, market-to-book, etc.), we provide evidence that firms respond to shifts between Early and Mature and between Mature and Late; however, we do not observe evidence of shifts in the weights on earnings and returns between Early and Late stages where differences in the informativeness of these measures are arguably less pronounced. Taken together, these results

suggest that boards alter their CEO compensation contracts in predictable ways in response to their evolving firm.

As further evidence, we separately examine whether firms respond equally to forward shifts (from Early to Mature, from Mature to Late, etc.) and backward shifts (from Mature to Early, from Late to Mature, etc.). We continue to document greater weight on accounting performance in Mature stage firms when transitioning either to or from Early stages; however, we only identify a decreased weight on returns in transitions from Early to Mature. Similarly, in moving between Mature and Late stages we continue to document a lower weight on returns in the Mature stage. However, we only find evidence of an increase in the weight on accounting performance when firms shift from Late to Mature. This asymmetric responsiveness suggests that other firm or manager characteristics may play a role in the contracting reaction to a shift in the underlying informativeness of these two measures.

We perform several cross sectional tests capturing settings in which firms are more or less likely to respond to changes in the informativeness of performance measures and alter the weights on earnings and returns. First, we examine how CEO wealth may influence contracting changes in response to life cycle stage shifts. In firm years when the CEO has a low level of firm-related wealth we document a greater weight on earnings in the Mature stage (relative to the Early stage), as well as a lower weight on returns relative to both Early and Late stages. However, in the subsample of firm years with high firm-related wealth we find no evidence of a shift in the weights across any measure or partition. We posit that when a CEO has a large portfolio of firm equity the board considers the incentive effect of the manager's wealth already tied to returns and thus the benefit of reducing the sensitivity of compensation to market performance is low even though the measure is relatively less informative in the Mature stage.

Next, we consider the effects of CEO power over the board and examine whether firms' contracting responses vary when the CEO is also the chair of the board. We find that most of the observed changes in weighting are concentrated in firms without CEO duality, suggesting that without CEO influence, boards adjust weights for changes in informativeness, and with CEO power, these changes are less pronounced. Finally, we examine whether firms with a large percentage of compensation committee members with financial expertise alter contracts to a greater degree. Interestingly, we find that our results are evident only in the subsample of firm years with below median financial expertise on the compensation committee, suggesting that without high levels of financial expertise, the compensation committee has limited alternative monitoring channels. Thus, they rely heavily on the signal of summary performance measures and adjust contracts to reflect their informativeness. Overall, these cross-sectional results highlight that firm and manager characteristics play a role in how firms alter incentive design in response to changes in the informativeness of accounting and market performance metrics.

Recent academic studies highlight the importance of considering firms' dynamic nature in understanding optimal contracting decisions (Edmans and Gabaix 2016; Zhu 2018). Our study responds to the call for evidence on how contracting changes over time by offering some of the first large-scale evidence that boards make timely adjustments to compensation contracts in response to factors that make accounting and market measures of performance more or less informative of manager effort. However, and consistent with anecdotal evidence on the inability of firms to properly adjust contracts, we show these timely adjustments are affected by characteristics of the board, manager, and firm. Additionally, we extend the life cycle literature, which focuses mainly on the role of life cycle in understanding firm valuation. We broaden this

literature to examine whether firm life cycle stages are also informative of the stewardship role of accounting information.

2. Related Literature

Use of accounting market measures of performance in contracting

Dating back to Holmström (1979), contracting theory suggests that any measure providing incremental information about the manager's efforts to increase shareholder value is useful for contracting purposes (the "informativeness principle"). Since stock prices capture shareholder value, and the goal of contracting is to align the interests of the shareholders and managers, early research examines why executive compensation contracts routinely employed accounting performance measures in addition to stock returns. While stock returns may be the best summary measure for assessing changes in firm value, this early contracting research shows that while often correlated, "valuing the firm is not the same as evaluating the manager's contribution to the value of the firm" (Lambert 1993). Using the properties of contracting measures to assess the manager's contribution to firm value, both theoretical and empirical research shows that the optimal contract includes both accounting and market measures of performance and that the relative weight on these measures is linked with their informativeness (i.e., signal and noise) (Banker and Datar 1989; Lambert and Larcker 1987; Sloan 1993). These studies show that the weight on a performance measure is directly related to the sensitivity of the measure to manager effort and inversely related to the level of noise on the outcome (impact of factors other than manager effort).[1] Stated plainly in Dutta and Reichelstein (2005), "optimal

[1] It is worthwhile to note that Lambert and Larcker (1987) and Sloan (1993) conceptualize noise differently with Sloan pointing out the importance of isolating not only the variance in the performance measure itself, but the variance in the noise of the performance measure.

incentive provisions must combine 'forward-looking' market information with 'backward looking' accounting information" (p. 1069).

At a theoretical level, both sensitivity and precision are linked to managerial effort. However, in practice managerial effort is not observable making the measurement of the signal and noise of a given performance measure in a given firm-year difficult. Thus, the empirical literature examining the weights on performance measures often utilizes differences in observable firm characteristics that capture distinct differences in the informativeness of accounting and market measures of performance. For example, in early work, Lambert and Larcker (1987) empirically examine the differential weights on ROA and returns by examining their use across high and low growth firms. They posit that in the high growth sample the historical nature of accounting earnings less fully reflects manager effort, and they find a relatively lower weight on earnings (and a relatively greater weight on returns). Other studies also find that the weights on accounting and market measures of performance depend on differences in informativeness operationalized through differences in observed firm characteristics, including the liquidity of the firm's stock (Jayaraman and Milbourn 2012), earnings persistence (Baber et al. 1998), investment opportunities (Lambert and Larcker 1987), the cash flow and accrual composition of earnings (Banker et al. 2009), etc. In addition to underlying differences in the informativeness of these two performance measures, Datar et al. (2001) document that the weighting also functions as a mechanism for the board to signal where the manager's effort is most valuable. They show firms place more or less weight on a given measure than its level of informativeness would suggest in order to guide managers where to direct their effort allocation. Together, research on the use of alternative performance measures for contracting emphasizes how cross-sectional differences in observable firm traits capture the

underlying properties of these measures, allowing researchers to observe the impact of these properties on their use in contracting.

Changes in the weight on accounting and market measures of performance within firms

Rather than focusing on cross-sectional differences in the weights on accounting and stock returns, our study focuses on whether and how firms alter the weights on these measures in response to changes in their informativeness. While prior cross-sectional results suggest differences in the weightings in response to the informativeness of accounting and market measures, we may not observe within firm changes for at least two reasons. First, the common empirical specifications in prior studies group firm years into categories (e.g., high and low investment opportunities). However, if this sorting mechanism fully identifies time invariant (at least over the sample period) traits such that all years of a given firm are sorted into the same category, the resulting differences only capture contracting differences across firm types and cannot speak to whether a single firm alters its contract. Second, to the extent years of the same firm exist in both cross-sectional categories, the existing literature does not focus on isolating changes in the weights separately from changes in the firm category (i.e., the differences observed may result from some other event such as CEO turnover). As such, while the prior literature documents cross-sectional variation in the weights on accounting and market measures of performance consistent with expected variation in their relative informativeness, this literature does not provide evidence on whether and to what extent firms actively alter contracts with the same executive in response to shifts in the informativeness of performance measures.

While prior theoretical models suggest firms should alter the weights on accounting and stock returns in compensation contracts when either the level of signal or noise changes, in practice it may be difficult for the board to observe incremental changes to the measure's

informativeness, and contracting frictions may reduce the benefit of changing the contract. Consistent with these notions, ISS director John Roe alludes to firms' inability to properly assess changes in the firm and environment and adjust contracts accordingly, observing that firms often adopt a "one size fits all" policy for contracting (Freeman 2017). Further, referring directly to the use of earnings as a performance metric for contracting, BCG critiques firms for continuing to incentivize earnings performance even when its relation to firm value changes (Hansell et al. 2009). In prior academic research Richardson and Gordon (1980) use a field setting to examine contracting for a manager responsible for a single product and how the contracting measures change over time as the product evolves. Examining 15 Canadian manufacturing firms, the authors find that the performance measures used to evaluate the managers of plants producing a single product did not change even as the product transitioned from initial innovation, through increases in cost efficiency, and finally through product phase out. Their study suggests that, even in the arguably simplified contracting setting of a single product, firms may be unlikely to adjust contracting terms to reflect changes in the firm or its environment. Overall, it is an open question as to whether, in practice, firms alter employment contracts to reflect changes in the underlying informativeness of accounting and market measures of performance.

Identifying shifts in informativeness of accounting and market measures of performance

Taking a cue from prior literature that highlights the difficulty in measuring the informativeness of each performance measure directly, we rely on a dynamic firm characteristic, firm life cycle stage, to identify discernable shifts in the informativeness of accounting and market measures. Prior literature identifies several individual firm characteristics associated with cross-sectional differences in the weight on accounting measures and stock returns. We argue

that firm life cycle captures a number of these previously identified traits simultaneously, thereby capturing differences in the underlying informativeness of these two measures.

The theory of firm life cycle suggests that firms undergo multifaceted transitions through time that demonstrate the integral interdependencies of strategy, structure, and situation (Miller and Friesen 1984). Models of life cycle propose that there are regularities in organizational development that lend themselves to segmentation into stages (Smith, Mitchell, and Summer 1985). Life cycle theory considers a firm's life cycle stages as distinct phases that arise from a unique combination of the organization's internal characteristics (e.g., strategy choice, resource availability) as well as the external contexts in which the firm operates (e.g., macroeconomic factors, competitive environment) (Moores and Yuen 2001; Dickinson 2011; Anthony and Ramesh 1992).[2] As firms evolve over time, they experience simultaneous changes in these underlying characteristics, further highlighting their interdependencies. While some of these shifts can be observed in individual constructs, "life cycle is more than the sum of its parts and captures how a multitude of factors work together to achieve a variety of organizational outcomes" (Vorst and Yohn 2018, 8, p.8).[3]

We argue that life cycle stage captures differences in the informativeness of earnings and stock returns. To begin, Bushman, Engel, and Smith (2006) show that, while not perfectly

[2] Prior research documents an association between firm life cycle stages and the value relevance of accounting measures (Anthony and Ramesh 1992), the accrual anomaly (Hribar and Yehuda 2015), forecasting profitability and growth (Vorst and Yohn 2018), dividend payout policy (Coulton and Ruddock 2011; DeAngelo, DeAngelo, and Stulz 2006, 2010), governance (Chiang, Lee, and Anandarajan 2013; Ramaswamy, Ueng, and Carl 2008), and research and development and capital expenditures (Ahmed and Jinan 2011). Further, because life cycle stage succinctly captures interactive differences in a variety of firm characteristics, the notion of firm life cycle has been used to study a variety of firm outcomes including dividend payout policy (e.g., DeAngelo et al. 2006), the accrual anomaly (Hribar and Yehuda 2015), and the value relevance of accounting measures (e.g., Anthony and Ramesh 1992), among other factors.

[3] The firm life cycle construct is distinct from the product life cycle construct in that a firm likely contains multiple products in several different product life cycle phases. Although amalgamating the information of each product or firm segment's separate life cycle stages is difficult, Dickinson (2011) develops a parsimonious model of firm life cycle using firm fundamentals.

correlated, there is a strong positive correlation between the valuation and stewardship roles of accounting information. Investigating the role of life cycle for valuation, several studies show that the value relevance of accounting information varies by firm life cycle stage (Aharony et al. 2006; Anthony and Ramesh 1992; Black 1998). Further, recent research examining different aspects of valuation show that estimates of firm value can be improved by considering the firm's life cycle stage (e.g., Vorst and Yohn 2018; Anderson, Hyun, and Yu 2017). Building from these studies, and the usefulness of these measures for valuation and stewardship, we argue that the accounting and market information are differentially informative of the manager's impact on firm value as the firm evolves. Specifically, these studies show that historical nature of accounting information render it most value relevant in the mature stage.

Further, prior literature stresses the role of liquidity, earnings persistence, accrual and cash flow components of earnings, investment opportunities, etc. to identify differences in the underlying informativeness of accounting and market measures. Each of these characteristics has been shown to vary by life cycle stage. For example, the life cycle valuation literature shows that earnings persistence is greatest in the mature stage (Dickinson 2011; Hamers, Renders, and Vorst 2016; Hribar and Yehuda 2007). In addition, Baber et al. (1998) show that more persistent earnings are weighted more heavily for contracting, especially to alleviate the horizon problem. Taken together this suggests that earnings are relatively more useful for contracting in the mature stage. Together, the findings on life cycle and valuation suggest that moving between early and mature stages earnings (returns) are more (less) informative of manager effort in the mature stage. Moving between mature and late stages, this literature suggests that earnings (returns) are less (more) informative in the mature stage.

Finally, in addition to performance measure informativeness, alternative governance structures and signaling by the board also affect differential weighting. Wang and Singh (2014) posit that both available governance structures and the tasks managers need to be successful in each life cycle stage vary. To the extent governance structures vary by stage, contract responsiveness may be more or less beneficial. Further, both practitioner guides and academic evidence argue that the drivers of firm value change as a firm evolves (Aharony et al. 2006; Anthony and Ramesh 1992; Koller et al. 2010). Because contracting also serves as a signal to the manager where his effort is most valuable, and this varies as the firm evolves, we expect the weights on performance measures to vary over the life of the firm. Overall, we argue that firm life cycle stage captures discernable shifts in the informativeness of accounting measures and stock returns, as well as simultaneously capturing the shift in alternative governance structures and alternative managerial tasks valued by the board. Together, this prior research suggests that the historical nature of accounting information likely renders it less informative of manager effort to create firm value in the early and late stages relative to the mature stage. In addition, the ability of market measures to more fully reflect investments in activities with future profitability render returns more informative of managerial effort in early and late stages relative to the mature stage. Together, we posit that firms transitioning between life cycle stages present an opportune setting to examine whether firms alter the weights on accounting and market measures of performance in response to their changing internal and external environments.

3. Methodology

Sample Selection

Historically, examining our research question would have been difficult due to the limited time series of compensation information and limited sample of firm observations moving

between life cycle stages. However, the availability of basic compensation and performance data for a long period of time, over 25 years for some firms, allows us to identify life cycle stage transitions in a given firm and associated changes in the weights on earnings and returns. Further, in the spirit of Bushman, Indjejikian, and Smith (1996) and Ittner, Larcker, and Rajan (1997), recently available explicit contract details allow us to examine the actual weights on performance metrics disclosed in compensation contracts.

We first use the details of CEO compensation contracts found in the IL database to examine the explicit weights on earnings and stock returns in cash bonus contracts between 2006 and 2017.[4] We gather contract details for 7,479 firm-years representing 863 unique firms. While the IL database provides explicit details of the compensation contracts, given the limited time series of data available in IL, our ability to identify changes in a firm's life cycle stage is constrained. To address this issue, and for consistency with prior research, we also use Execucomp data and a model from the literature to test for implicit weights on earnings and returns. Using data on compensation and firm performance from Execucomp, Compustat, and CRSP, we gather a sample of 24,624 firm-years representing 2,148 unique firms.

Our focus is on whether and how boards adjust the weights on accounting and market measures of performance in response to changes in the informativeness of the measures over time. We first identify the phases of firm life cycle using the life cycle proxy from Dickinson (2011). The cash flow life cycle proxy uses the combination of the signs on operating, investing, and financing cash flows from the cash flow statement to categorize firms into one of five life cycle stages: introduction, growth, maturity, shake-out, and decline.[5] Because the Execucomp

[4] In Appendix 3, we provide details of the IL data collection and the classification of specific performance measures as accounting (earnings), market, or other.

[5] In Appendix 1, we summarize the cash flow patterns from Dickinson (2011) used to categorize firm-years into life cycle stages, including the number of observations in each stage from both the Execucomp and IL samples.

sample has fewer of observations in the outer two stages (i.e., introduction and decline), and to simplify transition tests, we collapse these five stages into three: Early, Mature, and Late (combining introduction and growth into Early, and shake-out and decline into Late).[6] We identify the life cycle stage at the end of year *t-1* and consider this the relevant life cycle stage for compensation in year *t*. We then identify firms with a change in life cycle stage as those firms with a change in life cycle stage between year *t* and *t+1*.[7] In the Execucomp sample we identify 5,540 instances of firms moving between Early and Mature stages, 1,893 moving between Mature and Late stages, and 1,340 moving between Early and Late stages.

Multivariate Model of Explicit Weights

We use the IL explicit contract weighting data and a multivariate model of contract weights from De Angelis and Grinstein (2015) to assess whether the weights on earnings and returns change in response to shifts in the life cycle stage. We use the set of observations transitioning between life cycle stages with available IL data to identify differences in the weights between stages. Using a sample of observations arising from one of two stages in the transition pair (Early/Mature, Mature/Late, Early/Late), we use a Tobit specification and regress the weight on either earnings or returns (ranging from zero to one) on indicators for one of the life cycle stages (to capture differences between stages) and a vector of control variables identified in De Angelis and Grinstein (2015), including firm size (*Size*), the number of operating

Additionally, although Dickinson (2011) suggests her life cycle proxy offers several advantages over other life cycle categorization schemes, in the Additional Analyses section, we validate our findings using the life cycle measure developed in Anthony and Ramesh (1992) to provide as validation that our results capture changes in underlying firm economics and are robust to an alternative life cycle proxy.

[6] All inferences are robust to the exclusion of firm-years in either the introduction or decline stage.

[7] While this is arguably a restrictive research design choice, it is possible that contracting changes may not manifest in the year of the change but rather in a later period. Although it is beyond the scope of this study to determine the most common period over which firms alter contracts in response to these environmental changes we argue the single year test is less subject to alternative explanations. In addition, to provide consistency in contracting across years, we require the firm employ the same CEO in both year *t* and *t+1*.

segments (*NumberSegments*), investments in research and development and capital expenditures relative to total assets (*Investments*), industry average Tobin's Q (*IndustryTobin'sQ*), the age of the firm (*Age*), and the tenure of the executive (*Tenure*). If firms vary the weights on accounting and market measures as the firm changes, we anticipate a significant coefficient on the life cycle stage indicator, suggesting that the weight on the performance measure varies by stage after controlling for other known determinants.

Estimating Implicit Weights

To assess the implicit weights on earnings and returns, we begin with a model of CEO compensation based on prior literature (e.g., Core, Guay, and Larcker 2008; Core, Holthausen, and Larcker 1999; Graham et al. 2012). Because prior literature argues that total compensation including current share grants better captures the CEO's incentives than cash compensation alone, we use total compensation as our dependent variable.[8] In addition, because we examine differences in the weight on earnings and returns immediately preceding and immediately following a change in life cycle stage we employ a levels specification and model total compensation as follows: [9]

$$\begin{aligned} TotalCompensation_t = {} & \beta_0 + \beta_1 AnnualReturn_t + \beta_2 ROA_t + \beta_3 LCStage_t \\ & + \beta_4 LCStage*AnnualReturn_t + \beta_5 LCStage*ROA_t + \beta_6 ln\_Size_{t-1} + \beta_7 MTB_{t-1} \\ & + \beta_8 AnnualReturn_{t-1} + \beta_9 VarReturns_{t,t-5} + \beta_{10} ROA_{t-1} + \beta_{11} VarROA_{t,t-5} \\ & + \beta_{12} CEO\ as\ Chair_t + \beta_{13} Tenure_t + \sum \gamma_k YEAR + \sum \lambda_k FIRM + \varepsilon_{i,t} \end{aligned} \quad (1)$$

[8] Core, Guay, and Verrecchia (2003) caveat that while total compensation measures the change in the CEO's wealth, without the changes in the value of the executive's portfolio, the measure is potentially incomplete with respect to the manager's incentives. To address this, in Additional Analyses, we model total compensation including changes in the manager's firm-related wealth.

[9] As an alternative specification, we examine differences in the weights on earnings and returns using a first differences model to measure the implicit weights. Specifically, we derive the implicit weights using the change in compensation between years *t-2* and *t-1* (before the life cycle stage change) and the change in compensation between years *t* and *t+1* (after the life cycle stage change) and all inferences hold.

Our dependent variable for this test, *TotalCompensation*, is the CEO's total compensation during year *t,* which includes compensation from salary, bonuses, stock and option grants, as well as other forms of current and deferred compensation. We test for differences in the weights on market- ($AnnualReturn_t$) and accounting- (ROA_t) based measures across the change in the firm's life cycle stage using the interaction coefficients between the firm's life cycle stage and earnings or returns (β_4 or β_5). Following Graham et al. (2012), we include additional firm-level controls for observable economic determinants of the total level of executive pay, including firm size (*Size*), the market-to-book ratio (*MTB*), the prior year buy-and-hold dividend reinvested annual stock return ($AnnualReturn_{t-1}$), the volatility of daily stock returns in the prior five-year period (*VarReturns*), the prior year return on assets (ROA_{t-1}), and the prior five-year volatility of quarterly ROA (*VarROA*). Additionally, we include time-varying manager level controls as determinants of total pay, including an indicator taking the value of one if the executive is the CEO and chair of the board (*CEO as Chair*) and the tenure of the manager at the current firm (*Tenure*). Further, we include firm fixed effects,[10] year indicators, and we present robust standard errors clustered by firm. As above, if firms alter the weights on returns and ROA as the firm changes across life cycle stages, we anticipate differences in the coefficients on ROA and returns between stages in our sample of firms transitioning stages.

Descriptive Statistics

In Table 1, we present summary statistics for all variables used in our analysis. In Panel A, we present descriptive statistics for the Execucomp sample, and in Panel B we present descriptive statistics for the IL sample. Similar to prior studies, we document mean unlogged

[10] Although Graham et al. (2012), suggest including manager fixed effects in a levels model of executive compensation, we examine within firm life cycle changes and require the CEO to be the same before and after the shift event. As such, firm and manager fixed effects are redundant in our setting.

total CEO compensation (*TotalCompensation*) of $4.898 million in the Execucomp sample and, consistent with the IL sample capturing a subset of the largest firms in the Execucomp database, $8.096 million in the IL sample. Further, we note approximately 50 percent of total compensation paid in cash in the Execucomp sample (41.2 percent in the IL sample). The Execucomp firms have, on average, approximately $6.301 billion in total assets ($12.437 billion in the IL sample) and have a median annual return of 10.8 percent (11.4 percent in the IL sample). The Execucomp firms report an average ROA of 5.3 percent (6.6 percent in the IL sample). Lastly, we note that the average CEO in the Execucomp sample serves for approximately 11 years (similar in the IL sample). Together, these statistics highlight similarity across the Execucomp and IL samples, and suggest the IL sample is composed of slightly larger and better performing firms.

In Panel C, we next turn to examining univariate differences in the mean values of compensation components and firm characteristics across our three life cycle groupings using the Execucomp sample.[11] We observe the highest level of total compensation in the Mature stage. Additionally, while total cash compensation and its components (salary and bonus) follow this pattern, the highest mean level of option grants is in the Early stage. We also find that while Early firm years have the highest returns, Mature firms have the highest ROA. To highlight that life cycle stages capture a broader construct than growth, we note no significant differences in MTB across the three stages. In Panel D, we explore univariate correlations between total compensation and related economic determinants in the Execucomp sample as a whole and separately by life cycle stage. As expected, we note a positive and significant correlation

[11] In untabulated tests, we also examine differences in the medians of these characteristics and our inferences remain. Further, we also document similar findings in both mean and median tests of differences in these characteristics across life cycle stages using our IncentiveLab sample (untabulated).

between total compensation and both ROA and returns in the full sample, however this correlation varies by life cycle stage. Additionally, we note the correlation between the two performance measures varies by life cycle stage, suggesting that their incremental informativeness may vary across life cycle stages. Overall, these descriptive statistics show differences across stages, supporting our choice to use life cycle as a setting to examine whether and how firms change weights on various measures in response to changes in their informativeness.

Multivariate Results

Tests of Weights on Earnings and Returns by Life Cycle Stage

The correlations above suggest that the relation between total compensation and earnings and returns may vary by life cycle stage. Although our focus is whether firms alter the weight on these metrics in response to shifts in the life cycle stage, we begin by examining cross-sectional differences in their weights by life cycle stage over the IL and Execucomp samples. In Table 2 Panel A, we use the explicitly stated weights from the IL data and observe that the weight on earnings (returns) is highest (lowest) in the Mature stage when it is likely most (least) informative of manager effort. We also note that the explicit weight on earnings is higher in the Early stages than the Late, but that the weight on returns is greater in the Late stage than in the Early stage. To the extent these explicit weights capture the underlying informativeness, these explicit contract results suggest that earnings (returns) may be more (less) informative of manager effort in the Early stage than it is in the Late stage.

Next, in Table 2 Panel B we use the Execucomp sample and Equation (1) to separately model total compensation in each life cycle stage and estimate the implicit weights on earnings and returns in each group. In Early stage firms, we anticipate that the nature of transactions is not

well captured in contemporaneous earnings, but rather in investor assessment of the firm's prospects. Similarly, in Late stage firms, efforts at returning the firm to profitability may be better assessed by market participants than in accounting earnings. Consistent with our expectations and the explicit results in Panel A, the results in Panel B show the lowest weight on the returns measure in the Mature stage. We also note the greatest weight on ROA in Mature stage firms consistent with our expectations that accounting earnings capture firm performance with less noise in this part of the firm life cycle. Additionally, we note that the coefficient on returns is greater in Early and Late stages. In untabulated results, we use seemingly unrelated regression tests and find no significant difference in the coefficients on earnings and returns across the Early and Late stages, suggesting no difference in the informativeness of earnings and returns across these stages. Together, these differences across life cycle stages, which we argue capture differences in the underlying informativeness of earnings and returns for contracting, supports prior cross-sectional findings of differential weightings linked to differential informativeness.

Quasi-Shift Results

We next test whether the firm alters compensation contracts to adjust for differences in the informativeness of earnings and returns. We begin with the IL data. However, given the limited number of years available in the database, we design a quasi-shift test to exploit the explicit contract details. To maximize the power of this test, we include all firm-years of a given firm from either stage in the test (Early/Mature, Mature/Late, or Early/Late) if that firm has at least one year in both categories (i.e., we do not restrict the sample to years just prior to or after the stage transition). In Table 3 Panel A, we estimate a multivariate model of the explicit weight on earnings and returns from De Angelis and Grinstein (2015) including an additional indicator

for one of the included life cycle stages to infer whether the explicit weight on earnings and returns varies by life cycle stage after controlling for other known determinants. The results in Columns (1) - (3) show that the explicit weight on earnings varies by life cycle stage. For firms with both Early and Mature years in the sample, we note a significantly greater weight on earnings in Mature years. Similarly, we note a greater weight on earnings in Mature years versus Late years (Column (2)) and in Early versus Late years (Column (3)). Moving to the weight on returns in Columns (4) - (6), we show that for firms with years in both stages the weight on returns is lower in Mature years than Early years (Column (4)), lower in Mature than Late (Column (5)), and lower in Early than Late (Column (6)). While not a direct test of a change in weights associated with the life cycle stage transition, these result suggest that for firms with years in both stages, we observe differing weights on earnings and returns by stage consistent with the informativeness of these two measures in those stages.

Similarly, in Table 3 Panel B, we also test the implicit weights on earnings and return using this quasi-shift framework on the Execucomp sample. Again, the sample we use in these tests consists of all firm years occurring in either stage of the life cycle stage pair, conditional on the firm having at least one year in each stage. Consistent with the explicit evidence above, we continue to document a greater weight on earnings for Mature years compared to both the Early and Late years. However, we do not document changes in the weights on earnings across Early and Late stage years. Further, we are only able to document a lower weight on returns in the Mature years compared to the Early and Late years in this sample. Taken together, both the implicit and explicit evidence suggests that within the same firm the weights on accounting and market measures of performance varies with shifts in their informativeness.

Tests of the Weights on Earnings and Returns in Response to Life Cycle Stage Shifts

Next, we turn to a test of within-firm variation in the weight on earnings and returns in response to a discernable shift in the informativeness of earnings and returns, as captured by a change in life cycle stage. We limit the sample for this test to the year immediately preceding and immediately following the life cycle shift to examine whether we can identify a concurrent shift in the weights on earnings and returns.[12] In Table 4, our results show that, consistent with our expectations and results above, we document a greater weight on earnings in the Mature stage when firms shift between Early and Mature years or between Mature and Late years, but fail to find evidence of a difference in the weight on earnings between Early and Late stages. Further, we also document a lower weight on returns in the Mature stage when firms transition between Mature and both Early and Late stages, but do not document a shift in the weight on returns between Early and Late stages. Overall, these results suggest that over a one-year window, we observe significant changes in the weight on earnings and returns consistent with shifts in their informativeness captured by life cycle stage movements, particularly when shifting into and out of the Mature stage.

In Table 5, to investigate whether firms respond equally to life cycle stage transitions in both directions, we next examine shifts in the implicit weights on earnings and returns considering the direction of the move (i.e., forward transitions capture from Early to Mature or Early to Late, while backward transitions capture Mature to Early, Late to Mature, etc.). While we continue to document an increased weight on earnings for Mature years compared to Early years in moves of both directions, we only document a decrease in the weight on returns in

[12] Alternatively, we could include several preceding or subsequent years, but choose this research design as it is the most restrictive test, and thus captures the notion of changes in compensation contracts associated with the change in life cycle stage. It is beyond the scope of this study to identify the existence of longer term contract reactions, or the most commonly observed lag.

forward transitions from Early to Mature. The lack of significant change in the weight on returns in moving from Mature to Early stages may signal a manager's reluctance to return to market measures of performance even though the measure is likely more informative of his effort in the Early stages. In moves between Mature and Late stages, we find evidence of a decrease in the weight on returns in the Mature stage in both forward and backward transitions. However, we note a significant difference in the size of the shift in the weight on returns. In addition, we note an increased weight on earnings only in backward shifts from Late to Mature. Finally, we do not observe shifts in the weight on earnings or returns for either direction move between Early and Late stages, suggesting that earnings and returns are not differentially informative of manager effort across these stages.

Cross-sectional analyses

To investigate scenarios in which we expect to observe variation in the change in the weight on earnings and returns, we examine cross-sectional differences in the change in the weight on these two metrics in response to a life cycle stage shift across different firm and manager characteristics. In Table 6, we examine subsamples formed on the level of the manager's firm-related wealth, the manager's influence over the board, and the financial expertise of the compensation committee. In Panel A, we examine our life cycle stage shift test of the implicit weights on earnings and returns separately in subsamples of above and below the median levels of firm-related wealth. We measure firm-related wealth as the value of the manager's portfolio of stock and option holdings at time *t* (the beginning of the first year in the new life cycle stage). While we continue to document shifts in the weights in earnings and returns in the low firm-related wealth subsample, we do not observe any shifts in the weight on ROA and returns between any life cycle stage pair in the subsample of executives with high

firm-related wealth. One possible explanation for this result is that when the board considers the considerable level of the manager's wealth already tied to stock market performance, the benefit of reducing the sensitivity of total compensation to market performance measures is low even though that measure is relatively less informative of manager effort in the Mature stage.

Next, a long line of literature focuses on how CEO power affects compensation contracting. Thus, in Panel B, we examine whether differences in CEO power influence the shift in the weights of accounting and market measures of performance in response to shifts in their informativeness. We employ our life cycle stage shift test in subsamples with and without CEO duality. Our results suggest that the overall result of a shift away (toward) from returns (earnings) in the Mature stage is driven by the subsample of firms where the CEO is not also chair of the board. We interpret this as suggesting that without CEO influence, the board adjusts weights for changes in informativeness and with CEO influence, these changes are less pronounced (with the exception of the increased weight on ROA between Early and Mature stages).

Finally, in Panel C, we investigate whether the composition of the compensation committee influences the contracting shift around life cycle stage changes. Because prior literature routinely shows characteristics of the compensation committee are associated with executive compensation, we examine our life cycle shift tests in subsamples with above and below the median levels of financial expertise on the compensation committee. If financial expertise captures better understanding of these two performance measures and how they relate to each other, firm value, and manager effort, we expect to see more pronounced changes in the high expertise sample. Interestingly, our results show that the full sample results of an increased weight on earnings and a decreased weight on returns in the Mature stage (relative to both Early

and Late stage years) are concentrated in the subsample of firms with low financial expertise. One possible explanation for this result is that when the compensation committee has a high level of financial expertise and is able to provide sufficient monitoring, the committee does not necessarily alter the weights in the contract. However, without financial expertise and the ability to monitor managerial effort through other channels, the committee relies on ROA and returns to ensure the contract is informative of manager effort. Overall, these cross-sectional tests document that the shift in the weights on earnings and returns within a firm in response to shifts in the firm's life cycle stage are also a function of the firm and manager characteristics.

Additional Analyses

Firm life cycle stage changes may be accompanied by other internal and external changes that influence contracting, making it difficult to infer whether the observed contracting changes are associated with shifts in the informativeness of the underlying performance measures. To the extent institutional owners offer an alternative monitoring mechanism, if firms' life cycle transitions are associated with a change in institutional monitoring, the observed adjustments to the weights on earnings and returns may result from a change in institutional ownership. To help alleviate concerns our results are associated with concurrent shifts in institutional ownership, we identify the quartile of institutional ownership in the year preceding and following the life cycle stage change. If this quartile changes over the two-year period, we classify this firm as having an ownership shift. In Table 7 Panel A, we re-estimate our life cycle stage shift tests on the set of firms that did not also concurrently experience an ownership shift and our inferences hold on changes between Mature and other life cycle stages.

Prior literature also considers cross-sectional differences in the weights on earnings and returns across high and low growth firms. While prior literature documents that the life cycle

construct is distinct from growth measures alone, and we argue our life cycle stage shift tests provide an incremental contribution to cross-sectional analyses, in Table 7 Panel B we investigate whether our results simply reflect changes in firm growth. In this test, we identify firms that move from above (below) to below (above) median asset growth (measured as the percentage change in the value of total assets) between the year preceding and following the life cycle stage shift. We classify these firms as growth change firms. We re-estimate our life cycle stage shift tests eliminating all firms with a concurrent change in growth classification and document that our inferences hold.

Finally, prior research suggests that modelling the incentive role of earnings and returns is incomplete without considering changes in the value of the manager's portfolio (Core et al. 2003). In Panel C, we re-estimate our life cycle stage shift tests replacing the dependent variable with the level of total compensation adjusted for the change in the value of the manager's equity holdings. The results in Panel C show that our inferences regarding the shifts in weights between Early and Mature and Mature and Late stage years still hold.

In addition, to ensure our results are associated with the underlying economics of a change in life cycle stage and not characteristics of the particular life cycle classification scheme measure employed, we also validate our findings using an alternative measure of life cycle stage (Anthony and Ramesh 1992) as well as an adjusted Dickinson measure relying on the three-year average cash flows. Our results hold in both settings.

4. Conclusions

The effectiveness of executive compensation depends on rewarding executives based on appropriate measures, those that are most informative of managerial effort. In our study, we examine whether and how boards change the weights on accounting and market measures of

performance in response to changes in the informativeness of these measures over the life of the firm. Life cycle offers a unique setting to examine firm transitions in which the informativeness of accounting and market measures of performance vary predictably.

Using explicit disclosures of the weight on earnings and returns in compensation contracts as well as implicit tests of the weights, we document changes in the weight on performance measures associated with changes in the informativeness of those measures. However, and consistent with anecdotal evidence on the inability of firms to properly adjust contracts, we show these timely adjustments are affected by characteristics of the board, manager, and firm. Our study highlights the dynamic nature of compensation and how boards adjust compensation based on the informativeness of the performance measure. Our large sample results complement prior literature that documents cross-sectional differences in weights on contracting measures and answers the call for empirical evidence of how incentive design evolves within a firm over time.

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Appendix 1: Cash flow determinants of life cycle stage

This table illustrates the cash flow patterns used to classify firms into each of the five life cycle stages from Dickinson (2011). Because contract parameters are set early in the fiscal year, we classify a firm's life cycle stage in year *t* using the firm's cash flow patterns in *t-1*. This categorization scheme does not require linear progression through the life cycle stages. Dickinson (2011) validates the stability of her life cycle categorization using a transition matrix framework in her Table 3 Panel B (p. 1320). In untabulated results, we note similar stability using her measure for our more limited sample of Execucomp firms.

	Introduction	Growth	Mature	Shake-out	Shake-out	Shake-out	Decline	Decline
Cash flows from operating activities	-	+	+	-	+	+	-	-
Cash flows from investing activities	-	-	-	-	+	+	+	+
Cash flows from financing activities	+	+	-	-	+	-	+	-

Life Cycle Stage Breakdown:

	Introduction	**Growth**	**Maturity**	**Shake-out**	**Decline**	**Total**
Execucomp Sample	1,116	7,310	13,242	2,245	711	24,624
	4.32%	29.30%	54.27%	9.28%	2.83%	
IL Sample	161	1,806	4,678	711	123	7,479
	2.19%	24.23%	62.38%	9.58%	1.62%	

Appendix 2: Variable Descriptions

Variable	Definition (Compustat/CRSP mnemonics in parentheses)
Compensation Variables:	
TotalCompensation	Natural log of (1+(TDC1)), where TDC1 is the total compensation as reported in Execucomp.
Salary	Natural log of (1+(SALARY)), where SALARY is the salary as reported in Execucomp.
Bonus	Natural log of (1+(BONUS + NONEQ_INCENT)), following Cadman et al. (2010) where bonus is the sum of (BONUS) and (NONEQ_INCENT) as reported in Execucomp.
CashCompensation	Natural log of (1+ SALARY+BONUS+NONEQ_INCENT), where all variables are defined as above.
StockCompensation	Natural log of (1+(RSTKGRNT + STOCK_AWARDS_FV), where the stock compensation is measured as either (RSTKGRNT) in the pre-FAS 123R period or (STOCK_AWARDS_FV) in the post-FAS 123R period as reported in Execucomp.
OptionCompensation	Natural log of (1+(OPTION_AWARDS_BLK_VALUE + OPTION_AWARDS_FV), where the option compensation is measured as either (OPTION_AWARDS_BLK_VALUE) in the pre-FAS 123R period or (OPTION_AWARDS_FV) in the post-FAS 123R period as reported in Execucomp.
EquityCompensation	Natural log of (1 + OPTION_AWARDS_BLK_VALUE + OPTION_AWARDS_FV + RSTKGRNT + STOCK_AWARDS_FV), where all variables are defined as above.
OtherCompensation	Natural log of (1+(TDC1-SALARY-BONUS-NONEQ_INCENT-OPTION_AWARDS_BLK_VALUE-OPTION_AWARDS_FV-RSTKGRNT-STOCK_AWARDS_FV), where all variables are measured as above. The typical components include (OTHANN), (LTIP), (ALLOTHTOT), (OTHCOMP), (DEFER_RPT_AS_COMP_TOT).
%Salary	Salary as a percent of total compensation, where both salary and total compensation are as defined above.
%Bonus	Bonus as a percent of total compensation, where both bonus and total compensation are as defined above.
%CashCompensation	Cash compensation as a percent of total compensation, where both cash and total compensation are as defined above.
%StockCompensation	Stock compensation as a percent of total compensation, where both stock and total compensation are as defined above.
%OptionCompensation	Option compensation as a percent of total compensation, where both option and total compensation are as defined above.
%EquityCompensation	Equity as a percent of total compensation, where both equity and total compensation are as defined above.
%OtherCompensation	Other compensation as a percent of total compensation, where both other compensation and total compensation are as defined above.
Economic Determinants:	
Size	Natural log of total assets as reported in Compustat (AT).
MTB	Market-to-book ratio as measured by the firm's market value of equity (CSHO*PRCC_F) divided by the firm's book value of equity (CEQ).
AnnualReturn	One year buy and hold dividend reinvested return for the underlying security.
VarReturns	Standard deviation of daily log returns over the past five years annualized by multiplying by the √(254).
ROA	Net income (NI) divided by total assets (AT).
VarROA	Standard deviation of quarterly ROA over the prior five years.

CEO as Chair	Indicator variable which takes the value of one if the executive is both the CEO of the firm and Chairman of the Board during the current period.
Tenure	Natural log of the length of time the executive has been with the current firm. Measured as (DATADATE-JOINEDCO)/365. Missing values are replaced with the number of years between the current year and the first year the executive appears with the firm in Execucomp.
Life cycle measures	
Early	Firm years classified as either Introduction or Growth using the life cycle proxy from Dickinson (2011).
Mature	Firm years classified as Mature using the life cycle proxy from Dickinson (2011).
Late	Firm years classified as either Shake-out or Decline using the life cycle proxy from Dickinson (2011).
Incentive Lab Variables:	
WeightonEarnings	The weight (percentage of payout dependent on performance on this measure) on all included earnings based metrics collected from ISS Incentive Lab.
WeightonReturns	The weight (percentage of payout dependent on performance on this measure) on all included market based metrics collected from ISS Incentive Lab.
Additional Control Variables (Explicit tests):	
NumberSegments	Using the Compustat segment file, this is the number of discrete operating segments. Missing values are replaced with 1.
Investments	Following De Angelis and Grinstein (2015), the sum of research and development (XRD) and capital expenditure (CAPX) spending scaled by total assets (AT).
IndustryTobin'sQ	Following De Angelis and Grinstein (2015), the industry (two-digit SIC) average (excluding own firm) Tobin's Q ((PRCC_F*CSHO+DLTT+DLC)/AT)
FirmAge	The length of time in years, from the firm's initial IPO date.
Cross-sectional Partitioning Variables:	
Firm-related wealth	We use the CEO firm-related wealth data for each firm-year used in Daniel, Li, and Naveen (2013) and provided by the authors at https://sites.temple.edu/lnaveen/data/. We create a partition based on whether or not the manager's level of firm-related wealth at the start of the first year in the new life cycle stage is above or below the median level of firm-related wealth in that sample year.
FinancialExpertise	We generate a variable representing the percentage of the compensation committee with financial expertise in place at the start of the first year in the new life cycle stage. We then split our sample into firm-years with above and below median levels of the percentage of the compensation committee with financial expertise. We define financial expertise following the SEC definition and use BoardEx employment history to identify financial expertise of members of the compensation committee. Specifically, we use the following terms to identify financial expertise in employment history: Chief Executive Officer (CEO), Chief Financial Officer (CFO), Chief Accounting Officer (CAO), Financial Director (FD), treas, finan, audit, controller, accounting, accountant, tax, or comptroller.
Additional Analyses:	
Δ*InstitutionalOwnership*	We measure institutional ownership as the percentage of shares outstanding held by large blockholders. We generate an indicator variable taking the value of one if the quartile of institutional ownership changes over the same period as the life cycle stage change.
Δ*AssetGrowth*	We generate an indicator variable taking the value of one if the firm's changes from above to below (or below to above) median percentage growth in assets in the years preceding and following the life cycle stage change. We measure asset growth as the percentage change in the level of total assets between year *t* and *t-1*.

CEOTotalWealth	We define *CEOTotalWealth* as the total compensation granted to the CEO in year t (Compustat TDC1) plus the change in the CEO's level of firm-related wealth between year *t-1* and *t*.

Appendix 3: ISS Incentive Lab Data Collection Procedures

The IncentiveLab database contains detailed information on executive compensation contracts pursuant to SEC disclosure enhancements enacted for FY 2007. The database contains disclosures from approximately 2,000 US firms with history back to 1998. To gather details on the metrics employed in performance-contingent award grants, we rely on several IncentiveLab files. The GPBAGRANT file provides basic details on each grant (there can be multiple grants per executive per year) including whether the grant is based on absolute, relative, or accelerated performance goals. We use this information to classify each underlying metric as absolute, relative, or accelerated. This file also contains information on the type of payout for each grant, among other things. Next, to collect more details on each individual grant we move to data separately provided in the GPBAABS, GPBAREL, and GPBAACC files depending on whether each grant falls within the absolute, relative, or accelerated categories. These tables contain similar information including the individual metrics used in each grant. IL first broadly classifies each metric as belonging to one of three categories: Accounting, Market, or Other. Accounting metrics are defined as belonging to one of the following groups: Cashflow, Earnings, EBIT, EBITDA, EBT, EPS, EVA, FFO, Operating Income, Profit Margin, ROA, ROE, ROI, ROIC, Sales, Vague, or Other. Market metrics are any metrics relying on stock price. Other metrics are defined as belonging to one of the following groups: Business Unit, Customer Satisfaction, Debt Related, FDA Approval, Individual, IPO of Subsidiary, Operational, Sales Contracts, Same Store Sales, or Other. We then further classify the Accounting metrics into two categories: earnings-based metrics and non-earnings-based metrics. We defined earnings based metrics as the following: Earnings, EBIT, EBITDA, EBT, EPS, Operating Income, Profit Margin, ROA, ROE, ROI, ROIC. By combining all grants to a single executive in a single year, we can identify the total number of metrics falling into each of these categories employed in any part of his performance contingent compensation contract. We can group these metrics by type (i.e., Accounting, Market, etc.) or by target measurement method (i.e., absolute, relative, etc.). To match this grant information back to Execucomp, we use information from the PARTICIPANTFY file including the current CEO identifier (CURRENTCEO) and explanation of current position (ROLECODE). We identify the CEO for each firm year and match back to the Execucomp data.

TABLE 1 Descriptive Statistics

Panel A: Descriptive statistics – Execucomp full sample

Compensation Variables (In 000s, all unlogged):	**N**	**Mean**	**Median**	**Std. Dev.**	**P25**	**P75**
TotalCompensation	24,624	4,898.43	2,811.16	9,039.59	1,283.43	5,915.55
Salary	24,624	715.88	657.00	369.33	455.00	922.97
%Salary	24,624	0.301	0.231	0.226	0.137	0.399
Bonus	24,624	960.91	500.00	1,752.49	145.00	1,186.51
%Bonus	24,624	0.207	0.185	0.170	0.075	0.300
CashCompensation	24,624	1,676.79	1,158.70	1,944.33	677.27	2,055.75
%CashCompensation	24,624	0.508	0.465	0.263	0.304	0.690
StockCompensation	24,624	1,253.10	0.00	5,110.55	0.00	1,257.66
%StockCompensation	24,624	0.167	0.000	0.234	0.000	0.318
OptionCompensation	24,624	1,572.76	416.64	5,950.31	0.00	1,590.42
%OptionCompensation	24,624	0.247	0.192	0.257	0.000	0.414
EquityCompensation	24,624	2,825.86	1,148.76	7,967.31	199.36	3,351.69
%EquityCompensation	24,624	0.414	0.451	0.279	0.173	0.639
OtherCompensation	24,624	389.45	72.81	1,979.30	16.73	260.10
%OtherCompensation	24,624	0.077	0.027	0.133	0.008	0.080

Firm/CEO Characteristics:	**N**	**Mean**	**Median**	**Std. Dev.**	**P25**	**P75**
TotalAssets (Unlogged)	24,624	6,301.39	1,232.50	26,969.61	455.83	3,911.86
AnnualReturn	24,624	0.188	0.108	0.703	-0.127	0.365
ReturnVariance	24,624	0.121	0.105	0.087	0.078	0.143
ROA	24,624	0.053	0.059	0.279	0.021	0.102
ROAVariance	24,624	0.063	0.035	0.124	0.019	0.070
MTB	24,624	2.042	1.624	1.824	1.240	2.301
Tenure(unlogged)	24,624	10.885	6.504	11.311	2.000	16.008
%Female	24,624	0.024	0.000	0.153	0.000	0.000
CEO as Chair	24,624	0.556	1.000	0.497	0.000	1.000

Table 1 (continued)
Panel B: Incentive Lab sample

Compensation Variables (In 000s, all unlogged):	**N**	**Mean**	**Median**	**Std. Dev.**	**P25**	**P75**
TotalCompensation	7,479	8,096.43	6,160.34	10,720.64	3,688.95	9,976.47
Salary	7,479	951.73	941.67	373.46	726.69	1,103.34
%Salary	7,479	0.190	0.148	0.149	0.105	0.220
Bonus	7,479	1,687.82	1,190.53	2,115.17	530.88	2,125.00
%Bonus	7,479	0.222	0.199	0.162	0.113	0.301
CashCompensation	7,479	2,639.56	2,100.00	2,303.65	1,305.00	3,222.94
%CashCompensation	7,479	0.412	0.364	0.221	0.260	0.513
StockCompensation	7,479	2,739.04	1,426.00	8,487.33	0.00	3,839.94
%StockCompensation	7,479	0.279	0.260	0.262	0.000	0.475
OptionCompensation	7,479	2,173.45	1,098.00	4,665.81	0.00	2,680.00
%OptionCompensation	7,479	0.243	0.207	0.239	0.000	0.387
EquityCompensation	7,479	4,912.49	3,450.01	9,706.23	1,509.03	6,297.68
%EquityCompensation	7,479	0.523	0.580	0.246	0.389	0.700
OtherCompensation	7,479	541.12	143.91	1,940.88	38.84	397.17
%OtherCompensation	7,479	0.065	0.023	0.120	0.008	0.059

Firm/CEO Characteristics:	**N**	**Mean**	**Median**	**Std. Dev.**	**P25**	**P75**
TotalAssets (Unlogged)	7,479	12,437.64	4,000.61	38,395.64	1,820.14	9,855.90
AnnualReturn	7,479	0.168	0.114	0.609	-0.099	0.341
ReturnVariance	7,479	0.105	0.093	0.056	0.069	0.126
ROA	7,479	0.066	0.066	0.094	0.029	0.106
ROAVariance	7,479	0.051	0.030	0.066	0.016	0.059
MTB	7,479	2.094	1.732	1.298	1.316	2.422
Tenure(unlogged)	7,479	10.849	7.000	10.900	3.000	15.647
CEO as Chair	7,479	0.597	1.000	0.491	0.000	1.000

Panel C: Means by stage (Execucomp sample)

Compensation Variables (In 000s, all unlogged):	(1)	(2)	(3)			
	Early	**Mature**	**Late**	**1v2**	**1v3**	**2v3**
	N=8,425	**N=13,243**	**N=2,956**			
TotalCompensation	4,605.29	5,248.51	4,165.55	***	**	***
Salary	658.78	765.44	656.57	***		***
%Salary	0.303	0.291	0.341	***	***	***
Bonus	859.31	1,065.17	783.41	***	**	***
%Bonus	0.200	0.216	0.184	***	***	***
CashCompensation	1,518.10	1,830.61	1,439.98	***	*	***
%CashCompensation	0.504	0.507	0.525		***	***
StockCompensation	1,007.07	1,460.91	1,023.33	***		***
%StockCompensation	0.145	0.185	0.152	***		***
OptionCompensation	1,710.33	1,539.67	1,328.89	**	***	*
%OptionCompensation	0.274	0.230	0.244	***	***	***
EquityCompensation	2,717.41	3,000.58	2,352.22	**	**	***
%EquityCompensation	0.419	0.414	0.396		***	***
OtherCompensation	354.66	415.25	373.04	**		
%OtherCompensation	0.076	0.078	0.079			

Firm/CEO Characteristics:	(1)	(2)	(3)			
	Early	**Mature**	**Late**	**1v2**	**1v3**	**2v3**
	N=8,425	**N=13,243**	**N=2,956**			
TotalAssets (Unlogged)	5,633.20	6,798.17	5,980.18	***		
AnnualReturn	0.215	0.183	0.135	***	***	***
ReturnVariance	0.131	0.109	0.147	***	***	***
ROA	0.043	0.074	-0.014	***	***	***
ROAVariance	0.073	0.049	0.101	***	***	***
MTB	2.028	2.052	2.036			
Tenure(unlogged)	10.610	11.380	9.452	***	***	***
CEO as Chair	0.543	0.577	0.499	***	***	***

Panel D: Correlations

Full Sample

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(1)TotalCompensation	1.000								
(2)TotalAssets	0.687***	1.000							
(3)AnnualReturn	0.013**	-0.058***	1.000						
(4)ReturnVariance	-0.152***	-0.281***	0.122***	1.000					
(5)ROA	0.053***	0.056***	0.059***	-0.101***	1.000				
(6)ROAVariance	-0.090***	-0.232***	0.036***	0.265***	-0.117***	1.000			
(7)MTB	0.045***	-0.135***	0.162***	0.021***	-0.067***	0.246***	1.000		
(8)Tenure	0.089***	0.148***	-0.008	-0.077***	0.016**	-0.060***	0.026***	1.000	
(9)CEO as Chair	0.172***	0.215***	-0.025***	-0.090***	0.011*	-0.076***	-0.009	0.275***	1.000

Early Stage Years

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(1)TotalCompensation	1.000								
(2)TotalAssets	0.638***	1.000							
(3)AnnualReturn	-0.002	-0.116***	1.000						
(4)ReturnVariance	-0.143***	-0.361***	0.111***	1.000					
(5)ROA	0.010	0.017	0.049***	-0.072***	1.000				
(6)ROAVariance	-0.064***	-0.243***	0.058***	0.335***	-0.055***	1.000			
(7)MTB	0.018*	-0.231***	0.298***	0.160***	-0.042***	0.237***	1.000		
(8)Tenure	0.112***	0.179***	-0.001	-0.081***	-0.002	-0.077***	0.003	1.000	
(10)CEOasChair	0.152***	0.200***	-0.030***	-0.097***	-0.002	-0.083***	-0.026**	0.281***	1.000

Mature Stage Years

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(1)TotalCompensation	1.000								
(2)TotalAssets	0.708***	1.000							
(3)AnnualReturn	0.013	-0.044***	1.000						
(4)ReturnVariance	-0.160***	-0.274***	0.203***	1.000					
(5)ROA	0.096***	-0.033***	0.134***	-0.161***	1.000				
(6)ROAVariance	-0.054***	-0.172***	0.054***	0.334***	0.032***	1.000			
(7)MTB	0.125***	-0.045***	0.155***	-0.110***	0.594***	0.062***	1.000		
(8)Tenure	0.083***	0.135***	-0.015*	-0.077***	0.056***	-0.055***	0.053***	1.000	
(9)CEOasChair	0.183***	0.221***	-0.023***	-0.099***	0.020**	-0.087***	-0.006	0.268***	1.000

Late Stage Years

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(1)TotalCompensation	1.000								
(2)TotalAssets	0.692***	1.000							
(3)AnnualReturn	0.049***	0.016	1.000						
(4)ReturnVariance	-0.148***	-0.229***	0.073***	1.000					
(5)ROA	0.182***	0.291***	0.073***	-0.156***	1.000				
(6)ROAVariance	-0.159***	-0.292***	-0.011	0.158***	-0.362***	1.000			
(7)MTB	-0.027***	-0.189***	0.049***	0.024	-0.497***	0.374***	1.000		
(8)Tenure	0.016	0.083***	-0.006	-0.079***	0.026	-0.029	0.024	1.000	
(9)CEOasChair	0.147***	0.195***	-0.025	-0.075***	0.031*	-0.042**	-0.005	0.276***	1.000

This table presents descriptive statistics for our samples. Panel A presents descriptive statistics for compensation variables from the Execucomp sample used in our tests. Panel B presents descriptive statistics for compensation variables from the IL sample used in our tests. Panel C presents means separately for each life cycle stage from the Execucomp sample, followed by F-tests of the differences in variable means across life cycle stages. Tests of difference are conducted on the logged variable when appropriate. Panel D presents correlations among our total compensation and economic determinants of compensation variables from the Execucomp sample, both across the full sample as well as in each life cycle stage. All variables are defined in Appendix 2. *, **, *** represents statistical significance at 10 percent, 5 percent, and 1 percent levels.

Table 2 Weights on earnings and returns by life cycle stage

Panel A: Explicit weights

	Means					
	Early N=1,967	**Mature N=4,678**	**Late N=834**	**1v2**	**1v3**	**2v3**
WeightonEarnings	0.629	0.692	0.602	***	**	***
WeightonReturns	0.045	0.036	0.053	***	**	***

Panel B: Implicit weights

	dv=*TotalCompensation*		
VARIABLES	**Early**	**Mature**	**Late**
$AnnualReturn_t$	0.117***	0.056***	0.103***
	(5.30)	(2.70)	(3.23)
ROA_t	0.193**	1.045***	0.214**
	(2.21)	(7.13)	(2.36)
$Size_{t-1}$	0.337***	0.245***	0.367***
	(12.72)	(9.06)	(6.37)
MTB_{t-1}	0.084***	0.073***	0.035***
	(5.02)	(6.69)	(3.24)
$AnnualReturn_{t-1}$	0.070***	0.051***	0.062**
	(4.93)	(3.11)	(2.03)
VarReturns	-0.371	-0.023	-0.572*
	(-1.57)	(-0.13)	(-1.82)
ROA_{t-1}	0.385***	0.057	0.142***
	(4.60)	(0.64)	(3.00)
VarROA	0.014	-0.310*	-0.106
	(0.13)	(-1.80)	(-1.20)
CEO as Chair	0.012	0.026	0.094
	(0.36)	(1.10)	(1.53)
Tenure	0.036	0.033	-0.098*
	(1.14)	(1.62)	(-1.93)
Constant	4.620***	5.000***	4.609***
	(25.67)	(27.66)	(11.70)
Year Indicators	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes
Manager Fixed Effects	Yes	Yes	Yes
Observations	8,425	13,243	2,956
Adjusted R^2	74.50%	82.00%	75.80%

This table presents weights on earnings and returns across life cycle stages for all available firm years. Panel A presents the explicit weights on earnings and returns by life cycle stage from the IL sample. Panel B presents the results of estimating the implicit weights using Equation (1) on the Execucomp sample. All variables are defined in Appendix 2. *, **, *** represents statistical significance at 10 percent, 5 percent, and 1 percent levels.

Table 3 Quasi-shift tests

Panel A: Explicit weights on earnings and returns from IL sample

	dv=*WeightonEarnings*			dv=*WeightonReturns*		
	(1)	(2)	(3)	(4)	(5)	(6)
	Early/Mature	Mature/Late	Early/Late	Early/Mature	Mature/Late	Early/Late
Mature	0.024**	0.054***	-	-0.005*	-0.015**	-
	(2.44)	(3.95)	-	(-1.81)	(-2.09)	-
Early	-	-	0.045***	-	-	-0.015*
	-	-	(2.75)	-	-	(-1.71)
Size	-0.024***	-0.029***	-0.010	0.008**	0.010***	0.005
	(-3.45)	(-3.19)	(-0.96)	(2.44)	(2.94)	(0.95)
NumberSegments	-0.003	-0.003	-0.001	0.001	0.000	0.002
	(-1.10)	(-1.21)	(-0.22)	(0.72)	(0.39)	(1.07)
Investments	-0.491***	-0.449**	-0.621***	0.171*	0.030	0.001
	(-3.69)	(-2.58)	(-4.99)	(1.80)	(0.53)	(0.01)
IndustryTobinsQ	0.004	0.017**	-0.001	-0.076*	-0.008**	-0.011**
	(0.72)	(2.02)	(-0.08)	(-1.77)	(-2.05)	(-2.17)
FirmAge	0.039	0.075**	0.059	-0.005	0.002	0.005
	(1.63)	(2.23)	(1.50)	(-0.39)	(0.12)	(0.41)
Tenure	0.015**	0.014*	0.019*	-0.005*	-0.003	-0.008*
	(2.50)	(1.84)	(1.91)	(-1.86)	(-0.91)	(-1.87)
Constant	0.605***	0.555***	0.401***	0.076*	0.031	0.083
	(6.68)	(4.36)	(2.85)	(1.88)	(0.57)	(1.25)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6,222	3,768	2,102	6,222	3,768	2,102
Adjusted R^2	14.70%	8.69%	14.50%	3.88%	3.04%	2.07%

Panel B: Implicit weights on earnings and returns in the Execucomp sample

	dv=*TotalCompensation*		
VARIABLES	**Early/Mature**	**Mature/Late**	**Early/Late**
$AnnualReturn_t$	0.102***	0.090***	0.107***
	(5.35)	(4.05)	(3.96)
ROA_t	0.450***	0.624***	0.294***
	(4.51)	(5.07)	(4.33)
Mature	-0.060***	0.033**	-
	(-4.96)	(2.06)	-
$Mature*AnnualReturn_t$	-0.040*	-0.043*	-
	(-1.65)	(-1.64)	-
$Mature*ROA_t$	0.641***	0.273*	-
	(5.20)	(1.86)	-
Early	-	-	0.124***
	-	-	(6.32)
$Early*AnnualReturn_t$	-	-	0.008
	-	-	(0.24)
$Early*ROA_t$	-	-	-0.062
	-	-	(-0.82)
$Size_{t-1}$	0.292***	0.263***	0.345***
	(14.81)	(10.17)	(11.10)
MTB_{t-1}	0.082***	0.089***	0.053***
	(6.51)	(8.99)	(3.90)
$AnnualReturn_{t-1}$	0.062***	0.044***	0.079***
	(5.77)	(3.31)	(4.78)
VarReturns	-0.252*	-0.142	-0.639***
	(-1.70)	(-0.74)	(-2.92)
ROA_{t-1}	0.236***	0.124	0.205***
	(3.50)	(1.43)	(2.84)
VarROA	-0.102	-0.423***	-0.110*
	(-0.87)	(-2.66)	(-1.85)
CEO as Chair	0.024	0.022	0.035
	(1.25)	(0.90)	(1.05)
Tenure	0.023	0.021	-0.021
	(1.28)	(0.91)	(-0.66)
Constant	4.805***	4.877***	4.644***
	(35.81)	(28.13)	(23.06)
Year Indicators	Yes	Yes	Yes
Firm and Manager Fixed Effects	Yes	Yes	Yes
Observations	19,886	10,938	8,055
Adjusted R^2	78.98%	80.88%	73.44%

This table presents tests of the weights on earnings and returns for firms with years in both life cycle stages. For this test we include all firm-years in the two life cycle stages conditional on the firm having at least one year in each stage of the pair. Panel A presents multivariate tests of the explicit weights on earnings and returns from the IL sample using the model in (De Angelis and Grinstein 2015). Panel B presents the results of estimating the implicit weights on ROA and returns using Equation (1) on the Execucomp sample. All variables are defined in Appendix 2. *, **, *** represents statistical significance at 10 percent, 5 percent, and 1 percent levels.

Table 4 Life cycle stage shift tests

	dv=*TotalCompensation*		
VARIABLES	**Early/Mature**	**Mature/Late**	**Early/Late**
$AnnualReturn_t$	0.152***	0.146***	0.054
	(7.16)	(4.01)	(1.28)
ROA_t	0.596***	0.462*	0.017
	(4.14)	(1.68)	(0.13)
Mature	-0.057***	-0.007	-
	(-3.83)	(-0.32)	-
$Mature*AnnualReturn_t$	-0.058*	-0.133***	-
	(-1.84)	(-2.97)	-
$Mature*ROA_t$	0.798***	0.401*	-
	(4.85)	(1.82)	-
Early	-	-	0.071**
	-	-	(2.30)
$Early*AnnualReturn_t$	-	-	0.066
	-	-	(1.18)
$Early*ROA_t$	-	-	0.049
	-	-	(0.42)
$Size_{t-1}$	0.361***	0.283***	0.435***
	(16.28)	(5.25)	(9.71)
MTB_{t-1}	0.090***	0.112***	0.057***
	(5.80)	(4.75)	(3.43)
$AnnualReturn_{t-1}$	0.063***	0.041	0.055**
	(6.20)	(1.37)	(2.10)
VarReturns	-0.159	0.148	-0.804
	(-0.82)	(0.33)	(-1.38)
ROA_{t-1}	0.214**	-0.259	0.130*
	(2.13)	(-1.46)	(1.96)
VarROA	-0.244	0.202	0.095
	(-1.24)	(1.13)	(1.28)
CEO as Chair	0.052**	0.082*	0.033
	(2.19)	(1.85)	(0.49)
Tenure	-0.006	-0.018	-0.015
	(-0.54)	(-0.73)	(-0.39)
Constant	4.289***	4.487***	4.196***
	(27.64)	(11.51)	(12.38)
Year Indicators	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes
Observations	8,717	2,890	1,940
Adjusted R^2	78.99%	82.08%	71.17%

This table presents the results of estimating the implicit weights on ROA and returns using Equation (1) on the Execucomp sample for all firms transitioning between life cycle stages. For this test we restrict our sample to the year before and after the life cycle change. All variables are defined in Appendix 2. *, **, *** represents statistical significance at 10 percent, 5 percent, and 1 percent levels.

Table 5 Life cycle stage shift tests – Forward and Backward Transitions

	dv=*TotalCompensation*					
	Forward Transition			Backward Transition		
VARIABLES	**Early/Mature**	**Mature/Late**	**Early/Late**	**Mature/Early**	**Late/Mature**	**Late/Early**
$AnnualReturn_t$	0.151***	0.269**	0.138	0.166***	0.163***	0.011
	(5.80)	(2.09)	(1.61)	(3.56)	(3.44)	(0.18)
ROA_t	0.672***	1.259**	-0.219	0.388	0.135	0.036
	(3.64)	(2.22)	(-0.77)	(1.07)	(0.45)	(0.22)
Mature	-0.083***	0.070	-	-0.073**	-0.018	-
	(-3.80)	(1.05)	-	(-2.13)	(-0.49)	-
$Mature*AnnualReturn_t$	-0.090**	-0.296**	-	-0.066	-0.162***	-
	(-2.33)	(-2.11)	-	(-1.27)	(-2.73)	-
$Mature*ROA_t$	1.038***	-0.183	-	0.992***	0.730**	-
	(4.01)	(-0.30)	-	(2.60)	(2.12)	-
Early	-	-	0.150**	-	-	0.096*
	-	-	(2.40)	-	-	(1.66)
$Early*AnnualReturn_t$	-	-	0.148	-	-	0.095
	-	-	(1.34)	-	-	(1.05)
$Early*ROA_t$	-	-	0.221	-	-	-0.113
	-	-	(0.93)	-	-	(-0.77)
$Size_{t-1}$	0.330***	0.307***	0.527***	0.393***	0.202**	0.376***
	(11.15)	(3.72)	(7.73)	(12.87)	(2.55)	(5.65)
MTB_{t-1}	0.091***	0.081**	0.039**	0.072***	0.111***	0.037
	(3.90)	(2.38)	(2.03)	(3.30)	(2.93)	(1.49)
$AnnualReturn_{t-1}$	0.084***	0.017	0.111***	0.028	0.081*	0.025
	(4.32)	(0.26)	(2.71)	(1.51)	(1.79)	(0.53)
VarReturns	-0.272	0.619	-0.021	0.179	-0.005	-0.559
	(-1.04)	(0.69)	(-0.03)	(0.79)	(-0.01)	(-0.66)
ROA_{t-1}	0.164	-0.185	0.177	0.145	-0.243	0.037
	(1.11)	(-0.58)	(1.02)	(0.76)	(-0.88)	(0.84)
VarROA	0.031	0.411***	0.053	-0.583*	-0.346	-0.020
	(0.12)	(5.68)	(0.43)	(-1.73)	(-0.79)	(-0.14)
CEO as Chair	0.051	0.125	-0.057	0.101***	0.090	-0.008
	(1.49)	(1.56)	(-0.47)	(3.09)	(1.39)	(-0.07)
Tenure	-0.020	-0.044	0.070	0.020	0.001	-0.044
	(-1.22)	(-1.14)	(1.19)	(1.26)	(0.03)	(-0.83)
Constant	4.497***	4.232***	3.511***	4.067***	5.092***	4.442***
	(20.14)	(6.99)	(6.61)	(19.32)	(9.29)	(8.60)
Year Indicators	Yes	Yes	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4,792	1,235	1,002	3,925	1,655	938
Adjusted R^2	79.56%	80.33%	71.81%	77.53%	82.56%	71.93%

This table presents the results of estimating the implicit weights on ROA and returns using Equation (1) on the Execucomp sample for all firms transitioning between life cycle stages partitioned on the direction of the move. For this test we separately estimate forward and backward life cycle stage transitions on a sample that includes only the year before and the year after the life cycle stage change. All variables are defined in Appendix 2. *, **, *** represents statistical significance at 10 percent, 5 percent, and 1 percent levels.

Table 6 Cross-sectional tests

Panel A: Partitioning on CEO firm-related wealth

	dv=*TotalCompensation*					
	High firm-related wealth			Low firm-related wealth		
VARIABLES	**Early/Mature**	**Mature/Late**	**Early/Late**	**Early/Mature**	**Mature/Late**	**Early/Late**
$AnnualReturn_t$	0.141***	0.164**	0.204	0.162***	0.167***	0.038
	(3.04)	(2.24)	(1.11)	(4.93)	(3.13)	(1.52)
ROA_t	0.460	0.482	-0.004	0.648***	1.532***	0.129
	(1.20)	(1.16)	(-0.01)	(2.92)	(3.09)	(1.14)
Mature	-0.064*	-0.053	-	-0.051***	0.051*	-
	(-1.70)	(-1.09)	-	(-2.62)	(1.70)	-
$Mature*AnnualReturn_t$	0.054	-0.149	-	-0.094**	-0.196***	-
	(0.76)	(-1.15)	-	(-2.51)	(-3.22)	-
$Mature*ROA_t$	0.351	0.465	-	0.923***	-0.131	-
	(0.84)	(0.95)	-	(3.46)	(-0.40)	-
Early	-	-	-0.540***	-	-	0.090
	-	-	(-2.76)	-	-	(0.54)
$Early*AnnualReturn_t$	-	-	0.063	-	-	0.152
	-	-	(0.15)	-	-	(0.91)
$Early*ROA_t$	-	-	0.056	-	-	0.088*
	-	-	(0.78)	-	-	(1.83)
$Size_{t-1}$	0.282***	0.180	0.239	0.397***	0.127	0.221*
	(5.15)	(1.09)	(1.46)	(7.56)	(1.06)	(1.89)
MTB_{t-1}	0.080***	0.060	0.073***	0.103***	-0.013	0.007
	(3.03)	(1.32)	(2.77)	(3.49)	(-0.26)	(0.21)
$AnnualReturn_{t-1}$	0.068**	0.085	0.234***	0.061***	0.101**	0.079***
	(2.23)	(1.11)	(4.00)	(3.72)	(2.04)	(3.65)
VarReturns	-0.436	0.299	-1.736	0.126	0.066	-0.449
	(-0.46)	(0.24)	(-1.08)	(0.48)	(0.10)	(-0.60)
ROA_{t-1}	0.677**	0.348	0.699	0.197	0.089	0.102
	(2.53)	(0.80)	(1.47)	(1.37)	(0.45)	(0.59)
VarROA	-0.864	-0.300	-0.558	-0.246	-0.568	-0.463*
	(-1.59)	(-0.52)	(-0.55)	(-1.22)	(-0.70)	(-1.89)
Tenure	-0.028	-0.076	0.171	0.028	-0.165	-0.153
	(-0.37)	(-0.54)	(0.62)	(0.58)	(-1.41)	(-0.95)
Constant	5.316***	5.741***	5.452***	3.856***	5.768***	6.167***
	(14.22)	(4.44)	(4.81)	(11.85)	(6.54)	(8.55)
Year Indicators	Yes	Yes	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3,081	916	492	3,025	1,030	789
Adjusted R^2	76.58%	79.46%	71.32%	78.79%	81.98%	70.11%

Panel B: CEO as chair

	dv=*TotalCompensation*					
	CEO is Chair			CEO is not Chair		
VARIABLES	**Early/Mature**	**Mature/Late**	**Early/Late**	**Early/Mature**	**Mature/Late**	**Early/Late**
$AnnualReturn_t$	0.179***	0.149***	0.030	0.117***	0.182***	0.085**
	(5.81)	(2.79)	(0.42)	(4.56)	(3.84)	(1.99)
ROA_t	0.752***	0.547	0.481**	0.461***	0.463	-0.275**
	(3.20)	(1.13)	(2.16)	(2.69)	(1.55)	(-2.13)
Mature	-0.064***	-0.015	-	-0.065***	-0.009	-
	(-2.93)	(-0.46)	-	(-3.04)	(-0.26)	-
$Mature*AnnualReturn_t$	-0.048	-0.090	-	-0.054†	-0.164***	-
	(-1.20)	(-1.23)	-	(-1.42)	(-2.71)	-
$Mature*ROA_t$	1.124***	0.381	-	0.643***	0.445†	-
	(3.96)	(1.05)	-	(3.29)	(1.52)	-
Early	-	-	0.024	-	-	0.083*
	-	-	(0.53)	-	-	(1.80)
$Early*AnnualReturn_t$	-	-	0.057	-	-	0.063
	-	-	(0.55)	-	-	(0.89)
$Early*ROA_t$	-	-	-0.168	-	-	0.186
	-	-	(-1.14)	-	-	(1.07)
$Size_{t-1}$	0.319***	0.191**	0.384***	0.367***	0.368***	0.405***
	(10.63)	(2.39)	(4.07)	(9.65)	(4.02)	(5.44)
MTB_{t-1}	0.100***	0.081**	0.023*	0.077***	0.075***	0.083***
	(5.97)	(2.34)	(1.66)	(3.65)	(2.63)	(2.86)
$AnnualReturn_{t-1}$	0.071***	0.057	0.050	0.054***	0.066**	0.082***
	(4.24)	(1.15)	(1.26)	(3.77)	(1.99)	(2.67)
VarReturns	0.043	-0.508	-0.850	-0.513	0.678	-1.296*
	(0.20)	(-0.68)	(-1.05)	(-1.56)	(1.07)	(-1.91)
ROA_{t-1}	0.200	-0.367	0.072	0.209*	-0.398**	0.359***
	(1.11)	(-0.98)	(1.58)	(1.67)	(-2.01)	(3.20)
VarROA	-0.272	0.195	-0.026	-0.644**	0.072	0.127
	(-1.07)	(1.22)	(-0.18)	(-2.04)	(0.15)	(0.48)
Tenure	0.002	-0.010	-0.085	0.014	-0.044	-0.048
	(0.09)	(-0.29)	(-1.14)	(0.76)	(-1.06)	(-1.07)
Constant						
Year Indicators	Yes	Yes	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5,072	1,657	956	3,645	1,233	984
Adjusted R^2	77.99%	82.48%	72.66%	80.58%	80.98%	72.42%

Panel C: Compensation committee financial expertise

	dv=*TotalCompensation*					
	Low Financial Expertise			High Financial Expertise		
VARIABLES	**Early/Mature**	**Mature/Late**	**Early/Late**	**Early/Mature**	**Mature/Late**	**Early/Late**
$AnnualReturn_t$	0.130***	0.169***	0.101**	0.160**	0.105	0.233***
	(4.65)	(3.21)	(2.28)	(2.55)	(1.44)	(3.58)
ROA_t	0.574**	0.295	0.028	0.575**	0.545	0.014
	(2.16)	(0.78)	(0.09)	(2.16)	(1.02)	(0.08)
Mature	-0.030	-0.008	-	-0.080***	0.023	-
	(-1.09)	(-0.20)	-	(-2.67)	(0.60)	-
$Mature*AnnualReturn_t$	-0.091***	-0.138**	-	-0.003	-0.085	-
	(-2.76)	(-2.11)	-	(-0.04)	(-0.79)	-
$Mature*ROA_t$	0.982***	0.830**	-	0.412	0.323	-
	(3.28)	(2.24)	-	(1.11)	(0.77)	-
Early	-	-	0.079	-	-	0.013
	-	-	(1.52)	-	-	(0.21)
$Early*AnnualReturn_t$	-	-	-0.098	-	-	-0.117
	-	-	(-1.59)	-	-	(-1.41)
$Early*ROA_t$	-	-	0.267	-	-	-0.230*
	-	-	(0.90)	-	-	(-1.77)
$Size_{t-1}$	0.307***	0.211**	0.323***	0.353***	0.003	0.231**
	(7.11)	(2.12)	(5.20)	(6.07)	(0.02)	(1.99)
MTB_{t-1}	0.093***	0.107***	0.082**	0.102***	0.024	0.024
	(4.17)	(3.24)	(2.36)	(2.62)	(0.61)	(0.56)
$AnnualReturn_{t-1}$	0.059***	0.075**	0.144***	0.064***	0.032	0.108**
	(3.59)	(2.23)	(5.06)	(2.80)	(0.77)	(2.15)
VarReturns	-0.276	-0.240	-2.689*	-0.434	-0.416	-1.389**
	(-0.63)	(-0.39)	(-1.78)	(-0.98)	(-0.50)	(-2.55)
ROA_{t-1}	0.230	-0.085	0.056	0.074	-0.799**	0.480**
	(1.30)	(-0.39)	(1.10)	(0.35)	(-2.30)	(2.17)
VarROA	-0.577**	0.332	-0.388	-0.197	0.225*	-0.054
	(-2.12)	(0.56)	(-0.90)	(-0.57)	(1.67)	(-0.63)
CEO as Chair	0.052	0.206***	-0.010	0.018	-0.004	-0.131
	(1.36)	(2.94)	(-0.06)	(0.29)	(-0.04)	(-1.16)
Tenure	0.030	0.024	0.076	0.023	0.010	0.052
	(1.27)	(0.53)	(0.92)	(0.92)	(0.25)	(0.83)
Constant						
Year Indicators	Yes	Yes	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3,047	1,166	668	2,439	871	553
Adjusted R^2	76.91%	79.03%	77.15%	78.09%	86.19%	79.70%

This table presents the results of estimating the implicit weights on ROA and returns using Equation (1) on the Execucomp sample for all firms transitioning between life cycle stages. Panel A presents the results on the sample partitioned on the median of the executive's firm-related wealth. Panel B presents the results on the sample partitioned on whether the CEO is also the chair of the board of directors. Panel C presents the results on the sample partitioned on the median of the portion of the compensation committee identified as a financial expert. All variables are defined in Appendix 2. †,*, **, *** represents statistical significance at 20 percent, 10 percent, 5 percent, and 1 percent levels.

Table 7: Additional Analyses

Panel A: Excluding significant changes in institutional ownership

	dv=*TotalCompensation*		
VARIABLES	**Early/Mature**	**Mature/Late**	**Early/Late**
$AnnualReturn_t$	0.134***	0.194***	0.018
	(5.95)	(4.22)	(0.54)
ROA_t	0.714***	0.528	-0.075
	(3.80)	(1.45)	(-0.61)
Mature	-0.056***	0.026	-
	(-2.96)	(0.92)	-
$Mature*AnnualReturn_t$	-0.039†	-0.164***	-
	(-1.36)	(-2.80)	-
$Mature*ROA_t$	0.876***	0.396†	-
	(3.93)	(1.42)	-
Early	-	-	0.106***
	-	-	(2.63)
$Early*AnnualReturn_t$	-	-	0.149***
	-	-	(2.62)
$Early*ROA_t$	-	-	0.131†
	-	-	(1.48)
$Size_{t-1}$	0.356***	0.276***	0.421***
	(13.52)	(4.52)	(8.60)
MTB_{t-1}	0.080***	0.090***	0.039***
	(4.02)	(3.14)	(2.76)
$AnnualReturn_{t-1}$	0.053***	0.058*	0.043
	(3.45)	(1.74)	(1.57)
VarReturns	-0.200	0.993**	-0.164
	(-0.92)	(1.99)	(-0.25)
ROA_{t-1}	0.266**	-0.091	0.304**
	(2.05)	(-0.45)	(2.46)
VarROA	-0.417	-0.407	0.044
	(-1.54)	(-0.87)	(0.57)
CEO as Chair	0.042	0.057	0.054
	(1.49)	(1.12)	(0.67)
Tenure	-0.016	0.008	-0.003
	(-1.13)	(0.26)	(-0.05)
Constant	4.469***	4.629***	4.083***
	(24.20)	(10.08)	(11.74)
Year Indicators	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes
Observations	6,355	2,060	1,398
Adjusted R^2	78.71%	82.80%	70.50%

Panel B: Excluding significant concurrent growth changes

	dv=*TotalCompensation*		
VARIABLES	**Early/Mature**	**Mature/Late**	**Early/Late**
$AnnualReturn_t$	0.124***	0.136***	0.037
	(5.06)	(3.57)	(0.94)
ROA_t	0.610***	0.782**	0.169
	(3.76)	(2.37)	(0.80)
Mature	-0.056***	0.014	-
	(-3.34)	(0.58)	-
$Mature*AnnualReturn_t$	-0.037†	-0.136***	-
	(-1.36)	(-2.91)	-
$Mature*ROA_t$	0.726***	0.142†	-
	(3.97)	(1.41)	-
Early	-	-	0.048
	-	-	(1.27)
$Early*AnnualReturn_t$	-	-	0.057
	-	-	(0.98)
$Early*ROA_t$	-	-	0.100
	-	-	(0.60)
$Size_{t-1}$	0.367***	0.304***	0.472***
	(15.00)	(5.61)	(9.93)
MTB_{t-1}	0.093***	0.098***	0.062***
	(5.31)	(3.79)	(2.85)
$AnnualReturn_{t-1}$	0.059***	0.038	0.050**
	(4.32)	(1.20)	(2.03)
VarReturns	-0.208	0.039	-1.028
	(-0.90)	(0.09)	(-1.61)
ROA_{t-1}	0.273**	-0.293	0.118*
	(2.49)	(-1.51)	(1.87)
VarROA	-0.171	0.274*	0.103
	(-0.79)	(1.84)	(1.33)
CEO as Chair	0.050*	0.068	0.083
	(1.93)	(1.46)	(1.12)
Tenure	-0.005	-0.021	-0.031
	(-0.38)	(-0.80)	(-0.78)
Constant	4.263***	4.383***	4.128***
	(24.79)	(11.11)	(11.17)
Year Indicators	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes
Observations	7,108	2,553	1,578
Adjusted R^2	78.92%	79.70%	69.99%

Panel C: Adjusting compensation for change in total wealth

	dv=*TotalCEOWealth*		
VARIABLES	**Early/Mature**	**Mature/Late**	**Early/Late**
$AnnualReturn_t$	0.644***	0.645***	0.215**
	(11.42)	(7.74)	(2.48)
ROA_t	1.918***	0.663	0.522**
	(7.82)	(1.61)	(2.49)
Mature	-0.052*	-0.036	-
	(-1.79)	(-0.78)	-
$Mature*AnnualReturn_t$	-0.266**	-0.331**	-
	(-2.32)	(-2.58)	-
$Mature*ROA_t$	0.844***	0.943**	-
	(2.60)	(2.15)	-
Early	-	-	0.045
	-	-	(0.74)
$Early*AnnualReturn_t$	-	-	0.361*
	-	-	(1.93)
$Early*ROA_t$	-	-	-0.179
	-	-	(-0.85)
$Size_{t-1}$	0.244***	0.191**	0.302***
	(6.64)	(2.47)	(4.20)
MTB_{t-1}	-0.068**	-0.053	0.030
	(-2.38)	(-1.11)	(1.45)
$AnnualReturn_{t-1}$	0.070***	0.134**	0.097*
	(3.66)	(2.41)	(1.72)
VarReturns	-0.147	-1.101	-1.366
	(-0.43)	(-1.51)	(-1.59)
ROA_{t-1}	0.251	-0.471	0.022
	(1.38)	(-1.54)	(0.32)
VarROA	-0.016	0.093	0.120
	(-0.05)	(0.69)	(0.67)
CEO as Chair	0.184***	0.282***	0.240**
	(4.23)	(3.59)	(2.28)
Tenure	0.078***	-0.002	0.045
	(4.13)	(-0.06)	(0.79)
Constant	4.944***	5.256***	5.119***
	(19.31)	(9.64)	(9.72)
Year Indicators	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes
Observations	6,106	1,946	1,281
Adjusted R^2	57.89%	59.74%	50.76%

This table presents the results of estimating the implicit weights on ROA and returns using Equation (1) on the Execucomp sample for all firms transitioning between life cycle stages. Panel A presents the results of re-estimating our life cycle stage shift tests on a subsample of firms without a concurrent change in institutional ownership measured as a change in the quartile raking of institutional ownership between the year preceding and the year following the change in life cycle stage. Panel B presents the results of re-estimating our life cycle stage shift tests

on a subsample of firms without a concurrent change in growth (change in growth measured as changes from above (below) the median asset growth in the year preceding the life cycle stage change to below (above) the median asset growth in the year following the life cycle change). Panel C presents the results of re-estimating our life cycle stage shift tests replacing the dependent variable with the executive's total compensation adjusted for change in the value of his firm-related wealth. All variables are defined in Appendix 2. †,*, **, *** represents statistical significance at 20 percent, 10 percent, 5 percent, and 1 percent levels.