Rank Order Tournaments and Incentive Alignment: The Effect on Firm Performance

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Abstract

In this article, we study the effectiveness of promotion-based tournament incentives. We simultaneously investigate tournament incentives for the VP and performance- or equity- based (alignment) incentives for the VP and the CEO. We find that tournament incentives, as measured by the pay differential between the CEO and VPs, relate positively to firm performance. We show that the effect of tournament incentives on firm performance is weaker when the firm has a new CEO and more so when the new CEO is an outsider, and when the firm belongs to a homogeneous industry. On the other hand, tournament effects are stronger when the CEO is close to retirement. Our analysis is robust to corrections for endogeneity of all our incentive measures as well for several alternate measures of tournament incentives and firm performance.

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"In the Olympics prizes are awarded, not on the basis of absolute performance, but on the basis of relative performance. Similarly, in most organizations, one of the most important rewards is promotion."

Green and Stokey (1983)

Issues relating to the level of Chief Executive Officer (CEO) compensation and the gap between CEO and worker remuneration receive considerable attention from the financial media. More often than not, the media contend that CEOs in the US receive excessive pay and that the gap between CEO and worker pay is now at its highest ever. A recent article in the New York Times by Eduardo Porter (May 25,2007) further asserts that excessive pay disparity now extends also to the top echelons of the corporate hierarchy, that is, between the CEO and other high-level executives. Most articles, including the one in the New York Times, attribute these large compensation gaps to increased CEO power on boards, the increased ability of CEOs to set their own pay, heightened competition for top management talent, and to indexing compensation to industry benchmarks. In this article, we do not stake a position in th-s debate on CEO pay. Instead, we investigate a potentially positive aspect of the compensation disparity between the CEO and the next-level executives, whom we call VPs for ease of exposition.[1] We consider the gap between CEO and VP compensation as a feature of tournament incentives first proposed by Lazear and Rosen (1981) and investigate its impact on firm performance.

Our analysis of managerial incentives encompasses two important features that are common to the economic organization of typical corporations. The first feature is management by a team consisting of a CEO and a cadre of lower-rung executives. Second, there are two distinct categories of incentive mechanisms in most corporations, one is output- or performance-based and the other is promotion. As Baker, Jensen and Murphy (1988) note, since the CEO is at

[1] An article by Tim Harford on Forbes.com (May 20, 2006) offers tournaments as a tongue-in-cheek explanation of why CEOs are paid much more than lower executives.

the top of the corporate hierarchy it rules out promotion-based tournament incentives for the CEO and leaves performance-based compensation as the only incentive.[2] A VP, on the other hand, faces both equity-based performance incentives and promotion-based tournament incentives. In a typical rank-order tournament, the best relative performer is promoted to the next level in the hierarchy, while the others are passed over. Promotion to the next level carries with it a higher pay and, therefore, provides managers the incentive to expend higher effort to increase their chances of promotion and, in doing so, increase the firm's output. Given the availability of alternate incentive mechanisms, we believe that an examination of the effect of executive compensation on firm performance ought to include both these incentive mechanisms. While there is considerable theoretical and empirical research in finance on performance-based incentives for managers, promotion-based tournament incentives, have received scant attention. To our knowledge, ours is the first study to incorporate the effect of performance-based incentives of the CEO and both performance- and promotion- based tournament incentives for VPs on firm performance.

We follow the extant literature (e.g., Aggarwal and Samwick (2003)) and measure performance-based or "alignment" incentives by the sensitivity of the manager's pay to stock price changes. Constructing an empirical proxy for a VP's tournament incentives involves two components. The first is the size of the tournament incentive, which is.the increase in the VP's compensation on promotion to CEO. The second aspect is the likelihood or probability of promotion. As a result, tournament incentives can take the form of the size of the prize and/or the probability of promotion. Lazear and Rosen (1981) were the first to illustrate that an agent's effort increases with the size of the promotion prize, if each agent perceives himself/herself as

[2] Corporate CEOs may be affected by external tournaments in which they compete with other CEOs, (e.g. Agrawal, Knoeber, and Tsoulouhas (2006) and Malmendier and Tate (2005)). In our analysis, we control for the effect of such tournaments and distinguish between CEO appointments from outside and from within (e.g. Weisbach (1988), Parrino (1997), and Huson, Maletesta, and Parrino (2004)).

being equally likely for promotion and firms can set tournament incentives simply by adjusting the size of the prize.[3] Consequently, empirical researchers in labor economics (e.g., Bognanno (2000)) use the gap in the compensation between the CEO and the VP as the measure of the size of the tournament prize. If, however, the firm can also affect the probability of promotion, then tournament incentives consist of the size of the prize and the probability of promotion. For instance, firms may have a designated successor or choose to hire a CEO from outside, both of which lower the likelihood of promotion for an incumbent VP.

In view of the two dimensions, prize size and the probability of promotion, we investigate the effect of tournament incentives on firm performance as follows. First, using a sample of nearly 18,000 firm-year observations over the period 1993 – 2004, we identify and investigate the relation between several factors that affect the size of tournament incentives as proxied by the pay gap between the CEO and the VP. These determinants provide us with an idea of what drives tournament incentives. Then, under the assumption that the pay gap is the measure of the tournament prize, we estimate the relation between tournament prize and measures of firm performance. These analyses offer a direct test of Lazear and Rosen (1981)'s predictions for the incentive effects of tournaments. We find significant evidence that both forms of incentives, equity- and promotion- based, relate positively to firm performance. We further show that these positive relations hold for several alternative measures of firm performance and tournament incentives and are robust to corrections for the endogeneity between incentives and firm performance measures. Finally, we investigate the joint effects of the prize size and promotion probability by investigating how the relation between the prize size and firm performance changes for events that are likely to affect the probability of promotion. The logic being that the prize-performance relation should become weaker (stronger) when certain events decrease

[3] See Prendergast (1999) for a detailed exposition of this result.

(increase) the probability of promotion. These tests supplement our earlier analyses by taking into account the joint effect of the tournament gap and variations in the probability of winning the tournament.

In our analysis of the determinants of tournament incentives measured as the CEO-VP pay gap, we include several new factors such as industry norms and variables that proxy for the likelihood of promotion for firm VPs in addition to conventional determinants of tournament incentives. We find that the gap is larger when the firm has just hired a new CEO. When the CEO is new, the probability of promotion for the existing VPs should be lower because the previous tournament for the CEO's job has just ended and the next tournament for the new CEO's job is in its infancy. We further find that yhe gap is even larger when the firm hires a new CEO from outside the firm or when the firm operates in a homogeneous industry (which represents an increased possibility of outside hires). Conversely, pay gaps are smaller for firms whose CEO is close to retirement. These findings suggest that pay gaps maybe affected by the perceived probability of promotion for firm VPs. We also find a positive relation between the pay gap of a firm and the gap for the median firm of the industry in which the firm operates, which suggests that industry norms may be an important determinant of tournament prize size in addition to the probability of promotion.

Our next set of tests find a significantly positive relation between the CEO-VP pay gap and firm performance. Under the assumption that the probability of promotion is set exogenously, this finding implies that tournament incentives have a positive relation with firm performance. We find that this positive relation holds for pay gaps in short-term, long-term, as well as in total executive pay. The empirical specifications in these tests include measures of equity-based performance incentives as well as adjustments for the potential endogenous determination of tournament incentives, performance incentives, and firm performance.

We then investigate how changes in the probability of promotion affect the positive relation between firm performance and tournament prize size. The event of a firm hiring a new CEO offers an interesting situation to determine the importance of tournament incentives. When the firm CEO is new, tournament incentives should be weak because the previous tournament for the CEO's job is over and the new tournament is at an early stage. Our empirical tests show that this is indeed the case—the relation between tournaments and firm performance is weaker in the year when the CEO is new. The impact of a new CEO further depends on whether the new CEO is an outsider or is someone promoted from within or from outside. If the new CEO is from within, the firm shows a preference for promoting from within, which should increase the perceived probability of promotion. If the new CEO is an outsider, the impact on perceived probability of promotion for firm VPs should be the opposite. We compare the impact of these two situations on the relation between tournaments incentives and firm performance. Consistent with our hypothesis, we find that tournament incentives are significantly weaker when the new CEO is an outsider as compared to when he/she is an insider.

Next, consider firms that operate in homogenous industries. In such firms, the probability of internal promotion is lower because firm outsiders can also compete for the CEO's job.[4] Tournament effect may also be weaker in these industries because VPs also are likely to have better outside employment opportunities. We find some evidence that the effect of tournaments on performance is weaker when the firm operates in a homogenous industry. We also consider cases when the incumbent CEO is close to retirement. In such cases, the tournament for the CEO's job should be in full swing and the effect of tournament incentives on firm performance to be most evident. Indeed, we do document evidence showing that tournament effects are stronger when the incumbent CEO is greater than 62 years of age.

[4] Our conjecture is consistent with Parrino (1997), who argues that it is easier for managers to transfer their skills in homogenous industries and finds that intra-industry mobility of CEOs is higher in these industries.

At a general level, our research findings add to the vast body of research that investigates the relation between managerial compensation and firm performance. More specifically, our work relates to two strands of literature on incentive mechanisms- tournaments and contracting. Lazear and Rosen (1981) were the first to present tournaments as an important incentive mechanism. Milgrom and Roberts (1992) argue that corporate tournaments are an effective incentive mechanism for several reasons. First, promotion incentive is the only candidate mechanism in those situations where there is little or no information about the absolute performance of the employee. For example, the individual divisions of a multi-division firm may operate in different industries, which make it difficult to compare absolute performance across divisions. Promotion-based incentives can be an effective mechanism in such a firm. Second, tournaments are more effective when there are possibilities of systematic shocks that affect the individual's performance. For instance, if increased competition from imported goods affects the performance of all sales personnel, relative performance may be a better incentive mechanism than absolute performance. Finally, the intuitive basis of performance incentive contracts lies in tying employees' future earnings to current performance (e.g. Becker and Stigler (1974) and Lazear and Rosen (1981)). However, if performance is not verifiable, employers can misrepresent the output level achieved. Pure rank-order tournaments solve this problem because prizes in a tournament are committed in advance, which precludes employers from reneging on promised payouts. Our finding that tournaments affect firm performance positively offers support to the predictions of tournament theories.

Since we analyze tournament and alignment incentives simultaneously, we offer insight into the prevalence of hybrid incentive scheme for VPs noted by Baker, Jensen and Murphy (1988). They further note that in most models of optimal compensation, the owner/principal, who offers the contract to the agent, owns 100 percent of the firm's equity. This assumption usually

does not hold in the case of the CEO who sets the salary structure for VPs (Murphy (1999)). Relaxing the assumption of 100 percent ownership by the principal brings in concepts of "fairness" in the setting of executive pay, which may break the optimality of performance-based contracts.[5] Garvey and Swan (1992) formalize this notion in a model of a CEO who (i) wants "good relations" with subordinates (Murphy (1999)), (ii) has low pay-performance sensitivity (Jensen and Murphy (1990)), and (iii) faces high personal costs in firm bankruptcy (Gilson (1989)). The authors show that the optimal compensation scheme in such a setting is a hybrid of rank-order tournament incentives and output-based rates. By providing empirical evidence on the joint effectiveness of alignment and tournament incentives, we contribute to this literature on hybrid incentive schemes.

Our work also adds to the labor economics literature on the determinants of tournaments (e.g. Ehrenberg and Bognanno (1990) and Bognanno (2001)). We propose and empirically investigate several factors that affect tournament prizes, not considered by prior studies in this area. Specifically, we include industry characteristics, CEO succession planning, CEO retirement, CEO entrenchment, promotion from within versus without, multi-division versus focused firms, and difficulty in signal extraction. We find that many of these new factors significantly affect the size of the tournament prizes. Finally, our findings on performance-based incentives contribute to the large body of empirical work based on the principal-agent framework pioneered by Jensen and Meckling (1976) and Holmstrom (1979), which proposes that making executive compensation dependent on the output of the firm. Finally, a significant portion of the existing empirical research on compensation-based incentives and firm performance focuses on the incentives of CEOs, in particular those features of the compensation contract that align the

[5] In a recent working paper, Rajgopal and Srinivasan (2006) address the "fairness" issue by examining determinants of pay dispersion among the top executives in a firm to compare three alternate theories; the pay-equity view, tournament theory, and agency theory. In a related paper, Bebchuk, Cremers, and Peyer (2007) examine the fraction of total senior executive compensation that accrues to the CEO and its relation to Tobin's q.

interests of the CEO with shareholders' interests. However, Holmstrom and Kaplan (2003) argue that corporate boards should require all key executives to hold "meaningful" amounts of firm equity in order to align manager and shareholder interests further. We contribute to this literature by jointly analyzing the performance-based incentives of both CEOs and VPs and by explicitly controlling for endogeneity between CEO and VP alignments with firm performance.

In the next Section, we describe our sample and variables. In Section II we discuss our findings on the determinants of tournaments. Section III contains our findings on the effect of tournaments and managerial alignment on firm performance and includes a discussion and our empirical treatment of the endogeneity issues. In Section IV, we discuss our findings on several special scenarios under which tournament effects are either stronger or weaker. In Section V, we present the findings of a number of tests that relate to the robustness of our results to alternate specifications as well as alternative measures of variables of interest. Section VI contains concluding remarks.

I. Data Sources, Variable Construction, and Sample Description

A. Data Sources

We obtain CEO and VP compensation data from the December 2005 release of Standard and Poor's (S&P) ExecuComp database, which covers about 1,500 firms per year that are in the S&P 500, S&P Mid-Cap 400, and S&P Small-Cap 600 indices. We define CEO as the person who is identified as the Chief Executive Officer of the firm in ExecuComp (CEOANN = CEO), and classify all other executives as VPs. Our sample period is from 1993 to 2004 and includes all firm-years that have an identifiable CEO, and at least three VPs.[6] We obtain compensation data, stock returns, and firm characteristics data from ExecuComp, Center for Research in Security

[6] Eliminating the restriction of having at least three VPs increases our final sample by 348 and does not significantly alter any of our results.

Prices (CRSP) and Compustat Industrial and Segment files. In addition to these data, we require several CEO- and VP- related variables for our analysis. These include age and experience of the CEO, whether the CEO (incumbent or new) is an insider or outsider, and the number and designation of VPs. ExecuComp provides data on CEO age and whether the CEO is from inside or outside the firm for about 50 percent of the CEOs and on CEO experience for about 90 percent of our sample. We obtain information on missing CEO age, CEO experience, and whether the CEO is an insider from other sources which include firm *Proxy statements*, the *International Directory of Company Histories*, *Marquis Who's Who publication*, *Forbes Surveys*, and the *Standard and Poor's Register of Corporations, Directors, and Executives*. For VP level data, such as whether one of the VPs is a President, Chief Financial Officer (CFO), or Chief Operating Officer (COO), we manually classify the designation of every VP for each firm-year in our sample based on their titles reported in ExecuComp. Our final sample contains complete data on all variables for 2,367 unique firms, 4,202 CEOs, 25,461 VPs, and 17,987 firm-years.[7]

B. Measures of Tournament Incentives

We classify the incentive features of executive compensation into two categories, "tournament" and "alignment". Consistent with prior studies the compensation gap between the CEO and the VPs is our primary measure of tournaments (e.g. Bognanno (2001) and Bloom (1999)). Executive compensation comprises of two components; (i) short-term compensation in the form of salary, bonus, and other fixed annual payments, and (ii) long-term compensation in the form of stock and option grants, and other long-term incentive payouts. Total compensation is the sum of short-term and long-term compensation. We compute three measures of tournament incentives; *Total Gap* based on total compensation, *ST Gap* based only on short-term compensation, and *LT Gap* based only on long-term compensation. Specifically,

[7] We are unable to identify whether 178 (out of 4,202) CEOs in our sample are insiders or outsiders. Consequently, our sample is reduced by 499 firm-years to 17,488 observations in tests that use this variable.

Log (Total Gap) = Log (Total compensation of CEO – Median value of total compensation of all VPs in the firm-year)

Log (ST Gap) = Log (Short-term compensation of CEO – Median value of short-term compensation of all VPs in the firm-year)

Log (LT Gap) = Log (Long-term compensation of CEO – Median value of long-term compensation of all VPs in the firm-year)

There are instances where the CEO's compensation is less than the median or average VP's compensation resulting in a negative gap. We follow previous studies (e.g. Hartman (1984), Slemrod (1990), and Cassou (1997)) and monotonically transform all observations by adding a constant equal to the absolute value of the minimum gap to each observation. This enables us to use the log transformation even for negative gap observations.[8] We also utilize several alternative methods to address the negative gap issue and discuss these in the robustness tests section.

While *Log (Total Gap)*, *Log (ST Gap)*, and *Log (LT Gap)* are the tournament measures for which we report our results, we repeat all analyses and report our findings for several alternative tournament measures. These include, (i) *Gini coefficient* of executive compensation, (ii) Normalized rank or Cumulative Density Function (CDF) of gaps, (iii) Compensation gap between the CEO and the *highest* paid VP, and (iv) Compensation gap between the CEO and the *mean* VP. The *Gini coefficient* is commonly used in the macroeconomics literature to measure income disparity (e.g. Donaldson and Weymark (1980), La Porta et al. (1998), Bloom (1999), and Biais and Perotti (2001)).[9] The formal definition of the *Gini coefficient* is;

[8] Short-term, long-term and total gaps are negative in 551, 2,022, and 770 firm-years. Consequently, we add 271, 1,040, and 810 thousand dollars to all observations for *ST Gap*, *LT Gap*, and *Total Gap* respectively, prior to the log transform.

[9] See Chakravarty (1988) for the uses of the *Gini Coefficient*.

$$Gini\ Coefficient = 1 + \frac{1}{n} - \frac{2}{n^2 \bar{y}} \left(y_1 + 2y_2 + ...ny_n \right)$$

Where, n is the number of executives including the CEO, $y_1, y_2 ... y_n$ is the compensation paid to each of the n executives in decreasing order of size, and $\bar{y}$ is their mean compensation. Therefore, the *Gini coefficient* in our analysis is a general measure of income disparity in the top echelon of a firm's hierarchy and is computable even for observations with negative gaps. By construction, the *Gini coefficient* takes values between zero and one; a coefficient closer to zero reflects lower income disparity while a coefficient closer to one reflects higher income disparity. The second tournament measure, *CDF Gap*, is the cumulative density function of the dollar value of compensation gaps between the CEO and the median VP across firms for each year in the sample. Like the *Gini Coefficient*, *CDF Gap* also assumes values between zero and one, where a value of zero implies that the firm has the lowest gap and one indicates the highest gap for that year. The last two measures of tournament are simply variants of our CEO-VP pay gap, and use the highest paid and the mean VP's compensation instead of the median.

C. Alignment Incentive Measures

Alignment incentives arise from the structure of the compensation contract and depend on an executive's ownership in the firm's equity. In keeping with the literature (e.g. Aggarwal and Samwick (2003)), we define *Alignment* as the sum of stock and option sensitivities to a $100 change in shareholders' wealth. Specifically,

CEO Alignment = Percentage of shares held by CEO + [delta of options * number of options held by CEO / total number of shares outstanding].

We use the percentage of stock ownership at the beginning of the year for each executive to obtain the stock based sensitivity of an executive's equity portfolio. For option holdings, we use the number of options held by the manager at the beginning of the year, which represent

option grants made in prior years. The proxy statement does not provide the exercise prices for these options but provides their intrinsic value. Following Murphy (1999), we determine an average exercise price for all previously granted options based on their year-end intrinsic value. Further, we treat all options held at the beginning of the year as a single grant with a five-year time to maturity.[10] We obtain the risk-free rate using data from the five-year treasury bills constant maturity series available from the Federal Reserve Bank's official website, and the dividend yield on the stock from ExecuComp. We estimate stock volatility as the annualized standard deviation of the previous 60 monthly total stock returns to shareholders using data from CRSP. We drop observations with less than 12 usable monthly returns. Using the above information, we compute the average delta of prior option grants using the modified Black-Scholes formula. For VPs, we compute the alignment variable described above for each VP and define *VP Alignment* as the median value of alignment for all VPs in a particular firm-year.

D. Summary Statistics for Managerial Incentives

We present summary statistics for managerial compensation, tournament and alignment measures in Table 1. Panels A and B present the compensation values for the CEO and median VP respectively. CEO compensation is significantly greater than median VP compensation, which is consistent with the existence of tournaments. For example, the mean total compensation of the CEO is in excess of $4.3 million and exceeds the total compensation of the median VP ($1.22 million) by over $3 million. Panel C provides descriptive statistics for tournament and incentive alignment measures. The skewness in *LT Gap* (mean = $1.98 million, median = $0.58 million) is likely because long-term compensation tends to vary significantly over the years, even for the same manager while short-term compensation, is reasonably steady each year. We use the

[10] We use an average term of five years for maturity of options. Kaplan and Minton (2006) argue that the average tenure of the CEO has reduced over the years. Using four, six or seven years as the maturity period in our analysis does not significantly alter any of our findings.

log of the standard deviation among the VPs' total compensation (σ *VP Total Comp*) to control for the possibility of a tournament among VPs.[11] Average *CEO Alignment* is \$3.52, which is considerably larger than the average *VP Alignment* which equals \$0.25, per \$100 of shareholder equity. We report Spearman rank correlations for alignment and tournament variables in Table 2. The correlation between *CEO Alignment* and *VP Alignment* is positive and the correlations among all tournament related variables are also positive.

E. Measures of Firm Performance and Other Variables

Our primary measures of firm performance are, return on assets (*ROA*) and *Firm q*, defined as the ratio of the firm's net income to total assets and the ratio of the sum of market value of equity and the book value of debt to total assets, respectively.[12] Further, we repeat our analysis and report findings for two additional measures of operating performance based on Loughran and Ritter (1997). These are, (i) *OIBD to Capital*, which is the ratio of firm's operating income before depreciation to net fixed assets and (ii) *ROE*, which is the ratio of net income to book value of equity. Panel A of Table 3 presents summary statistics for all firm performance measures. We also note here that all our performance measures are positively correlated with each other.

Panel B of Table 3 presents summary statistics for variables relating to CEO and VP characteristics. The median CEO in our sample is fifty-five years old and has been the CEO of the firm for five years. Sixty-seven percent of the CEOs in our sample also hold the position of Chair of the board. The median firm has five VPs. We define *Succession Plan* as a dummy variable that is equal to one if either one of the following two conditions is satisfied. First, the firm has a VP whose title is either *President* or *Chief Operating Officer* and who is not the Chair.

[11] This variable captures the possible tournament among VPs where "lower" VPs seek promotion to "higher" VPs (e.g. Gibbs (1994) and Milgrom and Roberts (1992)).
[12] Palia (2001), Anderson and Reeb (2003), and Bebchuk and Cohen (2005) are among many studies that use *Firm q* and *ROA* as measures of firm performance.

Second, the difference in short-term compensation between the CEO and the next-highest paid VP is less than 10 percent *and* the compensation of the highest paid VP is at least 20 percent greater than the second highest paid VP.[13] Approximately 48 percent of the firms in our sample satisfy the first condition and about 14 percent meet the second. Overall, 52 percent of our sample has a designated successor. We construct an indicator variable *CFO is VP* that is equal to one if any of the VPs in the firm-year is the CFO. We define *Retiring CEO* as a dummy variable that equals one when *CEO Age* is greater than 62 years; 17 percent of the CEOs in our sample fall in the retiring category. *New CEO* is a dummy variable that equals one in the CEO's first year of service as CEO and is zero otherwise. Next, as in Parrino (1997), we define a CEO who has been with the firm for at least one year prior to becoming the CEO as an insider.[14] The dummy variable *CEO is Insider* is equal to one if the CEO is such an insider. Note that this is a CEO specific variable and assumes the same value for all years that the CEO appears in our sample. Finally, we create a dummy variable by interacting *New CEO* and *CEO is Insider*.

Panel C of Table 3 presents summary statistics for firm and industry characteristics that we use in our analysis. *Firm Size* is the log of the firm's net sales for the year and *Stk. Return Volatility* is the variance of 60 monthly returns prior to the sample year, on the firm's stock. The variable *No. of Segments* is from the Compustat Segment files and represents the number of business segments in each firm-year; the median value for this variable is two.[15] We follow Parrino (1997) to construct the variable *Industry Homogeneity*, which measures the similarity

[13] This is a modified version of the variable in Naveen (2006), who does not impose any restriction on the difference in compensation between the highest and the next highest paid VP. Our results remain unchanged when we use either or both conditions to define succession plan.

[14] In order to obtain this information we first obtain the company joining date for the CEO and then compare this with the date that this executive becomes the CEO. Both these dates are available for 2,134 CEOs from ExecuComp. We use other sources outlined in Section II to fill in the missing data for 1,890 of the remaining 2,068 CEOs.

[15] For 152 (1,056) firms (firm-years), there is no information on the number of segments.

between firms within an industry after isolating the effects of the market.[16] *Capital to Sales* is net fixed assets to sales and *Leverage* is the ratio of the firm's long-term debt to its total assets. Finally, the definitions of variables *R&D to Capital*, *Advertising to Capital*, and *Dividend Yield* are as the names suggest.

II. Determinants of the Size of the Tournament Prize

In this section, we first present hypotheses regarding factors that are likely to affect the size of the tournament prize (the pay gap) followed by empirical evidence on these hypothesized determinants. The expected payoff for a VP in the tournament for promotion to CEO is the product of the size of the prize, which is the compensation gap between the CEO and the VP and the probability of promotion. If we assume that the probability of promotion is exogenous to the firm, then the firm (shareholders or boards) can influence only the size of the prize. If, however, the firm can also affect the probability of promotion then tournament incentives ought to be the product of the gap and probability of promotion. In the latter case, if the expected prize is fixed an increase (decrease) in the probability of promotion will lead to a decrease (increase) in the size of the prize.

We consider several factors that affect the wage gap such as *New CEO*, *CEO is Insider*, *Industry Homogeneity*, *Retiring CEO, CEO is Chair*, *Succession Plan, Median Industry Gap, No. of VPs, VP is CFO*, *Firm Size, Stock Return Volatility*, *No. of Segments*, *CEO Age,* and *CEO Experience.* Of these determinants, some such as *CEO Age*, *CEO Experience*, *Firm Size*, *Stock Return Volatility* and *No. of VPs* have appeared in prior research (e.g. Bognanno (2001)), while

[16] First, we classify all firms in the CRSP monthly returns file into a 2-digit historical SIC industry code and then regress each firm's prior 60 monthly returns on an equally weighted monthly industry index and an equally weighted market return. For each firm, we then compute the partial correlation coefficient between the firm's returns and the equally weighted industry returns while holding market returns constant. *Industry Homogeneity* is the average partial correlation coefficient from these regressions for all firms within an industry. We use a 5-year rolling estimation period for each year in the sample.

the others, to the best of our knowledge are, new. Some of these factors affect the probability of promotion while others do not.

A. Factors that Affect Prize Size through the Effect on Probability of Promotion

First, when the firm has a new CEO, it is likely that the tournament for the CEO's job has just ended and the tournament for the incumbent CEO's position is in its infancy. As a result, the probability of winning the tournament for VPs is lower, which implies that the pay gap should be greater when the firm has just hired a new CEO. Now compare the situation when the firm has a new CEO who is an outsider to when the CEO is from within. The former case should result in the lower perceived probability of promotion for incumbent VPs because it indicates the possibility that none of the incumbent VPs may be promoted. Therefore, the compensation gap when the new CEO is an outsider should be greater than when the new CEO is an insider. Parrino (1997) shows that industries with strong commonalities among firms have a higher probability of an outside succession. In such homogeneous industries, it may also be easier for VPs to change employment. Since homogeneous industries represent a higher likelihood of an outside CEO succession, we hypothesize that the size of the tournament prize should be increasing in *Industry Homogeneity*.

Conversely, when a CEO who is close to retirement, the likelihood of promotion for VPs should increase and, consequently, the compensation gap should be lower when the firm has a *Retiring CEO*. Next, an increase in the number of VPs will lead to a decline in individual VPs' probability of winning the tournament (Main, O'Reilly, and Wade (1993)), implying a positive relation between the gap and *No. of VPs*. When the CEO *does not* also hold the chair's position, oftentimes it indicates that the CEO is under some sort of probation, increasing the likelihood of a promotion for VPs. Thus, when the CEO is also the chair, compensation gap should be higher. Consistent with Prendergast (1999)'s argument the existence of a designated successor

significantly increases the probability of one agent and lowers that of the others resulting in a "biased" tournament. The compensation gap must be higher in these cases to offset the decreased probabilities of promotion for the non-successor VPs. Therefore, we hypothesize that the compensation gap should be higher when the firm has a *Succession Plan* in place. Finally, Mian (2001) documents that only about 5 percent of the CFOs are promoted to the position of CEO or president, indicating that the position of the CFO is usually a terminal one. Consequently, when the CFO is one of the VPs, the probability of promotion is greater for the other VPs and a smaller gap is sufficient as the tournament incentive, implying a negative relation between pay gap and *CFO is VP*.

B. Factors that Affect the Size of the Prize Directly

Two sets of findings in the literature imply a positive relation between *Firm Size* and tournament gaps. First, Lambert, Larcker and Weigelt (1993) document that the size of the prize increases with the hierarchy level, implying that the largest gap exists between the CEO and VPs. Second, Murphy (1999) documents that executive pay increases with firm size. These two findings together suggest a positive relation between *Firm Size* and compensation gaps. Murphy (1999) documents that firms benchmark executive compensation to pay levels of similar firms in the industry. Therefore, the size of the wage gap in the firm will relate positively to the *Median Industry Gap*. Nalebuff and Stiglitz (1983) and Zabojnik and Bernhardt (2001) posit that firms are more likely to use tournament incentives when extracting managerial effort from an output signal is more difficult. The variables *Stk. Return Volatility* and *No. of Segments* capture aspects of this signal extraction problem and should relate positively to the size of the tournament prize.

C. Findings on the Determinants of the Size of the Tournament Prize

Our findings on the determinants of the CEO-VP pay gap are in Table 4. We have two hypotheses regarding the effect of new CEOs on the prize size. The first is that the gap will be

greater when there is a new CEO and second is that that the gap when the new CEO is from the outside is greater than when the new CEO is an insider. To determine these two effects, we need to combine the coefficients on the variables *New CEO*, *CEO is Insider*, and their product, which we present in Panel B. The first row indicates that the prize size is significantly higher in the year of a new CEO; the coefficients are significantly positive for all the three measures of the size of the tournament prize. The second row presents the results from comparing the pay gap when the new CEO is an outsider with when he/she is an insider. Consistent with our hypothesis, we find that all three measures of the pay gap are significantly greater when the new CEO is hired from outside the firm. Both these findings are consistent with the negative relation between the probability of promotion and the size of the tournament prize.

The coefficient on *Retiring CEO* is not significant in the *Log (Total Gap)* and *Log (LT Gap)* regressions and is weakly positive for *Log (ST Gap)*, which is inconsistent with our hypothesis. The coefficient on *No. of VPs* is significantly positive in the total and LT gap regressions, which is consistent with our conjecture that a greater number of VPs implies a lower promotion probability for individual VPs. We find no support for the hypothesis that pay gaps should be greater when the CEO is also the Chair. The negative coefficient on *Succession Plan* is contrary to the expectation that when the firm has a succession plan, it will have to offset the effect of a lower probability of promotion by a larger pay gap. We find no relation between *Industry Homogeneity* and pay gaps and a weakly positive relation with *CFO is VP*, which is contrary to what we expect.

We find evidence supporting some of our hypotheses regarding the factors that affect the size of the prize directly. First, the coefficient on *Firm Size* is significantly positive for all the three measures of tournament prize is positive, which is consistent with our prediction. Next, we find a positive and highly statistically significant relationship between *Log* (*Median Industry*

Gap) and all our three measures of pay gap. Our findings on the conventional determinants of tournaments are generally in keeping with those in the literature (e.g. Bognanno (2001)). The age of the CEO is negatively related to total and long-term gaps and unrelated to short-term gap. The CEO's experience relates (weakly) positively to *Log* (*ST Gap*) but is unrelated to the other two tournament measures. We find little evidence supporting the prediction that when managerial effort is difficult to determine, tournaments are more likely to exist. The coefficients on the variables, *Stk. Return Volatility* and *No. of Segments*, are either generally not significant or inconsistent with our hypotheses.

III. Tournament Incentives, Alignment, and Firm Performance

In this section, we relate the tournament incentives and alignment incentives to measures of firm performance. We measure tournament incentives by the size of the prize, which implicitly assumes that the firm does not set the probability of promotion. We will relax this assumption in the next section and consider the size of the prize and the probability of promotion together. It is possible that unobserved variables affect our independent variables, tournament and alignment incentives, as well as the dependent variable, firm performance. Unobservable managerial ability is such a variable that likely affects both executive compensation and firm performance. In addition to being unobservable, managerial ability may vary over time because of on-the-job learning (e.g. Baker, Gibbs, and Holmstrom (1994)). Further, even if true managerial ability is constant over time, shareholders' perception of managerial ability, which determines managerial compensation, may vary over time as shareholders update their priors on ability. In our empirical analysis, we consider both these issues and treat them as follows. First, assuming that unobserved heterogeneity is time-constant, we estimate a firm-level fixed-effects model. If, however, omitted variables vary over time, Wooldridge (2002, p. 299) shows that

fixed-effects alone are insufficient since they make the estimates inconsistent. Thus, in order to include the possibility of time-varying omitted variables such as managerial ability, we also employ an instrumental variables two-stage least squares (2SLS) approach with firm fixed-effects.

A. Results from OLS Fixed Effect Regressions

We report our findings on the incentive effects of tournaments and alignment on firm performance from estimating a firm-fixed-effects model in Table 5. The first column in the table has *ROA* as the dependent variable and *Log* (*Total Gap)* as the measure of tournament incentives. The coefficient on *Log* (*Total Gap)* is positive (0.429) and significant (t-value = 4.74). The coefficients on both *CEO Alignment* and *VP Alignment* are also positive and statistically significant at the one percent level. In the second column, we report results for *Firm q*, the alternative firm performance measure. The coefficients on *Log* (*Total Gap*) as well as the alignment measures are positive and statistically significant. In the last two columns of this table, we estimate the model by replacing *Log* (*Total Gap*) with *Log* (*ST Gap*) and *Log* (*LT Gap*) as tournament measures. The coefficient on *Log* (*ST Gap*) is positive and significant in both specifications. The coefficient on *Log* (*LT Gap*), however is significant in the *Firm q* regression, but is not significant at conventional levels (t-value = 1.41) when *ROA* is dependent variable. These findings from estimating the firm-fixed effects model offer considerable support to the conjecture that alignment effects in the case of CEO and both tournament and alignment effects in the case of VPs positively affect firm performance.

Among the control variables, the coefficient estimate on *Log (σ VP Comp)* is positive and significant in the *Firm q* specifications. Greater variability in VP compensation indicates the possibility of a tournament among VPs, in which lower level VPs are competing for promotion to a senior VP level. Our findings indicate that a tournament among VPs also improves firm

value. The coefficient on *Log (CEO Age)* is negative and statistically significant in all the regressions implying that older CEOs are associated with a lower firm performance. The coefficient on *Industry Homogeneity* is positive in all the four regressions. A possible explanation for this finding is that setting performance benchmarks and therefore monitoring is easier in industries where firms are more similar. As a result, managers of firms in homogenous industries expend relatively more effort, which results in improved firm performance. The signs of the coefficients on the remaining control variables are generally similar to those found in prior literature.

B. Instrumental Variables Estimation

We next consider the scenario where the relation between managerial compensation and firm performance may be endogenous. The endogeneity may be due to unobservable and observable firm characteristics that arise out of differences in the contracting environment.[17] Since, both tournament and alignment incentive measures are related to managerial compensation we treat all tournament and alignment variables as endogenous. In order to address endogeneity, we first identify instrumental variables for incentives that are otherwise uncorrelated with firm performance, the dependent variable.

The instruments in our analysis include *Log* (*Median Industry Total Gap*), *Log* (*Median Industry ST Gap*), *Log* (*Median Industry LT Gap), Industry CEO Alignment*, and *Industry VP Alignment*, for our endogenous variables. These instrumental variables are median values of the incentive measures for firms in the same two-digit SIC code and in the same size quartile as the firm. The underlying economic rationale for these instruments is from Murphy (1999), who documents that the level and structure of managerial compensation varies by firm size and

[17] This argument is consistent with Palia (2001). Other studies that recognize and address the endogeneity between managerial ownership and firm performance include Aggarwal and Samwick (2006), and Coles, Lemmon, and Meschke (2005).

industry. Since tournament and alignment incentives are based on managerial compensation, median values for firms that are in the same industry and of similar size are natural choices for instrumental variables. Further, from our earlier analysis, we know that the median industry values for all three measures of pay gaps are significant determinants of the size of the tournament prize. Thus, median industry gaps provide potentially good exogenous variation as instruments for tournament incentives. In order to obtain additional heterogeneity, we also include *No. of VPs* and *CFO is VP* as instruments.[18] As reported in Table 4, *No. of VPs* and *CFO is VP* are determinants of tournaments (e.g. Bognanno (2001), Chan (1996), Main, O'Reilly, and Wade (1993), and Mian (2001)). We then test these instrumental variables for their relevance (correlated with the endogenous variables) and validity (orthogonal to the residuals or exogenous to the dependent variable) using several statistical tests.[19] Based on our analyses, we find that median industry gaps, median industry CEO and VP alignments, *No. of VPs*, and *CFO is VP* satisfy the relevance and validity criteria necessary for appropriate instruments. We also investigate the robustness of our results to the choice of instruments by using an alternate set of instruments and discuss the findings of this analysis in Section V.

In the first three columns of Table 6, we report results from estimating the first stage of the 2SLS specification and present all the test statistics related to endogeneity and instrumental variable selection in the bottom panel of the table. First, the difference in Sargan C statistic rejects the null that tournament and alignment variables in the estimated specifications are jointly exogenous to firm performance. The coefficients on individual instruments, *Industry CEO*

[18] We choose a subset of tournament determinants as instruments instead of using all the determinants to obtain a parsimonious set of instruments that satisfy the relevance and validity criterion. Thus, the first stage equations for tournament variables in the 2SLS estimates in Tables 6 and 7 are different from the determinants of tournaments regressions in Table 4. We thank Jeffrey Wooldridge for clarifying this issue.

[19] As noted by Angrist and Krueger (2001), testing the validity and relevance of instruments is critical because correlation between instruments and the omitted variables (invalid instruments) can potentially lead to a bias in the resulting IV estimates that is greater than the bias in OLS estimates. Further, weak instruments (irrelevance) can also induce bias in the estimated endogenous variables, leading to problems of inference (e.g. Bound, Jaeger, and Baker (1995)).

Alignment, *Industry VP Alignment*, *Log (Median Industry Total Gap)*, *Log (Median Industry ST Gap), Log (Median Industry LT Gap), No. of VPs* and *CFO is VP* for *Total Gap* are all statistically significant in the appropriate first-stage regressions. These findings indicate that our instruments are individually relevant. Further, the Shea partial R squared values and the F-statistic provide significant support for the joint relevance of all our instruments in the first stage. Note that we have an overidentified specification since the number of instruments is greater than the number of endogenous variables. To test the validity of instruments we use the Hansen-Sargan test of overidentifying restrictions. For both *ROA* and *Firm q* regressions, the Hansen J statistic (2.00 and 1.18, respectively) is unable to reject the null hypothesis (p-values of 0.37 and 0.55, respectively) that the instruments are valid and orthogonal to the residuals. These statistics show that our instruments are valid and that their exclusion from the main estimated equation is appropriate.

The last two columns in Table 6 present second-stage results on the relation between incentives and firm performance. The coefficient on *Log* (*Total Gap*) is 1.115 in the *ROA* regression and is significant with a t-value of 3.66. *Log* (*Total Gap*) is also significantly positively related to *Firm q* (coefficient = 0.133, t-value = 3.39). The coefficients on *CEO* and *VP Alignment* are positive and significant in both *ROA* and *Firm q* regressions. We replace *Log* (*Total Gap*) with *Log* (*ST Gap*) and *Log* (*LT Gap*) as tournament measures and report results from the 2SLS estimation in Table 7. In the second stage analysis, we find that the coefficient on *Log* (*ST Gap*) is positive and significant at the one percent level in both *ROA* and *Firm q* regressions. While the coefficient estimate of *Log* (*LT Gap*) is positive for both *ROA* and *Firm q*, the level of statistical significance is lower (t-value = 1.74) in the *ROA* specification. *CEO* and *VP Alignment* remain positive and significant determinants of *ROA* and *Firm q*. Further, the Anderson-Rubin statistic shows that the endogenous variables are jointly significant in the

second stage. As with total gap, our instruments in these regressions pass the relevance and validity criteria reported in the bottom panel of Table 7. The 2SLS analysis, therefore, also offers significant support for the positive effect of tournament and alignment incentives on firm performance.

IV. Tournament Incentives, Probability of Promotion, Alignment, and Firm Performance

The results in the previous section establish a significantly positive relation between tournament incentives and firm performance with tournament incentives proxied by the CEO-VP wage gap. In this section, we analyze the effect of "total" tournament incentives, that is, pay gap and the probability of promotion together on firm performance. In order to determine the impact of the probability of promotion, we consider the "special scenarios" which affect the probability of promotion. In Section II where we analyze the effect of these scenarios on the prize size, an increase (decrease) in the probability of promotion meant a smaller (larger) size of the prize. However, in terms of the relation between tournament incentives and firm performance, for a given gap, an increase (decrease) in the probability of promotion will strengthen (weaken) the relation between the pay gap and firm performance that we document in the previous section. In other words, the effect of a change in probability of promotion on the relation between prize size and firm performance is exactly the opposite of its effect on the size of the prize.

First, when the firm has a new CEO, the probability of winning the tournament for incumbent VPs is lower. Therefore, tournament effects should be weaker when the firm has just had a CEO turnover. Further, if the new CEO is an outsider, the probability of promotion as perceived by the firm's VPs is lower than when the new CEO is an insider. Therefore, tournament effects on firm performance should be weaker when the new CEO is an outsider as compared to the case when the new CEO is an insider. When a CEO is close to retirement,

tournament effects should be stronger because the probability of promotion for VPs should be higher. The probability of promotion should be lower when the CEO is also the Chair of the board and when the firm has a CEO succession plan in place. In homogenous industries, there is a greater likelihood of an outside CEO and the improved outside employment opportunities for VPs. Therefore, the probability of promotion will be lower for a VP in his/her current job. Therefore, we hypothesize that the effect of total tournament incentives on firm performance will be weaker when the CEO is also the Chair, the firm has a succession plan, and when the firm operates in a homogenous industry.

To investigate the effects of total tournament incentives on firm performance, we interact each special scenario variable with the pay gap measures. These interaction variables measure the effect of total tournament incentives on firm performance. We estimate the firm fixed-effects model of Table 5 in which these interaction terms are also included. The general specification we use in these tests is as follows;

$$\begin{aligned} Performanc\ e = {} & \beta_0 + \beta_1 Gap + \beta_2 CEOAlignme\ nt + \beta_3 VPAlignmen\ t + \beta_4 Log\,(SDVPTotalc\ omp) \\ & + \beta_5 Gap * NewCEO + \beta_6 Gap * Insider + \beta_7 Gap * NewCEO * Insider \\ & + \beta_8 Gap * IndustryHo\ mogeneity + \beta_9 Gap * \mathrm{Re}\,tiringCEO \\ & + \beta_{10} Gap * Succession\ Plan + \beta_{11} Gap * Chair \\ & + \beta_{12} NewCEO + \beta_{13} Insider + \beta_{14} Succession\ Plan + \beta_{15} Chair + \beta_{16} Log\,(CEOAge) \\ & + \beta_{17} IndustryHo\ mogeneity + Controls + YearDummie\ s + FirmEffect\ s + \varepsilon_{it} \end{aligned}$$

The coefficients on the interaction variables form the basis of our inferences in this section. We estimate the above model for all three measures of pay gap as well as for both the measures of firm performance and present the findings in Table 8. Results for the tournament variable *Log (Total Gap)* are in the first two columns, for *Log (ST Gap)* in the next two columns, and for *Log (LT Gap)* in the last two columns. We omit reporting the intercept term and control variables in the table for brevity and expositional convenience.

To test our hypothesis on CEO turnover and for comparing the cases of outsider versus insider new CEO, we need to consider combinations of the coefficients on *New CEO*, *CEO is Insider* and the interaction term with these two variables. Panel B of Table 8 presents these combinations. The first row of the panel compares the tournament incentives for the cases when the firm has a new CEO and when the existing CEO continues in the job. We find some support for the hypothesis that tournament incentives are weaker in the year that the firm has a new CEO. The next row in Panel B presents the results when we compare the effect of tournament incentives when the new CEO is an outsider to those when the new CEO is an insider. We conjecture that firm VPs will perceive the probability of their promotion to be lower in the case of an outsider CEO than when he/she is an insider. Therefore, we hypothesize that the effect of tournament incentives on firm performance will be weaker when the new CEO is an outsider. We find that this is indeed the case in the regressions where we measure firm performance by *ROA*.

Detecting the effect of other special scenario variables on the relation between tournament incentives and firm performance is relatively more straightforward. We consider tournament incentives to be more (less) effective in a special case if the coefficient on the interaction term for that special case is positive (negative). In two out of the three specifications for *Firm q*, the coefficient on the interaction term for *Industry Homogeneity* is negative and significant. Thus, there is some evidence to support our hypothesis that tournament incentives are likely to be less effective in industries where there is a greater possibility that the CEO can be drawn from outside the firm. These results offer additional support for our earlier findings regarding an outsider CEO.

The coefficient on the interaction variable for *Retiring CEO* is positive and significant in all the three specifications where we measure firm performance by *Firm q*. Therefore, there is

some evidence to suggest that tournament incentives are stronger when the CEO is near retirement. Consistent with our predictions the coefficient estimates for *Chair* are negative in all six specifications. However, the estimates are statistically significant only when we use *Firm q* as the performance measure and when tournament incentives are measured using total or ST gaps. Finally, we find little evidence to support our hypothesis that having a designated successor in place weakens the incentive effects of tournaments.

V. Robustness and Economic Significance

In this section, we first report our findings on the determinants of tournaments and the effectiveness of alignment and tournaments (with total compensation) using alternate measures of tournament and firm performance. The additional reported tournament measures include: *Gini Coefficient (Total Comp)*, *CDF (Total Gap)*, *Log (Total Gap with Max VP Comp.)*, and *Log (Total Gap with Mean VP Comp)*. The alternate measures of firm performance are the ratio of operating income before depreciation to net fixed assets (*OIBD to Capital*) and return on equity (*ROE*). We then present analyses that shed some light on the economic significance of tournament incentives.

A. Robustness of Findings

A.1. Determinants of Alternate Tournament Measures

Table 9 present results for the determinants of tournaments using the four alternate tournament measures. As in Table 4, we find that the relation between *New CEO* and tournament incentives is positive, in all but one specification. The negative relations between *CEO is Insider*, and *New CEO * CEO is Insider*, and tournament incentives are statistically significant and remain robust to all measures of tournament. As with our main reported measure (in Table 4), the positive relation between *No. of VPs* and tournament incentives continues to hold for all alternate

measures except for *Log (Total Gap with Max VP Comp)*, where the relation is negative.[20] The median industry values of alternate tournament variables continue to relate positively to the alternate measures. Only the *Gini Coefficient* relates positively to *Succession Plan,* which is consistent with our prediction. We find no significant relation between any of our alternate measures and *CFO is VP* and *Retiring CEO*.

A.2. Firm Performance and Alternate Measures of Tournament

We first re-estimate the fixed-effects regressions on firm performance (Table 5) using alternate tournament measures and present our findings in Table 10. In Panel A, with *ROA* as the measure of firm performance, we find that *CEO Alignment*, *VP Alignment*, and three of the four alternate measures of tournaments are positive and statistically significant at the one percent level. We find that the *Gini Coefficient (Total Gap)* is negatively related to *ROA*, but the result is only weakly significant. Panel B in Table 10 presents results on the relation between alternate tournament measures and *Firm q*. Here, we find that all measures of alignment and tournament are positive and statistically significant at the one percent level. Next, we repeat the 2SLS analyses and present our findings in Table 11. In these tests, we use instruments for each of the four different tournament measures in addition to the instruments *CFO is VP* and *No. of VPs*. As before, these new instruments are industry medians of the respective tournament measures. For brevity, we report only some of the statistics to show that our instruments are valid and relevant. We find that all the tournament variables relate significantly positively to both *ROA* and *Firm q*. Further, we find that *CEO* and *VP Alignments* relate positively to *ROA* and *Firm q*, in all specifications except one**.**

[20] This could be because as the number of VPs increases, there is an increase in the range of VP compensation, which may reduce the gap between CEO pay and the highest paid VP.

A.3. Additional Corrections for Negative Gaps

In our reported results thus far, we correct for negative tournament measures, that is, when the CEO earns less than the median VP, either by adding a constant dollar amount to each gap, or using alternate measures such as the *Gini Coefficient*, or the CDF of gaps. We now construct alternate measures of tournament incentives that address the issue of negative gaps in other ways. First, we use the inverse hyperbolic sine (IHS) transformation of the compensation gap as an alternate to the log transformation.[21] The IHS is a modified version of the Box-Cox transformation and unlike the natural log or the Box-Cox transformation, is defined for all real values.[22] We construct the IHS transformation for all compensations gaps as $\sinh^{-1}(x) = \log(x + (x^2 + 1)^{1/2})$, where x is the amount (in 000s of dollars) of *Total*, *ST*, and *LT Gap*. Additionally, we also use the dollar amount of the compensation gaps without any transformation. As a third tournament measure, we use the coefficient of variation among CEO and VP compensation. Finally, we use the ratio of the CEO's compensation to the median VP's compensation. In all these alternate specifications, we find that tournament incentives are significantly positively related to *ROA* and *Firm q*. Finally, we re-examine all our results presented in Tables 5 and 6 by dropping observations that have a negative gap.[23] Our results are qualitatively similar to the reported results.

A.4. Alternative Measures of Firm Performance

We re-examine the fixed-effects regressions and 2SLS regressions using alternate performance measures, *OIBD to Capital* and *ROE*, and report our findings in Table 12. We find that *Log (Total Gap)* and *Log (ST Gap)* relate positively to both alternate measures of

[21] Pence (2006) uses the IHS as an alternate to the log transformation in her analysis to estimate the effect of tax incentives such as individual retirement accounts on household saving. Her analysis compares the change in the level of wealth over time of households that both eligible and ineligible for the tax incentive where, the change in wealth can assume economically significant negative values.

[22] See Burbidge, Magee, and Robb (1988), for statistical properties of the IHS transform.

[23] Some studies such as Diamond and Hausman (1984) drop observations with non-positive values of the dependent variables when the variable is log transformed.

performance in fixed-effects as well as the 2SLS specifications. The coefficient estimate on *Log (LT Gap)* is always positive but statistically significant only in the *OIBD to Capital* regressions. We follow the methodology outlined in Faleye, Mehrotra, and Morck (2006) and construct another measure of firm performance, *Total Factor Productivity* (*TFP*) using the Cobb-Douglas production for the firm's output.[24] We estimate the fixed-effects regression specifications (Table 5) using *TFP* instead of *Firm q* and *ROA*. In unreported results we find that *Log (Total Gap)* and *Log (ST Gap)* continue to remain positive and statistically significant but the coefficient on *Log (LT Gap)* is not significantly different from zero.

A5. Alternate Instruments

To verify the sensitivity of our results to the choice of instruments, we construct two additional instruments. First, we compute *Bachelors* which is the percentage of full-time employees in an industry with a bachelors degree or higher. Our second measure *CEO Reputation* is in the spirit of Milbourn (2003) and Rajgopal, Shevlin and Zamora (2005) and we construct a proxy for CEO reputation by the number of articles returned by the *Dow Jones News* retrieval service in nine selected publications.[25] We replace *CFO is VP* and *No. of VPs* with *Bachelors* and *CEO Reputation* as instruments in the specifications reported in Tables 6 and 7. In unreported results we find that all our existing results are robust to these alternate instruments. The instruments are also relevant. However, with total gap as the tournament measure (specification in Table 6), we reject exogeneity of the instruments at the 5 percent level.

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[24] Specifically, we assume that a firm's sales in year t, Y_{it} are generated by the function; $Y_{it} = AL_{it}^{\alpha}K_{it}^{\beta}$, where L_{it} is the number of employees, K_{it} is net property plant and equipment, and A, α, and β are parameters. We estimate a logarithmic transformation of the above specification and employ the residuals from industry-year wise regressions as a measure of TFP.

[25] While Milbourn (2003) uses this construct as an estimate of CEO reputation, Rajgopal, Shevlin and Zamora (2005) use this as a proxy for CEO talent which in turn reflects the CEO's outside employment opportunities. We manually collect the number of cites returns for each CEO-firm-year, for each of the CEOs in our sample. Details of the publications and an example of our search are in the data appendix.

A6. Other Robustness Checks

Conventional IV estimators obtained from the 2SLS procedure although consistent may be inefficient in the presence of arbitrary heteroskedasticity (Hansen (1982)). To address this issue we re-estimate all the 2SLS analyses using the Generalized Method of Moments (GMM) estimator to allow for efficient estimation (Baum, Schaffer, and Stillman (2003)). In unreported results, we find that the coefficient estimates and statistical significance from the GMM estimation are almost identical to those reported in Tables 6 and 7. To account for differences among CEO characteristics rather than firm-level heterogeneity, we repeat all our analyses for determinants of the gap (reported in Table 4) and the effect of incentives on firm performance (reported in Tables 5, 6, and 7) using CEO fixed-effects. All our earlier findings remain robust to this change in specification.

Taken together, our results indicate that tournament incentives relate positively to firm performance and these findings are robust to several alternate measures of tournament incentives as well as firm performance.

B. Economic Significance

The earlier tests offer evidence that there is a significant relation between firm performance and tournament and alignment incentives. We now offer findings from two analyses that measure the importance of these incentives in terms of how they affect shareholder wealth. In the first set of tests, we consider and compare the marginal effects on the equity value of the typical firm from increasing the alignment and tournament incentives of its CEO and VPs. In the second, we investigate returns to portfolios that differ in levels of alignment and tournament incentives.

B.1. Marginal Effects of Tournament and Alignment Incentives on Firm Equity Value

Consider a firm with (sample) median values for all relevant variables. Assume that $100,000 is available for payment to either the CEO or $20,000 to each of the five VPs as short-term or long-term compensation. We compute the marginal effect of these possible payment schemes on firm equity value and *ROA* using the estimates from the *Firm q* and *ROA* regressions in Table 5. When the payment is in the form of short-term compensation to the CEO (VP), there is a positive (negative) impact on firm value through an increase (decrease) in *ST Gap* and no effect due to alignment. When the payment is in the form of long-term compensation to the CEO, there is a positive impact due to increases in *LT Gap* and *CEO Alignment*. When the payment is in the form of long-term compensation to the VP, there is a negative effect because *LT Gap* is lower but a positive effect because *VP Alignment* is higher. We present the effect of all these possibilities on the market value of firm equity and *ROA* in Table 13.[26]

We find that the market value of equity for the typical firm increases by about $11.06 million or 0.55% when the CEO's short-term compensation increases by $100,000, which is 10.87% of the CEO's short-term compensation. If the $100,000 is paid as long-term compensation (an increase of 11.29% in the CEO's long-term compensation) to the CEO, there is a $3.44 million increase in the market value of equity; $3.29 million due to the *LT Gap* effect and $0.15 million dollar due to the alignment effect. An increase in the VPs' compensation reduces tournament gap but increases VP alignment when the increase is in the form of long-term compensation. The tournament effect however, dominates the alignment effect since we see a decrease in the market value of the firm's equity even for an increase in VP compensation. The decrease is lower when VPs' pay is greater through long-term compensation. All the above market value of equity numbers should be treated with caution since the impact on the market value of equity reflects the market's anticipation of a continued increase in gap. Further, these

[26] In all these computations we make appropriate adjustments to account for the addition of a constant to the gaps.

computations are based on a representative firm and do not capture the considerable heterogeneity among firms.

B.2.Portfolio Returns

Using a modified version of the procedure used by Gompers, Ishi, and Metrick (2003), we divide our sample of firms into portfolios that differ in terms of magnitudes of tournament and alignment incentives. To isolate the effects of the two types of incentives, we use the double-sorting procedure suggested by Badrinath, Kale and Noe (1995). We first divide our sample of firms into five quintile portfolios (A_1 to A_5) based on *CEO Alignment* levels. We then divide each of these five alignment portfolios into five quintile portfolios based on *ST Gap* (A_{11}, ..., A_{15}; A_{21}, ..., A_{25}; ..., A_{55}). We then combine the lowest *ST Gap* portfolios from each of the five alignment portfolios (A_{11}, A_{21}, A_{31}, A_{41}, and A_{51}) into one portfolio TA_1. Analogously, we combine higher tournament level portfolios from each of the five alignment portfolios to form portfolios TA_2, TA_3, TA_4, and TA_5. In the five portfolios $TA_1 - TA_5$, the *CEO Alignment* levels are similarly distributed but the portfolios differ in terms of *ST Gap*. These portfolios allow us to focus on the effects of tournament incentives while controlling for *CEO Alignment*.

We use the Fama and French (1993) and Carhart (1997) four-factor model to estimate monthly portfolio excess returns for each of these five portfolios. We find that an equally weighted portfolio that is long in the highest quintile of *ST Gap* and short in the lowest quintile of *ST Gap* (after controlling for *CEO Alignment*) generates a excess return of 0.928 percent per month over the 12-year sample period, with 8 of the 12 years exhibiting positive and statistically significant excess returns. When we use value-weighted portfolios, the overall excess return is 0.338 percent per month with half the years exhibiting positive excess returns. We next reverse the double-sorting procedure described above to form five portfolios that differ in *CEO Alignment* but are similar in terms of *ST Gap*. The analysis of the returns to these portfolios

allows us to investigate the effects *CEO Alignment* while controlling for *ST Gap*. We report the findings in Table 14B. The excess returns for the entire period are 0.847 percent and 0.584 percent with equally-weighted and value-weighted portfolios, respectively.

VI. Conclusion

The primary motivation for our study is to examine how promotion incentives based on the differential compensation between CEOs and their potential successors from within the firm affect firm performance. Thus, while alignment with shareholders induces all managers to maximize the value of a firm's equity, tournaments induce lower level managers to exert greater effort and increase their probability of promotion to CEO. Our argument rests on the premise that while CEO alignment is an important consideration for firm performance, the incentive structures of other top-level managers are also important. What induces CEOs to exert effort is the incentive alignment owing to their ownership in firm specific equity. For lower level managers however, the motivation is due to two sources; how and how much they are currently paid, and how much they can expect to be paid in case of a promotion to the position of CEO. The latter is essentially the prize in a rank order tournament, which we study using compensation differentials between the CEO and the next level of managers.

We show that total, short-term and long-term compensation gaps between the CEO and median VP compensation affect *Firm q and ROA* positively, which provides evidence on the effectiveness of tournament incentives. The positive relation between tournament incentives and firm performance obtains for many alternate specifications for measures of tournaments and firm performance. We then investigate the effectiveness of tournaments in special situations. We show that tournaments are less effective when the firm has a new CEO and, especially when the new CEO is an outsider, or when the firm operates in a more homogenous industry. When the

incumbent CEO is close to retirement, we find that tournament incentives are stronger. Our analyses of tournaments include alignment incentives and we find that alignment incentives also affect performance positively. Overall, our analysis indicates that a rank-order tournament that provides promotion incentives to managers is an important incentive mechanism for motivating corporate managers.

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Appendix A

This Appendix defines the variables used in the study. The data items taken from COMPUSTAT are denoted as Data #. All returns data are from the Center for Research in Security Prices (CRSP). The Compensation related variables are from Compustat's ExecuComp. Other data sources include *Proxy statements, the International Directory of Company Histories, Marquis Who's Who publication, Forbes Surveys,* and the *Standard and Poor's Register of Corporations, Directors, and Executives.*

Variable	Source	Definition
Compensation and Alignment		
Short-term compensation (ST Comp)	ExecuComp	Salary + Bonus + Other annual payments
Long-term compensation (LT Comp)	ExecuComp	Restricted stock grants + Options granted + Long-term incentive payouts + Total other annual payments.
Total Compensation (Total Comp)	ExecuComp	Short-term compensation + Long-term compensation
CEO Alignment (per $100 of SH equity) - For CEO	ExecuComp	(Shares owned at the beginning of the year + Average delta of prior option grants * # of options) / Number of shares outstanding *100.
VP Alignment (per $100 of SH equity) - Median value of VPs	ExecuComp	(Shares owned at the beginning of the year + Average delta of prior option grants * # of options) / Number of shares outstanding *100.
Tournament Variables		
Total Gap	ExecuComp	CEO's Total comp – Median VP's Total comp
Short-term gap (ST Gap)	ExecuComp	CEO's ST Comp – Median VP's ST Comp
Long-term gap (LT Gap)	ExecuComp	CEO's LT Comp – Median VP's LT Comp
Log (Total Gap)	ExecuComp	Log (Total Gap + 810)
Log (ST Gap)	ExecuComp	Log (ST Gap + 271)
Log (LT Gap)	ExecuComp	Log (LT Gap + 1,040)
Gini Coefficient (Total Comp) (ST, LT)	ExecuComp	$1+\frac{1}{n}-\frac{2}{n^2\bar{y}}\left(y_1+2y_2+....ny_n\right)$ where y_i is the Total Comp (ST, LT) of all managers in decreasing amounts.
CDF Total Gap (ST, LT)	ExecuComp	(Rank of firm's Total Gap (in the year) minus 1) / (Number of firms minus 1)
Log (Total Gap based on Max VP)		Log (CEO's Total Comp – Highest paid VP's Total Comp)
Log (Total Gap based on Mean VP)		Log (CEO's Total Comp – Mean VP's Total Comp)
σ VP Comp	ExecuComp	Standard Deviation among VPs' Total Comp.
Firm Performance Measures		
Firm q	Compustat	(Market value of equity + Book value of debt) / Book value of total assets (Data 6-Data 60 + Data 25*Data 199) / Data 6
Return on assets (ROA)	ExecuComp	ROA
OIBD to Capital	Compustat	Operating income before depreciation / Net fixed assets (OIBD / Data 8)
Return on equity (ROE)	ExecuComp	ROE
Total Factor Productivity	CRSP and Compustat	Residuals from a regression of log (Sales) on log (Employees) and log (Property, plant, and equipment). The regressions are run by industry-year.

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Other Variables		
CEO Age	ExecuComp, Proxies, Other	Age of CEO
CEO Experience	ExecuComp, Proxies, Other	Number of years as CEO
No. of VPs	ExecuComp	Number of VPs in a firm-year.
Chair	ExecuComp	Dummy = 1 if CEO is also Chair, 0 otherwise.
Succession Plan	ExecuComp	Dummy = 1 if any VP is either President or COO *or* (CEO's ST Comp is at most 10% more than highest paid VP *and* highest paid VP's ST Comp is at least 20% more than next highest paid VP), 0 otherwise.
Succession Plan Designation	ExecuComp	Dummy = 1 if any VP is either President or COO, 0 otherwise.
CFO is VP	ExecuComp	Dummy =1 if one of the VPs is the CFO, 0 otherwise.
Retiring CEO	ExecuComp, Proxies, Other	Dummy = 1 if CEO's age is greater than 62, 0 otherwise.
New CEO	ExecuComp	Dummy = 1 if CEO became CEO in that year, 0 otherwise.
CEO is Insider	ExecuComp, Proxies, Other	Dummy = 1 if CEO has been with the firm for at least 1 year prior to becoming CEO, 0 otherwise.
New CEO is Insider	ExecuComp, Proxies, Other	New CEO * CEO is Insider
No. of Segments	Compustat Segment data	Number of business segments in which firm operates.
Industry homogeneity	CRSP	Mean Partial correlation between firm's returns and an equally weighted industry index, for all firms in the same 2-digit SIC industry code, holding market return constant (see Parrino (1997)). Estimated based on 60 monthly returns prior to sample year.
Firm Size	COMPUSTAT	Log (Sales)
Firm Risk	CRSP	Variance of 60 monthly returns preceding sample year.
Capital to Sales	Compustat	Net fixed assets / Sales; Data 8 / Sales
Leverage	Compustat	Book value of debt / Total assets; (Data 9 + Data 34) / Data 6
R&D to Capital	Compustat	Research & development expenditure to Net fixed assets Data 46 / Data 8
Advertising to Capital	Compustat	Advertising expenditure to Net fixed assets; Data 45 / Data 8
Dividend Yield	ExecuComp	The dividends per share by ex-date divided by close price for the fiscal year.
Log (Industry Total Gap) (ST, LT)	ExecuComp	Log (Median total gap for firms in the same 2-digit SIC and same size quartile) (ST, LT)
Industry CEO Alignment	ExecuComp	Median CEO Alignment for firms in the same 2-digit SIC and same size quartile.
Industry CEO Alignment	ExecuComp	Median VP Alignment for firms in the same 2-digit SIC and same size quartile.
Bachelors	www.bls.gov	Ratio of full time employees with a Bachelors' degree or higher degree to the total number of full-time employees in the industry-year.
CEO Reputation	Factiva	The number of times in the sample year a combination of the CEO's name and company appears in the following list of publications; (i) The Wall Street Journal, (ii) Asian Wall Street Journal, (iii) Wall Street Journal Europe, (iv) Wall Street Journal Sunday (v) Financial Times, (vi) New York Times, (vii) Washington Post, (viii) USA Today, and (ix) International Herald Tribune. For e.g. "(Microsoft Corp or Microsoft) and (William Gates or William H. Gates or William Gates or Bill Gates or Will Gates or William H. Gates III)"

Appendix B

From the general specification in Section IV, consider the following equation, which includes all interaction terms containing the *New CEO* and *CEO is Insider* dummies.

$$Performance = \beta_0 + \beta_1 Gap + \beta_5 Gap * NewCEO + \beta_6 Gap * Insider + \beta_7 Gap * NewCEO * Insider$$

In the above specification, New CEO is a dummy variable equal to 1 if the firm-year has a CEO who is in her first year of service as CEO and 0 otherwise. Insider is a dummy that takes on a value of 1 when the CEO is promoted from within the firm, and zero otherwise. Note that while the New CEO dummy is a CEO-year specific variable, Insider is a CEO specific variable. Thus, for any CEO, the New CEO variable will be equal to 1 only for the CEO's first year, while the Insider dummy will assume the same value for all years in the sample. Each of the 17,488 firm-years (and CEO-years) in our sample can be classified in one of four categories. For expositional ease, we summarize the values of individual dummies and the resulting estimates from the general specification below;

Scenario	*New CEO*	*Insider*	*New CEO * Insider*	*Estimate for* $\frac{\partial Performance}{\partial Gap}$
New CEO and Outsider	1	0	0	$\beta_1 + \beta_5$
New CEO and Insider	1	1	1	$\beta_1 + \beta_5 + \beta_6 + \beta_7$
Continuing CEO and Insider	0	1	0	$\beta_1 + \beta_6$
Continuing CEO and Outsider	0	0	0	β_1
Reported Comparisons				
(a) New CEO with Continuing CEO	$((\beta_1 + \beta_5) + (\beta_6 + \beta_7)Mean(Insider)) - (\beta_1 + \beta_6 * Mean(Insider))$ $= \beta_5 + \beta_7 * Mean(Insider)$			
(b) New CEO from Outside with New CEO from Inside	$(\beta_1 + \beta_5) - (\beta_1 + \beta_5 + \beta_6 + \beta_7) = -(\beta_6 + \beta_7)$			

Table 1: Summary Statistics for Managerial Compensation, Alignment, and Tournament Variables

The Table presents summary statistics for compensation of the Chief Executive Officer (CEO) and the other executives in the firm-year as listed by ExecuComp. The sample period is from 1993 through 2004 and contains 17,987 firm-year observations. *Total short-term compensation* is the sum of Salary, Bonus, and Other Annual Payments in any given year. L*ong-term compensation* is the sum of Restricted Stock Grants, Option grants, Long-term incentive payouts and All other total payments received during the year. *Total compensation* is the sum of S*hort-term compensation* and L*ong-term compensation. CEO (VP) Alignment* represents the sum of stock and option sensitivity of the CEO's (VP's) equity portfolio. σ VP Comp. is the standard deviation of Total VP compensation among all the VPs for any firm-year. *Gini Coefficient* is computed as $1+\frac{1}{n}-\frac{2}{n^2\overline{y}}\left(y_1+2y_2+....ny_n\right)$ where n is the number of executives including the CEO and $y_1, y_2 ... y_n$ represent the compensation paid to each of the n executives, in decreasing order of size. Total, ST, and LT Gap based on Median (Mean and Max) VP is the difference between the CEO's compensation and the median (Mean and Highest paid) VP's compensation for Total, ST, and LT compensations, respectively. All variables are winsorized at the 1 and 99 percentile levels.

	Mean	Median	Lower Quartile	Upper Quartile
Panel A: Compensation and Alignment for CEO				
Short-term compensation ($ 000)	1,334.69	919.60	560.55	1,559.48
Long-term compensation ($ 000)	3,043.69	886.07	198.09	2,678.24
Total compensation ($ 000)	4,378.38	1,978.45	985.58	4,331.32
Panel B: Compensation and Alignment for "Median" VP				
Short-term compensation ($ 000)	518.83	383.13	264.50	593.28
Long-term compensation ($ 000)	686.87	248.67	75.40	681.07
Total compensation ($ 000)	1,224.60	689.58	405.00	1,313.95
Panel C: Tournament Incentive Measures				
Total Gap based on Median VP Comp ($ 000)	2,765.54	1,205.00	494.40	2,948.71
ST Gap based on Median VP Comp ($ 000)	778.72	513.36	261.07	956.85
LT Gap based on Median VP Comp ($ 000)	1,975.55	579.27	79.81	1,938.84
Gini Coefficient of Total Compensation	0.32	0.31	0.23	0.39
CDF of Total Gap based on Median VP	0.50	0.51	0.26	0.75
Total Gap based on Max VP Comp ($ 000)	1,405.30	596.54	87.08	1,751.61
Total Gap based on Mean VP Comp ($ 000)	2,605.54	1,140.78	442.75	2,794.90
σ VP Comp ($ 000)	791.12	341.15	157.59	792.02
CEO Alignment ($ per $100 of SH wealth)	3.52	1.24	0.44	3.24
VP Alignment ($ per $100 of SH wealth)	0.25	0.15	0.06	0.32

Table 2: Spearman's Rank Correlation Matrix

Table 2 presents the Spearman's rank correlation matrix among the alignment and tournament variables. The sample period is from 1993 through 2004 and contains 17,987 firm-year observations. *CEO (VP) Alignment* represents the sum of stock and option sensitivity of the CEO's (VP's) equity portfolio. σ VP Comp is the standard deviation of Total VP compensation among all the VPs for any firm-year. *Gini Coefficient* is computed as $1+\frac{1}{n}-\frac{2}{n^2\bar{y}}\left(y_1+2y_2+....ny_n\right)$ where n is the number of executives including the CEO and $y_1, y_2 ... y_n$ represent the compensation paid to each of the n executives, in decreasing order of size. Total, ST, and LT Gap based on Median (Mean and Max) VP is the difference between the CEO's compensation and the median (Mean and Highest paid) VP's compensation for Total, ST, and LT compensations, respectively. * denotes statistical significance at the 5 percent level or less. All variables are winsorized at the 1 and 99 percentile levels.

	CEO Align	VP Align	Total Gap (Median VP)	ST Gap (Median VP)	LT Gap (Median VP)	σ VP Total Comp	Gini Coeff (Total Comp)	CDF Total Gap Med VP	Total Gap (Max VP)
VP Align	0.196*	1							
Total Gap (Median VP)	-0.093*	-0.083*	1						
ST Gap (Median VP)	-0.088*	-0.106*	0.565*	1					
LT Gap (Median VP)	-0.086*	-0.069*	0.976*	0.399*	1				
σ VP Comp	-0.033*	-0.036*	0.599*	0.363*	0.584*	1			
Gini Coeff (Total Comp)	-0.032*	-0.068*	0.508*	0.285*	0.502*	0.426*	1		
CDF Total Gap Med VP	-0.206*	-0.173*	0.668*	0.570*	0.618*	0.373*	0.557*	1	
Total Gap (Max VP)	-0.092*	-0.077*	0.811*	0.452*	0.792*	0.085*	0.306*	0.570*	1
Total Gap (Mean VP)	-0.096*	-0.084*	0.991*	0.561*	0.967*	0.536*	0.483*	0.668*	0.860*

Table 3: Summary Statistics for Performance Measures and Other Variables

The Table presents summary statistics for the dependent variable and other variables used in the study. The sample period is from 1993 through 2004. *ROA* = Net Income / Total assets. *Firm q* = (Market value of equity + Book value of debt) / Total assets. *OIBD to Capital* = Operating income before depreciation / Net fixed assets. *ROE* = Net income / Equity. TFP is the residual from a regression of the firm's sales on employees and fixed assets. *CEO Age* is the age of the CEO as of the sample year. *CEO experience* is the number of years the CEO has held the position of CEO in the firm. *No. of VPs* is the number of VPs for each-year in the ExecuComp database. The following dummy variables are set equal to 1 if the respective condition holds, and zero otherwise. *Chair* is equal to 1 if the CEO also holds the position of Chairperson. *Succession Plan* is 1 if the firm has a succession plan as defined in the data appendix. *CFO is* VP takes on a value of 1 when any one of the VPs is the CFO. *Retiring CEO* is 1 if the CEO is more than 62 years of age. *New CEO* is 1 in the CEO's first year of service as CEO and *Incumbent CEO is Insider* is equal to 1 if the incumbent CEO is an insider. *New CEO is Insider* equals 1 if the firm has a new CEO who is from inside the firm. *Firm Size* is Log (Sales). *Stk. Ret. Volatility is* the variance of 60 monthly returns prior to the sample year. *No. of Segments* is the number of business segments of the firm in the Compustat Segment database. *Industry Homogeneity* is the average partial correlation coefficient of all firms in the same 2-digit SIC code with the industry return, holding market return constant. *Leverage* is computed as Long-term debt / Total assets. *Capital to Sales*= Net fixed assets / Sales. *R&D to Capital* is the ratio of research and development expenditure / Net fixed assets. *Advertising to Capital* is the ratio of advertising expenditure / Net fixed assets. *Dividend Yield is* the dividend yield as reported in ExecuComp. All variables are winsorized at the 1 and 99 percentile levels.

Variable	N	Mean	Median	Lower Quartile	Upper Quartile
Panel A. Firm Performance Measures					
ROA (%)	17,987	3.17	4.04	1.18	7.85
Firm q	17,987	1.98	1.48	1.15	2.19
OIBD to Capital	17,714	0.99	0.54	0.25	1.14
ROE (%)	17,602	7.97	11.93	5.31	17.38
Total Factor Productivity (TFP)	17,987	0.01	-0.01	-0.23	0.22
Panel B. CEO and VP Characteristics					
CEO Age	17,987	54.74	55.00	50.00	60.00
CEO Experience	17,987	7.59	5.00	2.00	10.00
No. of VPs	17,987	5.31	5.00	4.00	6.00
Chair	17,987	0.67	1.00	0.00	1.00
Succession Plan	17,987	0.52	1.00	0.00	1.00
CFO is VP	17,987	0.67	1.00	0.00	1.00
Retiring CEO	17,987	0.17	0.00	0.00	1.00
New CEO	17,987	0.11	0.00	0.00	0.00
Incumbent CEO is Insider	17,488	0.75	1.00	0.00	1.00
New CEO is Insider	17,488	0.08	0.00	0.00	0.00
Panel C. Firm and Industry Characteristics					
Firm Size	17,987	7.10	7.03	6.08	8.11
Stk. Ret. Volatility (% /month)	17,987	1.71	1.11	0.61	2.18
No. of Segments	16,931	2.78	2.00	1.00	4.00
Industry Homogeneity	17,987	0.22	0.20	0.13	0.30
Leverage	17,987	0.23	0.22	0.08	0.35
Capital to Sales	17,987	0.46	0.22	0.12	0.48
R&D to Capital	17,987	0.23	0.00	0.00	0.12
Advertising to Capital	17,987	0.06	0.00	0.00	0.00
Dividend Yield (%/ year)	17,987	1.30	0.59	0.00	2.14

Table 4: Determinants of Tournaments-Fixed Effects Regressions

The sample period is from 1993 through 2004. *Total Gap* is the difference between the CEO's total compensation and the Median VP's total compensation for any given firm-year. *ST (LT) Gap* is the difference between the CEO's ST (LT) compensation and the Median VP's ST (LT) compensation for any given firm-year. *New CEO* is 1 in the CEO's first year of service as CEO and *CEO is Insider* is equal to 1 if the CEO is an insider. *Industry Homogeneity* is the average partial correlation coefficient of all firms in the same 2-digit SIC code with the industry return, holding market return constant. *Retiring CEO* is 1 if the CEO is at least 62 years of age. *Chair* is equal to 1 if the CEO also holds the position of Chairperson. *No. of VPs* is the number of VPs for each-year in the ExecuComp database. *Succession Plan* is 1 if the firm has a succession plan as defined in the data appendix. *Median Industry Gap* is the respective median gap for all firms in the same 2-digit industry and size quartile. *CFO is VP* takes on a value of 1 when any one of the VPs is the CFO. *CEO Age* is the age of the CEO as of the sample year. *CEO experience* is the number of years the CEO has held position as CEO in the firm. *Firm Size* is Log (Sales). The following dummy variables are set equal to 1 if the respective condition holds, and zero otherwise. *Stk. Ret. Volatility is* the variance of 60 monthly returns prior to the sample year. *No. of Segments* is the number of business segments of the firm in the Compustat segment database. All variables are winsorized at the 1 and 99 percentile levels. All specifications contain year dummies and firm fixed-effects. t-values based on heteroskedasticity robust standard errors, clustered by firm are in parentheses. The symbols ***, **, and * denote significance at the 1%, 5%, and 10% respectively.

Dependent Var. →	**Log (Total Gap)**	**Log (ST Gap)**	**Log (LT Gap)**
Predictor Var. ↓			
Constant	3.211*** (4.59)	2.101*** (2.66)	3.095*** (4.73)
New CEO (β_5)	0.305*** (5.05)	-0.005 (-0.10)	0.338*** (5.52)
CEO is Insider (β_6)	-0.105** (-2.45)	-0.108*** (-2.96)	-0.038 (-0.87)
New CEO * CEO is Insider (β_7)	-0.320*** (-5.02)	-0.072 (-1.39)	-0.344*** (-5.47)
Industry Homogeneity	0.078 (0.36)	0.187 (0.79)	0.142 (0.64)
Retiring CEO	0.003 (0.11)	0.059** (2.32)	-0.029 (-0.91)
Chair	0.030 (0.93)	0.006 (0.19)	0.029 (0.92)
No. of VPs	0.031*** (4.21)	-0.011 (-1.58)	0.043*** (5.59)
Succession Plan	-0.086*** (-4.26)	-0.155*** (-7.82)	-0.031 (-1.50)
Log (Median Industry Gap)	0.714*** (15.42)	0.666*** (15.17)	0.753*** (14.69)
CFO is VP	0.041* (1.84)	0.049*** (2.78)	0.024 (1.04)
Log (CEO Age)	-0.410** (-2.54)	-0.066 (-0.33)	-0.436*** (-3.09)
Log (CEO Experience)	0.006 (0.25)	0.045* (1.83)	-0.016 (-0.69)
Firm Size	0.070** (2.45)	0.067** (2.27)	0.043 (1.55)
Stk. Ret. Volatility	-1.497 (-0.85)	-4.538*** (-2.61)	-0.357 (-0.21)
No. of Segments	-0.017** (-2.09)	-0.010 (-1.50)	-0.016** (-1.96)

Cont.

Cont.

Comparisons (t / F stat)		**Log (Total Gap)**	**Log (ST Gap)**	**Log (LT Gap)**
(a) New CEO with Continuing CEO	$(\beta_5 + \beta_7 * Mean(Insider)$	0.067* (2.69)	-0.056** (3.96)	0.083** (4.14)
(b) New CEO from Outside with New CEO from Inside	$-(\beta_6 + \beta_7)$	0.425*** (40.85)	0.179*** (7.64)	0.382*** (40.03)
Within R-squared		0.13	0.12	0.12
No. of Obs. (Year dummies)		16,460 (Yes)	16,460 (Yes)	16,460 (Yes)
No. of Firms (Firm fixed-effects)		2,166 (Yes)	2,166 (Yes)	2,166 (Yes)

Table 5: Effects of Tournament and Alignment Incentives on Firm Performance – Fixed-effects Regressions

The Table reports fixed-effect OLS regressions of *Firm q* and *ROA* on tournament and alignment. The sample period is from 1993 through 2004. The dependent variables are firm performance measured as *ROA* = Net income / Total assets and *Firm q* = (Market value of equity + Book value of debt) / Total assets. *Total Gap* is the difference between the CEO's Total comp. and the Median VP's Total comp. for any given firm-year. *ST (LT) Gap* is the difference between the CEO's ST (LT) comp. and the Median VP's ST (LT) comp. for any given firm-year. *CEO (Median VP) Alignment* represents the stock price sensitivity of the CEO's (VP's) stock and option portfolio at the beginning of the year. *σ VP Comp* is the standard deviation of the total compensation among all the VPs for any firm-year. *CEO Age* is the age of the CEO as of the sample year. *Industry Homogeneity* is the average partial correlation coefficient of all firms in the same 2-digit SIC code with the industry return, holding market return constant. *Firm Size* is Log (Sales). *Stk. Ret. Volatility* is the variance of 60 monthly returns prior to the sample year. *Capital to Sales* is Net fixed assets / Sales. *Leverage* is computed as Long-term debt / Total assets. *R&D to Capital* is the ratio of Research and development expenditure to Net fixed assets. *Advertising to Capital* is the ratio of Advertising expenditure to Net fixed assets. *Dividend Yield is* the dividend yield as reported in ExecuComp. All variables are winsorized at the 1 and 99 percentile levels. All specifications contain year dummies and firm fixed-effects. t-values based on heteroskedasticity robust standard errors, clustered by firm are in parentheses. The symbols ***, **, and * denote significance at the 1%, 5%, and 10% respectively.

Using →	**Log (Total Gap)**		**Log (ST Gap) and Log (LT Gap)**	
Dependent Var. →	*ROA*	*Firm q*	*ROA*	*Firm q*
Predictor Var. ↓				
Constant	-20.428*** (3.13)	5.631*** (6.77)	-23.313*** (3.52)	5.409*** (6.51)
Log (Total Gap)	0.429*** (4.74)	0.059*** (4.68)		
Log (ST Gap)			1.050*** (6.82)	0.068*** (3.88)
Log (LT Gap)			0.119 (1.41)	0.040*** (3.66)
CEO Alignment	0.128*** (4.67)	0.015*** (3.76)	0.134*** (4.79)	0.016*** (3.79)
Median VP Alignment	2.429*** (5.63)	0.151*** (2.93)	2.417*** (5.56)	0.150*** (2.91)
Control Variables				
Log (σ VP Comp)	0.021 (0.21)	0.110*** (9.33)	0.036 (0.36)	0.110*** (9.33)
Log (CEO Age)	-2.657*** (2.74)	-0.281** (2.43)	-3.007*** (3.08)	-0.296** (2.56)
Industry Homogeneity	5.419*** (2.97)	0.463* (1.91)	5.250*** (2.90)	0.455* (1.88)
Firm Size	9.139*** (6.32)	-0.650*** (3.25)	9.097*** (6.30)	-0.650*** (3.24)
Firm Size Squared	-0.491*** (5.32)	0.029** (2.07)	-0.498*** (5.41)	0.028** (2.04)
Stk. Ret. Volatility	-70.667*** (3.28)	-9.906*** (4.35)	-65.560*** (3.07)	-9.619*** (4.21)
Capital to Sales	-3.255*** (6.58)	-0.328*** (4.49)	-3.162*** (6.32)	-0.324*** (4.42)
Leverage	-19.314*** (14.72)	-1.027*** (6.66)	-19.006*** (14.66)	-1.011*** (6.54)
R&D to Capital	-3.372*** (4.05)	0.053 (0.57)	-3.444*** (4.15)	0.049 (0.53)
Advertising to Capital	0.063 (0.05)	0.109 (0.70)	0.044 (0.03)	0.110 (0.71)
Dividend Yield	-0.500*** (7.13)	-0.110*** (11.34)	-0.458*** (6.50)	-0.107*** (11.14)
Within R-squared	0.15	0.13	0.15	0.13
No. of Obs.(Year dummies)	17,987 (Yes)	17,987 (Yes)	17,987 (Yes)	17,987 (Yes)
No. of Firms (Firm fixed-effects)	2,367 (Yes)	2,367 (Yes)	2,367 (Yes)	2,367 (Yes)

Table 6: Effect of Tournament and Alignment Incentives on Firm Performance–2SLS with Total Gap

The Table reports fixed-effect 2SLS regressions of ROA and Firm Q on tournament and alignment based on Total Gaps. The sample period is from 1993 through 2004. The dependent variables are firm performance measured as *ROA* = Net Income / Total assets and *Firm q* = (Market value of equity + Book value of debt) / Total assets. *Total Gap* is the difference between the CEO's Total comp. and the median VP's Total comp. for any given firm-year. *CEO (Median VP) Alignment* represents the stock price sensitivity of the CEO's (Median VP's) stock and option portfolio. *σ VP Comp* is the standard deviation of the total compensation among all the VPs in each firm-year. *CEO Age* is the age of the CEO as of the sample year. *Industry Homogeneity* is the average partial correlation coefficient of all firms in the same 2-digit SIC code with the industry return, holding market return constant. *Firm Size* is log (Sales). *Stk. Ret. Volatility is* the variance of 60 monthly returns prior to the sample year. *Capital to Sales* is Net fixed assets / Sales. *R&D to Capital* is the ratio of Research and development expenditure to Net fixed assets. *Advertising to Capital* is the ratio of Advertising expenditure to Net fixed assets. *Dividend Yield is* the dividend yield as reported in ExecuComp. *No. of VPs* is the number of VPs for each-year in the ExecuComp database. *CFO is VP* is a dummy variable equal to 1 if any of the VPs in the firm-year is the CFO, 0 otherwise. *Industry Total Gap* is the median value of *Total Gap* for all firms in the same size quartile and 2-digit SIC code as the firm. *Industry CEO (VP) Alignment* is the median value of CEO and VP alignments for all firms in the same size quartile and 2-digit SIC code as the firm. All variables are winsorized at the 1 and 99 percentile levels. All specifications contain year dummies and firm fixed-effects. t-values based on heteroskedasticity robust standard errors, clustered by firm are in parentheses. The symbols ***, **, and * denote significance at the 1%, 5%, and 10% respectively. Statistics from tests for relevance and validity of instruments are reported in the bottom panel. Difference in Sargan C statistic tests the exogeneity of the endogenous variables. F-statistics of joint significance of the instruments in the first stage test, Shea partial R squared, and the Anderson-Rubin F statistic for the joint significance of the endogenous variables in the second stage provide tests of instrument relevance. The Hansen J statistic tests the exogeneity of instruments for validity.

	First Stage			**Second Stage**	
Dependent Var. →	*Total Gap*	*CEO Alignment*	*VP Alignment*	*ROA*	*Firm q*
Constant	3.179*** (4.31)	-3.518 (-0.84)	1.266*** (6.35)		
Endogenous Variables					
Log (Total Gap)				1.115*** (3.66)	0.133*** (3.39)
CEO Alignment				0.235*** (3.05)	0.019** (2.13)
Median VP Alignment				12.909*** (7.83)	0.755*** (4.43)
Control Variables					
Log (σ VP Comp)	0.089*** (5.55)	0.059 (1.47)	-0.003 (-0.83)	0.086 (0.77)	0.110*** (8.30)
Log (CEO Age)	-0.471*** (-3.95)	3.944*** (4.22)	0.013 (0.46)	-2.544** (-2.34)	-0.247** (-2.00)
Industry Homogeneity	0.077 (0.41)	1.966** (2.22)	0.118* (1.77)	4.054** (2.00)	0.389 (1.54)
Firm Size	0.072 (0.65)	-1.770*** (-3.62)	-0.196*** (-5.23)	11.903*** (7.70)	-0.489** (-2.41)
Firm Size Squared	-0.003 (-0.32)	0.061* (1.73)	0.008*** (3.46)	-0.621*** (-6.39)	0.021 (1.48)
Stk. Ret. Volatility	-0.934 (-0.52)	-4.263 (-0.62)	-0.550 (-1.15)	-65.322*** (-3.07)	-9.547*** (-4.19)
Capital / Sales	-0.039 (-0.56)	-0.279 (-1.11)	-0.049*** (-4.38)	-2.598*** (-4.91)	-0.290*** (-3.85)
Leverage	-0.203** (-2.08)	0.474 (1.16)	0.089*** (3.06)	-19.861*** (-14.8)	-1.049*** (-6.72)
R&D to Capital	0.041 (1.00)	-0.212 (-1.21)	-0.002 (-0.11)	-3.366*** (-4.08)	0.052 (0.57)
Adv. to Capital	0.062 (0.50)	-0.752 (-1.58)	0.049* (1.93)	-0.354 (-0.25)	0.081 (0.52)
Dividend Yield	-0.035*** (-3.36)	-0.129*** (-3.30)	-0.012*** (-4.97)	-0.299*** (-3.83)	-0.097*** (-9.55)

(Continued)

Table 6: Effect of Tournament and Alignment Incentives on Firm Performance–2SLS with Total Gap (Continued)

	First Stage			Second Stage	
Dependent Var. →	*Log(Total Gap)*	*CEO Align.*	*VP Align.*	*ROA*	*Firm q*
Instrumental Variables					
No. of VPs	0.020*** (2.75)	-0.125*** (-3.94)	-0.045*** (-22.2)		
CFO is VP Dummy	0.053** (2.50)	-0.067 (-0.73)	-0.005 (-0.92)		
Log (Industry Total gap)	0.701*** (14.4)	0.045 (0.56)	0.013*** (2.58)		
Industry CEO Alignment	0.009 (1.43)	0.426*** (7.82)	0.003** (2.11)		
Industry VP Alignment	0.005 (1.04)	-0.093** (-2.06)	0.012** (2.46)		
Within R-squared	0.13	0.12	0.10	0.06	0.10
No. of Obs.	17,987	17,987	17,987	17,987	17,987
No. of Firms	2,367	2,367	2,367	2,367	2,367
Year dummies and Firm fixed effects	Yes	Yes	Yes	Yes	Yes
Tests of Endogeneity, Relevance and Validity of Instruments					
Difference in Sargan C (χ^2)				62.61***	21.26***
Shea Partial R^2	0.07	0.07	0.06		
F statistic	44.54***	14.95***	102.00***		
Anderson – Rubin F statistic				22.97***	9.26***
Hansen J statistic (p-val)				2.00 (0.37)	1.18 (0.55)

Table 7: Effects of Tournament and Alignment Incentives on Firm Performance – 2SLS with ST and LT Gap

The Table reports fixed-effects 2SLS regressions of *ROA* and *Firm q* on tournament and alignment based on short-term and long-term gaps. The sample period is from 1993 through 2004. The dependent variables are firm performance measured as *ROA* = Net Income / Total assets and *Firm q* = (Market value of equity + Book value of debt) / Total assets. *ST (LT) Gap* is the difference between the CEO's total comp. and the median VP's total comp. for any given firm-year. *CEO (Median VP) Alignment* represents the stock price sensitivity of the CEO's (Median VP's) stock and option portfolio. *σ VP Comp* is the standard deviation of the total compensation among all the VPs in each firm-year. *CEO Age* is the age of the CEO as of the sample year. *Industry Homogeneity* is the average partial correlation coefficient of all firms in the same 2-digit SIC code with the industry return, holding market return constant. *Firm Size* is log (Sales). *Stk. Ret. Volatility is* the variance of 60 monthly returns prior to the sample year. *Capital to Sales* is Net fixed assets / Sales. *R&D to Capital* is the ratio of Research and development expenditure to Net fixed assets. *Advertising to Capital* is the ratio of Advertising expenditure to Net fixed assets. *Dividend Yield is* the dividend yield as reported in ExecuComp. *No. of VPs* is the number of VPs for each-year in the ExecuComp database. *CFO is VP* is a dummy variable equal to 1 if any of the VPs in the firm-year is the CFO, 0 otherwise. *Industry ST (LT) Gap* is the log of the median value of short-term (long-term) gap for all firms in the same size quartile and 2-digit SIC code as the firm. *Industry CEO (VP) Alignment* is the median value of CEO and VP alignments for all firms in the same size quartile and 2-digit SIC code as the firm. All variables are winsorized at the 1 and 99 percentile levels. All specifications contain year dummies and firm fixed-effects. t-values based on heteroskedasticity robust standard errors, clustered by firm are in parentheses. The symbols ***, **, and * denote significance at the 1%, 5%, and 10% respectively. Statistics from tests for relevance and validity of instruments are reported in the bottom panel. Difference in Sargan C statistic tests the exogeneity of the endogenous variables. F-statistics of joint significance of the instruments in the first stage test, Shea partial R squared, and the Anderson-Rubin F statistic for the joint significance of the endogenous variables in the second stage provide tests of instrument relevance. The Hansen J statistic tests the exogeneity of instruments for validity.

	First Stage				**Second Stage**	
Dependent Var. →	*Log (ST Gap)*	*Log (LT Gap)*	*CEO Align.*	*VP Align.*	*ROA*	*Firm q*
Constant	1.710*** (2.62)	3.813*** (5.42)	-4.594 (-1.09)	1.248*** (6.15)		
Endogenous Variables						
Log (ST Gap)					2.998*** (5.98)	0.178*** (3.66)
Log (LT Gap)					0.490* (1.74)	0.069** (2.42)
CEO Alignment					0.283*** (3.25)	0.022** (2.39)
Median VP Alignment					11.511*** (6.96)	0.672*** (3.88)
Control Variables						
Log (σ VP Comp)	0.022** (2.34)	0.096*** (6.07)	0.054 (1.36)	-0.002 (-0.81)	0.075 (0.66)	0.112*** (8.66)
Log (CEO Age)	0.205 (1.52)	-0.644*** (-6.35)	3.968*** (4.25)	0.013 (0.46)	-3.512*** (-3.02)	-0.313** (-2.45)
Industry Homogeneity	0.103 (0.49)	0.121 (0.64)	2.025** (2.29)	0.119* (1.78)	3.704* (1.84)	0.371 (1.47)
Firm Size	-0.010 (-0.11)	0.133 (1.12)	-1.686*** (-3.44)	-0.196*** (-5.21)	11.616*** (7.46)	-0.508** (-2.49)
Firm Size Squared	0.006 (0.85)	-0.008 (-0.89)	0.053 (1.51)	0.008*** (3.44)	-0.637*** (-6.54)	0.020 (1.44)
Stk. Ret. Volatility	-4.763*** (-3.04)	0.003 (0.0015)	-4.252 (-0.62)	-0.551 (-1.15)	-50.935** (-2.43)	-8.793*** (-3.78)
Capital / Sales	-0.086* (-1.67)	0.004 (0.092)	-0.281 (-1.12)	-0.049*** (-4.37)	-2.403*** (-4.32)	-0.281*** (-3.75)
Leverage	-0.311*** (-3.42)	-0.082 (-0.95)	0.479 (1.18)	0.089*** (3.06)	-18.875*** (-14.2)	-1.003*** (-6.38)
R&D to Capital	0.094*** (2.63)	0.004 (0.097)	-0.210 (-1.20)	-0.001 (-0.10)	-3.564*** (-4.32)	0.042 (0.46)
Adv. to Capital	0.051 (0.32)	0.017 (0.13)	-0.743 (-1.57)	0.050* (1.96)	-0.338 (-0.24)	0.087 (0.57)
Dividend Yield	-0.038*** (-4.65)	-0.031*** (-3.38)	-0.129*** (-3.31)	-0.012*** (-4.95)	-0.187** (-2.36)	-0.092*** (-9.03)

(Continued)

Table 7: Effects of Tournament and Alignment Incentives on Firm Performance – 2SLS with ST and LT Gap
(Continued)

	First Stage				Second Stage	
Dependent Var. →	*ST Gap*	*LT Gap*	*CEO Align.*	*VP Align.*	*ROA*	*Firm q*
Instrumental Variables						
No. of VPs	-0.018*** (-2.74)	0.033*** (4.35)	-0.126*** (-3.96)	-0.045*** (-22.2)		
CFO is VP Dummy	0.065*** (3.76)	0.030 (1.41)	-0.066 (-0.72)	-0.005 (-0.92)		
Log (Industry ST gap)	0.690*** (16.6)	-0.107*** (-2.91)	-0.037 (-0.31)	0.007 (0.96)		
Log (Industry LT gap)	-0.086** (-2.56)	0.759*** (14.0)	0.188 (1.58)	0.010** (2.08)		
Industry CEO Alignment	0.001 (0.25)	0.009* (1.78)	0.428*** (7.91)	0.003** (2.15)		
Industry VP Alignment	0.003 (0.41)	-0.002 (-0.32)	-0.092** (-2.04)	0.012** (2.46)		
Within R^2	0.11	0.12	0.12	0.10	0.06	0.10
No. of Obs.	17,987	17,987	17,987	17,987	17,987	17,987
No. of Firms	2,367	2,367	2,367	2,367	2,367	2,367
Year dummies and Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Tests of Endogeneity, Relevance and Validity of Instruments						
Difference in Sargan C (χ^2)					78.59***	21.86***
Shea Partial R^2	0.07	0.07	0.07	0.06		
F statistic	62.02***	40.06***	13.30***	85.67***		
Anderson – Rubin F statistic					26.03***	9.55***
Hansen J statistic (p-val)					0.53 (0.77)	0.66 (0.72)

Table 8: Effects of Tournament and Alignment Incentives on Firm Performance –Sub-Sample Analysis

The Table reports fixed-effect regressions of *ROA* and *Firm q* on tournament and alignment with interaction terms for sub-samples. The sample period is from 1993 through 2004. The dependent variables are firm performance measured as *ROA* = Net Income / Total assets and *Firm q* equal to (Market value of equity + Book value of debt) / Total assets. *Total gap* is the difference between the CEO's total comp. and the Median VP's total comp. for any given firm-year. *ST (LT) gap* is the difference between the CEO's ST (LT) comp. and the Median VP's ST (LT) comp. for any given firm-year. *CEO (VP) Alignment* represents the stock price sensitivity of the CEO's (VP's) stock and option portfolio. The interaction variables are as follows. The following dummy variables are set equal to 1 if the respective condition holds, and zero otherwise. *New CEO* is 1 in the CEO's first year of service as CEO and *CEO is Insider* is equal to 1 if the CEO is an insider. *Industry Homogeneity* is the average partial correlation coefficient of all firms in the same 2-digit SIC code with the industry return, holding market return constant. *Retiring CEO* is 1 if the CEO is at least 62 years of age. *Chair* is equal to 1 if the CEO also holds the position of Chairperson. *Succession Plan* is 1 if the firm has a succession plan as defined in the data appendix. All models include the following control variables, *Log (CEO Age), Industry Homogeneity, Firm Size, Stk. Ret. Volatility, Firm Size Square*d, *Capital to Sales, R&D to Capital, Adv. to Capital, Leverage, and Dividend Yield.* All variables are winsorized at the 1 and 99 percentile levels. All specifications contain year dummies and firm fixed-effects. t-values based on heteroskedasticity robust standard errors, clustered by firm are in parentheses. The symbols ***, **, and * denote significance at the 1%, 5%, and 10% respectively.

Tournament Measure →	*Log (Total Gap)*		*Log (ST Gap)*		*Log (LT Gap)*	
Dependent Var. →	**ROA**	**Firm q**	**ROA**	**Firm q**	**ROA**	**Firm q**
Log (Total Gap)	0.263	0.233***				
	(0.82)	(4.68)				
Log (ST Gap)			1.489***	0.234***	0.948***	0.062***
			(2.69)	(3.60)	(6.17)	(3.38)
Log (LT Gap)			0.121	0.044***	-0.095	0.165***
			(1.45)	(3.94)	(-0.36)	(4.13)
CEO Alignment	0.108***	0.012**	0.114***	0.012**	0.115***	0.012***
	(3.63)	(2.56)	(3.77)	(2.48)	(3.81)	(2.66)
Median VP Alignment	2.501***	0.166***	2.503***	0.170***	2.476***	0.164***
	(5.25)	(2.93)	(5.24)	(2.97)	(5.16)	(2.88)
Log (σ VP Comp)	0.255**	0.121***	0.256**	0.121***	0.252**	0.122***
	(2.28)	(8.94)	(2.30)	(8.94)	(2.26)	(8.98)
Interaction of Gap with ↓						
New CEO (β_5)	-0.774***	-0.052*	-0.105	0.008	-0.905***	-0.028
	(-3.11)	(-1.70)	(-0.36)	(0.29)	(-3.24)	(-0.77)
CEO is Insider (β_6)	0.141	-0.057*	0.161	-0.000	0.138	-0.024
	(0.64)	(-1.74)	(0.51)	(-0.00027)	(0.68)	(-0.87)
New CEO * CEO is Insider (β_7)	0.305***	0.016**	0.409***	0.019**	0.300***	0.016**
	(3.79)	(2.21)	(4.29)	(2.26)	(3.63)	(2.15)
Industry Homogeneity	0.802	-0.304***	-1.538	-0.241	0.955	-0.316***
	(1.09)	(-2.83)	(-1.33)	(-1.64)	(1.43)	(-2.97)
Retiring CEO	0.036	0.014***	0.031	0.018***	0.034	0.014***
	(0.99)	(2.75)	(0.77)	(3.09)	(0.89)	(2.63)
Chairman	-0.139	-0.061**	-0.251	-0.117***	-0.053	-0.044
	(-0.76)	(-2.07)	(-0.78)	(-2.68)	(-0.31)	(-1.54)
Succession Plan	0.028	-0.028	-0.215	-0.049*	0.060	-0.013
	(0.21)	(-1.08)	(-1.05)	(-1.70)	(0.50)	(-0.54)

Cont.

Cont.

Tournament Measure →	*Log (Total Gap)*		*Log (ST Gap)*		*Log (LT Gap)*	
Interacted Variables	**ROA**	**Firm q**	**ROA**	**Firm q**	**ROA**	**Firm q**
New CEO (β_{12})	2.934* (1.67)	0.178 (0.80)	-2.517 (-1.38)	-0.266 (-1.51)	4.058** (2.07)	-0.003 (-0.013)
CEO is Insider (β_{13})	-1.396 (-0.86)	0.437* (1.83)	-1.287 (-0.62)	0.002 (0.0076)	-1.281 (-0.89)	0.176 (0.91)
Industry Homogeneity	-0.227 (-0.037)	2.902*** (3.31)	16.738** (2.02)	2.146** (2.08)	-1.405 (-0.26)	2.927*** (3.48)
CEO Age	-3.106** (-2.49)	-0.501*** (-3.25)	-3.168** (-2.53)	-0.535*** (-3.46)	-3.342*** (-2.66)	-0.515*** (-3.34)
Chairman	1.380 (0.97)	0.493** (2.13)	1.948 (0.89)	0.801*** (2.69)	0.688 (0.52)	0.358 (1.63)
Succession Plan	-1.451 (-1.35)	0.148 (0.74)	0.330 (0.23)	0.270 (1.37)	-1.560* (-1.67)	0.037 (0.20)
Controls						
Firm Size	8.717*** (5.91)	-0.717*** (-3.45)	8.493*** (5.78)	-0.708*** (-3.44)	8.692*** (5.89)	-0.705*** (-3.40)
Firm Size Squared	-0.476*** (-5.09)	0.033** (2.30)	-0.469*** (-5.03)	0.032** (2.24)	-0.483*** (-5.16)	0.032** (2.22)
Stk. Ret. Volatility	-68.651*** (-3.15)	-10.133*** (-4.30)	-64.957*** (-3.02)	-9.848*** (-4.19)	-64.225*** (-2.97)	-9.798*** (-4.16)
Capital / Sales	-3.272*** (-6.30)	-0.349*** (-4.48)	-3.268*** (-6.33)	-0.343*** (-4.40)	-3.209*** (-6.13)	-0.341*** (-4.37)
Leverage	-19.044*** (-14.4)	-1.040*** (-6.47)	-18.807*** (-14.4)	-1.032*** (-6.42)	-18.748*** (-14.4)	-1.030*** (-6.39)
R&D to Capital	-3.384*** (-4.06)	0.064 (0.69)	-3.471*** (-4.18)	0.063 (0.67)	-3.452*** (-4.15)	0.065 (0.69)
Adv. to Capital	0.100 (0.075)	0.100 (0.64)	0.089 (0.068)	0.104 (0.66)	0.079 (0.059)	0.101 (0.64)
Dividend Yield	-0.456*** (-6.51)	-0.109*** (-11.1)	-0.431*** (-6.13)	-0.106*** (-10.8)	-0.422*** (-5.99)	-0.107*** (-11.0)
Comparisons (F stat)						
(a) New CEO with Continuing CEO ($\beta_5 + \beta_7 * Mean(Insider)$	-0.547** (5.86)	-0.040 (1.96)	0.200 (0.55)	0.022 (0.75)	-0.68*** (7.08)	-0.016 (0.22)
(a) New CEO from Outside with New CEO from Inside -($\beta_6 + \beta_7$)	-0.446** (4.21)	0.041 (1.85)	-0.57* (3.15)	-0.019 (0.26)	-0.438** (4.79)	0.008 (0.09)
Within R^2	0.16	0.14	0.16	0.14	0.16	0.14
No. of Obs.	17,488	17,488	17,488	17,488	17,488	17,488
No. of Firms	2,314	2,314	2,314	2,314	2,314	2,314
Year dummies, and Firm fixed effects.	Yes	Yes	Yes	Yes	Yes	Yes

Table 9: Determinants of Alternative Tournament Measures

The sample period is from 1993 through 2004. *Gini Coefficient Total Comp.* = $1+\frac{1}{n}-\frac{2}{n^2\bar{y}}\left(y_1+2y_2+....ny_n\right)$ where n is the number of executives including the CEO, and y_1, y_2,..y_n represent the total compensation paid to each of the n executives, in decreasing order of size. CDF ($ Total Gap) is the cumulative density function of the total gap for each year. *Total Gap* with Max (Mean) VP Comp. is the difference between the CEO's total comp. and the highest paid (mean) VP's total comp. for each firm-year. *New CEO* is 1 in the CEO's first year of service as CEO and *CEO is Insider* is equal to 1 if the CEO is an insider. *Industry Homogeneity* is the average partial correlation coefficient of all firms in the same 2-digit SIC code with the industry return, holding market return constant. *Retiring CEO* is 1 if the CEO is at least 62 years of age. *Chair* is equal to 1 if the CEO also holds the position of Chairperson. *No. of VPs* is the number of VPs for each-year in the ExecuComp database. *Succession Plan* is 1 if the firm has a succession plan as defined in the data appendix. *Median Industry Gap* is the respective median gap for all firms in the same 2-digit industry and size quartile. *CFO is VP* takes on a value of 1 when any one of the VPs is the CFO. *CEO Age* is the age of the CEO as of the sample year. *CEO experience* is the number of years the CEO has held position as CEO in the firm. *Firm Size* is Log (Sales). The following dummy variables are set equal to 1 if the respective condition holds, and zero otherwise. *Stk. Ret. Volatility is* the variance of 60 monthly returns prior to the sample year. *No. of Segments* is the number of business segments of the firm in the Compustat segment database. All variables are winsorized at the 1 and 99 percentile levels. All specifications contain year dummies and firm fixed-effects. t-values based on heteroskedasticity robust standard errors, clustered by firm are in parentheses. The symbols ***, **, and * denote significance at the 1%, 5%, and 10% respectively.

Dependent Var. →	***Gini Coeff. (Total Comp)***	***CDF ($ Total Gap)***	***Log (Total Gap with Max VP Comp)***	***Log (Total Gap with Mean VP Comp)***
Predictor Var. ↓				
Constant	-0.037 (-0.63)	-0.581*** (-3.90)	2.210 (1.62)	2.804*** (3.38)
New CEO	0.055*** (8.68)	0.101*** (6.98)	0.104 (1.43)	0.286*** (4.35)
CEO is Insider	-0.007 (-1.52)	-0.030*** (-2.89)	-0.125*** (-2.96)	-0.118** (-2.56)
New CEO * CEO is Insider	-0.046*** (-6.92)	-0.112*** (-7.28)	-0.206** (-2.66)	-0.348*** (-4.92)
Industry Homogeneity	0.029 (1.22)	0.022 (0.41)	-0.013 (-0.05)	-0.006 (0.03)
Retiring CEO	0.001 (0.30)	0.003 (0.39)	-0.005 (-0.17)	0.036 (1.14)
Chair	0.008*** (2.79)	0.016** (2.31)	0.048 (1.55)	0.041 (1.30)
No. of VPs	0.026*** (31.83)	0.007*** (4.22)	-0.044*** (-4.98)	0.011 (1.52)
Succession Plan	0.008*** (4.07)	-0.024*** (-5.43)	-0.155*** (-6.71)	-0.290*** (-7.84)
Median Industry Value	0.565*** (29.25)	0.131*** (17.10)	0.885*** (6.70)	0.729*** (12.55)
CFO is VP	-0.003 (-1.20)	0.010* (1.94)	-0.012 (-0.52)	0.028 (1.28)
Log (CEO Age)	0.003 (0.23)	-0.077** (-2.13)	-0.091 (-0.48)	-0.269 (-1.58)
Log (CEO Experience)	0.001 (0.49)	0.002 (0.33)	-0.020 (0.75)	-0.018 (-0.73)
Firm Size	0.002 (0.53)	0.056*** (7.99)	-0.064** (-2.04)	0.067** (2.22)
Stk. Ret. Volatility	-0.054 (-0.37)	-0.309 (0.91)	0.985 (0.64)	-0.541 (-0.31)
No. of Segments	-0.001 (-0.94)	-0.004** (-2.39)	-0.017** (-2.09)	-0.020** (-2.41)
Within R-squared	0.24	0.11	0.03	0.09
No. of Obs. (firms)	16,460 (2,166)	16,460 (2,166)	16,460 (2,166)	16,460 (2,166)

Table 10: Effects of Tournament and Alignment Incentives on Firm Performance - Fixed Effects Regressions using Alternate Total Gap Measures

The Table reports fixed-effect regressions of *ROA* and *Firm q* on tournament and alignment with alternate tournament measures. The sample period is from 1993 through 2004. *Gini Coefficient Total Compensation* = $1+\frac{1}{n}-\frac{2}{n^2\bar{y}}\left(y_1+2y_2+....ny_n\right)$ where n is the number of executives for firm I in year t, including the CEO, and y_1, y_2,..y_n represent the total compensation paid to each of the n executives, in decreasing order of size. CDF ($ Total Gap) is the cumulative density function or normalized rank of the total gap for each year in the sample. . *Total Gap* with Max (Mean) VP Compensation is the difference between the CEO's total compensation and the highest paid (mean) VP's total compensation for any given firm-year. *CEO (VP) Alignment* represents the stock price sensitivity of the CEO's (VP's) stock and option portfolio. *σ VP Comp*. is the standard deviation of the total compensation among all the VPs for any firm-year. All models include the following control variables, *Log (CEO Age), Industry Homogeneity, Firm Size, Firm Size Square*d, *Stk. Ret. Volatility*, *Capital to Sales, R&D to Capital, Adv. to Capital, Leverage, and Dividend Yield.* All variables are winsorized at the 1 and 99 percentile levels. All specifications contain year dummies and firm fixed-effects. t-values based on heteroskedasticity robust standard errors, clustered by firm are in parentheses. The symbols ***, **, and * denote significance at the 1%, 5%, and 10% respectively.

Using Tournament Measure →	**Gini Coeff. (Total Comp)**	**CDF ($ Total Gap)**	**Log (Total Gap with Max VP Comp)**	**Log (Total Gap with Mean VP Comp)**
Panel A. Firm performance measured by ROA				
Tournament Measure	-1.507*	2.635***	0.210**	0.394***
	(1.90)	(6.41)	(2.47)	(4.16)
CEO Alignment	0.122***	0.130***	0.122***	0.125***
	(4.52)	(4.76)	(4.48)	(4.59)
Median VP Alignment	2.336***	2.448***	2.443***	2.443***
	(5.42)	(5.68)	(5.64)	(5.66)
Log (σ VP Comp)		-0.089	0.133	0.093
		(0.90)	(1.36)	(0.97)
Panel B. Firm performance measured by Firm q				
Tournament Measure	0.528***	0.311***	0.031***	0.059***
	(5.26)	(6.10)	(2.69)	(4.63)
CEO Alignment	0.015***	0.015***	0.014***	0.015***
	(3.64)	(3.77)	(3.56)	(3.68)
Median VP Alignment	0.156***	0.153***	0.153***	0.153***
	(2.98)	(2.96)	(2.96)	(2.97)
Log (σ VP Comp)		0.098***	0.126***	0.120***
		(8.23)	(10.10)	(10.09)

Table 11: Effects of Tournament and Alignment Incentives on Firm Performance – 2SLS Regressions using Alternate Total Gap Measures

The Table reports 2SLS fixed-effect regressions of *ROA* and *Firm q* on tournament and alignment with alternate tournament measures. The sample period is from 1993 through 2004. The dependent variables are firm performance measured as *ROA* = Net Income / Total assets and *Firm q* = (Market value of equity + Book value of debt) / Total assets. *Gini Coefficient Total Compensation* = $1+\frac{1}{n}-\frac{2}{n^2\bar{y}}\left(y_1+2y_2+....ny_n\right)$ where n is the number of executives for firm I in year t, including the CEO, and y_1, y_2,..y_n represent the Total compensation paid to each of the n executives, in decreasing order of size. *CDF (Total Gap)* is the cumulative density function or normalized rank of the total gap for each year in the sample. *CEO (VP) Alignment* represents the stock price sensitivity of the CEO's (VP's) stock and option portfolio. *σ VP Comp*. is the standard deviation of the total compensation among all the VPs for any firm-year. All models include the following control variables: *Log (CEO Age), Industry Homogeneity, Firm Size, Firm Size Squared, Stk. Ret. Volatility, Capital to Sales, Leverage, R&D to Capital, Advertising to Capital,* and *Dividend Yield*. All variables are winsorized at the 1 and 99 percentile levels. All specifications contain year dummies and firm fixed-effects. t-values based on heteroskedasticity robust standard errors, clustered by firm are in parentheses. The symbols ***, **, and * denote significance at the 1%, 5%, and 10% respectively. Anderson-Rubin F statistic is for the joint significance of the endogenous variables in the second stage and provides tests of instrument relevance. The Hansen J statistic tests the exogeneity of instruments for validity.

Using Tournament Measure →	**Gini Coeff. (Total Comp)**	**CDF ($ Total Gap)**	**Log (Total Gap with Max VP Comp)**	**Log (Total Gap with Mean VP Comp)**
Panel A. Firm performance measured by ROA				
Tournament Measure	4.260* (1.73)	6.352*** (4.48)	2.834*** (4.86)	1.387*** (3.62)
CEO Alignment	0.231*** (2.94)	0.252*** (3.29)	0.256*** (3.14)	0.231*** (2.94)
Median VP Alignment	14.451*** (6.34)	12.420*** (7.54)	12.049*** (6.98)	13.110*** (7.88)
Log (σ VP Comp)		-0.177 (-1.27)	1.024*** (5.25)	0.295*** (2.71)
Anderson-Rubin F Stat	18.86***	22.97***	26.46***	22.55***
Hansen J Stat (p-val)	3.99 (0.14)	1.68 (0.43)	1.80 (0.41)	2.08 (0.35)
Panel B. Firm performance measured by Firm q				
Tournament Measure	1.929*** (6.50)	0.749*** (4.17)	0.243*** (3.48)	0.141*** (3.07)
CEO Alignment	0.016 (1.62)	0.021** (2.32)	0.021** (2.36)	0.019** (2.10)
Median VP Alignment	1.529*** (5.86)	0.697*** (4.05)	0.663*** (3.78)	0.766*** (4.47)
Log (σ VP Comp)		0.079*** (4.67)	0.195*** (8.50)	0.133*** (10.40)
Anderson-Rubin F Stat	15.42***	9.26***	9.24***	8.13***
Hansen J Stat (p-val)	5.03* (0.08)	0.99 (0.61)	0.64 (0.73)	1.20 (0.55)

Table 12: Effects of Alignment and Tournament Incentives on Firm Performance – Fixed Effects and 2SLS Fixed Effects Regressions using Alternate Performance Measures (OIBD to CAP and ROE)

The Table reports fixed-effect 2SLS regressions of *OIBD to Capital* and *ROE* on tournament and alignment. The sample period is from 1993 through 2004. *OIBD to Capital* = Operating Income before depreciation / Net fixed assets. *ROE* = Net income / Total equity. *Total gap* is the difference between the CEO's total comp. and the Median VP's total comp. for any given firm-year. *ST (LT) gap* is the difference between the CEO's ST (LT) comp. and the Median VP's ST (LT) comp. for any given firm-year. *CEO (Median VP) alignment* represents the stock price sensitivity of the CEO's (VP's) stock and option portfolio. *σ VP Comp*. is the standard deviation of the total compensation among all the VPs for any firm-year. All models include the following control variables: *Log (CEO Age), Industry Homogeneity, Firm Size, Firm Size Squared, Stk. Ret. Volatility, Capital to Sales, Leverage, R&D to Capital, Advertising to Capital,* and *Dividend Yield*. All variables are winsorized at the 1 and 99 percentile levels. All specifications contain year dummies and firm fixed-effects. t-values based on heteroskedasticity robust standard errors, clustered by firm are in parentheses. The symbols ***, **, and * denote significance at the 1%, 5%, and 10% respectively. Anderson-Rubin F statistic is for the joint significance of the endogenous variables in the second stage and provides tests of instrument relevance. The Hansen J statistic tests the exogeneity of instruments for validity.

Using Performance Measure →	**OIBD to Capital**		**ROE**	
Panel A. Fixed Effects Regressions				
Log (Total Gap)	0.046*** (4.60)		1.137*** (4.80)	
Log (ST Gap)		0.096*** (5.27)		2.744*** (7.10)
Log (LT Gap)		0.019** (2.30)		0.253 (1.17)
CEO Alignment	0.009*** (2.91)	0.009*** (3.06)	0.257*** (3.15)	0.273*** (3.27)
Median VP Alignment	0.186*** (4.03)	0.186*** (4.05)	6.536*** (5.77)	6.508*** (5.70)
Log (σ VP Comp)	0.031*** (2.71)	0.032*** (2.78)	0.106 (0.39)	0.144 (0.53)
Panel B. 2SLS with Fixed Effects Regressions				
Log (Total Gap)	0.167*** (3.51)		2.829*** (3.35)	
Log (ST Gap)		0.278*** (3.91)		8.713*** (6.21)
Log (LT Gap)		0.084** (2.56)		1.011 (1.14)
CEO Alignment	0.018 (1.46)	0.022* (1.80)	0.252 (1.13)	0.400 (1.53)
Median VP Alignment	0.914*** (5.76)	0.787*** (5.13)	39.283*** (8.34)	35.501*** (7.51)
Log (σ VP Comp)	0.026** (2.16)	0.028** (2.25)	0.364 (1.15)	0.314 (0.97)
Anderson-Rubin F Stat	9.13***	8.32***	23.77***	25.53***
Hansen J Stat (p-val)	5.29* (0.07)	4.64* (0.09)	1.82 (0.40)	0.12 (0.94)

Table 13: Marginal Effects of Tournament and Alignment Incentives on Firm Equity Value

We assume that there is one CEO and five VPs. One millions dollars can be paid:- (i) entirely to the CEO as Short-term compensation, (ii) entirely to the CEO as long-term comp.,(iii) as $200,000 to each of the five VPs as short-term comp., (iv) $200,000 to each of the five VPs as long-term comp. We compute the effect of each of these four possible payment schemes on *Firm q* and thereby on the market value of equity of the typical firm. *Firm q* is defined as (Market Value of equity + Book value of debt) / Total assets. *ROA* = Net income / Total assets. *CEO (VP) Alignment* represents the stock price sensitivity of the CEO's (VP's) stock and option portfolio. ST (LT) Gap is the difference between the CEO's ST (LT) comp. and the Median VP's ST (LT) comp. for any given firm-year. Percentages of the mean values for the respective variables are in parentheses.

	$ 100,000 is paid			
	Entirely to CEO as		**As $20,000 to each VP as**	
	Short-term compensation	Long-term compensation	Short-term compensation	Long-term compensation
Change in Compensation	10.87%	11.29%	5.22%	8.04%
Change in MV of Firm Equity ($ mn.)				
From change in CEO Alignment	0.00	0.15 (0.01%)	0.00	0.00
From change in VP Alignment	0.00	0.00	0.00	0.32 (0.02%)
From change in ST Gap	11.06 (0.55%)	0.00	-2.21 (-0.11%)	0.00
From change in LT Gap	0.00	3.29 (0.16%)	0.00	-0.66 (-0.03)
Total Change in MV of Equity	**11.06 (0.55%)**	**3.44 (0.17%)**	**-2.21 (-0.11%)**	**-0.34 (-0.02%)**
Change in ROA (%)				
From change in CEO Alignment	0.0000	0.0009 (0.02%)	0.0000	0.0000
From change in VP Alignment	0.0000	0.0000	0.0000	0.0390 (0.10%)
From change in ST Gap	0.1300 (3.22%)	0.0000	-0.0260 (-0.64%)	0.0000
From change in LT Gap	0.0000	0.0078 (0.20%)	0.0000	-0.0016 (-0.04%)
Total Change in ROA	**0.1300 (3.22%)**	**0.0087 (0.23%)**	**-0.0260 (-0.64%)**	**0.0023 (0.06%)**

Table 14A: Fama – French Carhart – 4 Factor Model: ST GAP after controlling for CEO Alignment

The Table reports the results of a four-factor equally weighted monthly returns for portfolios of firms sorted first by *CEO Alignment* quintiles and then by ST dollar gap quintiles. The rows in each Panel report excess returns in percent per month when we buy the portfolio in the highest quintile of *ST Gap* and sell short the portfolio with the lowest *ST gap* after controlling for *CEO Alignment*. The portfolios are reset every year. The explanatory variables are RMRF, SMB, HML, and UMD or momentum factor are suppressed and only intercepts are reported. The sample period is from 1993 to 2004. All excess returns that are significant at the 5 percent level or below are underlined.

	Equally Weighted						Value Weighted					
Year	**Q1**	**Q2**	**Q3**	**Q4**	**Q5**	**Q5 - Q1**	**Q1**	**Q2**	**Q3**	**Q4**	**Q5**	**Q5 - Q1**
1993	0.303	0.117	0.580	0.394	0.574	**0.271**	-0.365	-0.373	-0.503	0.382	0.301	**0.666**
	(0.71)	(0.30)	(1.94)	(1.75)	(2.72)		(-0.86)	(-1.58)	(-1.95)	(1.47)	(2.68)	
1994	-0.536	-0.185	-0.006	0.243	0.570	**1.106**	-0.529	-0.649	-0.312	0.163	0.231	**0.760**
	(-1.84)	(-0.77)	(-0.02)	(1.12)	(2.40)		(-1.24)	(-2.19)	(-0.77)	(0.98)	(1.50)	
1995	-0.524	-0.386	-1.034	-0.166	0.516	**1.040**	-0.559	-0.410	-0.125	0.735	-0.627	**-0.068**
	(-0.77)	(-0.97)	(-3.73)	(-0.28)	(1.52)		(-0.44)	(-0.63)	(-0.18)	(1.54)	(-3.13)	
1996	-0.226	-0.530	-0.139	0.499	0.681	**0.907**	0.490	-1.289	-0.320	-0.333	0.376	**-0.114**
	(-0.94)	(-1.71)	(-0.34)	(2.27)	(2.93)		(1.21)	(-2.39)	(-0.91)	(-1.66)	(1.69)	
1997	-0.198	-0.288	-0.047	0.356	0.604	**0.802**	1.149	-0.503	-0.549	-0.528	0.547	**-0.603**
	(-0.43)	(-0.66)	(-0.09)	(0.70)	(2.62)		(2.54)	(-0.66)	(-0.88)	(-1.00)	(1.72)	
1998	0.771	0.820	0.105	0.371	0.270	**-0.502**	2.776	-1.055	-0.904	0.548	0.116	**-2.660**
	(0.88)	(1.45)	(0.15)	(1.19)	(1.03)		(2.29)	(-0.92)	(-1.36)	(1.72)	(0.40)	
1999	0.305	0.469	0.538	0.567	1.018	**0.713**	-0.499	-0.473	-1.059	-0.947	0.493	**0.992**
	(0.80)	(2.48)	(1.61)	(1.47)	(2.45)		(-0.40)	(-0.57)	(-2.28)	(-1.55)	(1.68)	
2000	1.192	1.052	1.328	1.636	2.124	**0.932**	-1.041	0.299	-1.204	-1.181	1.858	**2.899**
	(1.18)	(1.70)	(1.66)	(1.89)	(3.95)		(-0.62)	(0.21)	(-0.78)	(-0.96)	(3.11)	
2001	0.998	0.317	0.406	0.786	1.090	**0.092**	0.386	-1.024	-0.473	0.251	0.356	**-0.030**
	(2.10)	(0.89)	(0.77)	(1.85)	(1.80)		(0.49)	(-0.95)	(-0.83)	(0.50)	(0.83)	
2002	0.924	0.662	0.864	1.083	1.137	**0.213**	0.597	-0.697	-0.507	-0.346	0.650	**0.054**
	(2.27)	(1.66)	(2.64)	(4.61)	(2.62)		(0.83)	(-1.42)	(-0.68)	(-0.85)	(2.13)	
2003	-1.217	-1.021	-0.745	0.124	-0.128	**1.089**	0.003	-1.709	-0.858	0.553	-0.074	**-0.077**
	(-3.58)	(-3.01)	(-2.19)	(0.37)	(-0.52)		(0.00)	(-2.75)	(-1.32)	(1.19)	(-0.22)	
2004	-0.982	-0.208	0.358	0.589	1.317	**2.299**	-0.551	-0.594	-0.453	-0.274	0.362	**0.913**
	(-3.47)	(-0.92)	(1.09)	(1.65)	(3.02)		(-1.01)	(-1.59)	(-1.41)	(-0.76)	(1.32)	
Overall	-0.081	0.085	0.253	0.451	0.848	**0.928**	0.117	-0.665	-0.617	0.451	0.456	**0.338**

Table 14B: Fama – French Carhart – 4 Factor Model: CEO Alignment after controlling for ST Gap

The Table reports the results of a four-factor equally weighted monthly returns for portfolios of firms sorted first by ST GAP then by *CEO Alignment* quintiles. The rows in each Panel report excess returns in percent per month when we buy the portfolio in the highest quintile of *ST Gap* and sell short the portfolio with the lowest *ST gap* after controlling for *CEO Alignment*. The portfolios are reset every year. The explanatory variables are RMRF, SMB, HML, and UMD or momentum factor are suppressed and only intercepts are reported. The sample period is from 1993 to 2004. All excess returns that are significant at the 5 percent level or below are underlined.

	Equally Weighted						Value Weighted					
Year	**Q1**	**Q2**	**Q3**	**Q4**	**Q5**	**Q5 - Q1**	**Q1**	**Q2**	**Q3**	**Q4**	**Q5**	**Q5 - Q1**
1993	0.131	0.097	0.494	0.576	0.666	**0.535**	0.084	0.229	0.076	0.063	-0.213	**-0.297**
	(0.57)	(0.41)	(0.90)	(1.05)	(1.46)		(0.36)	(1.58)	(0.24)	(0.12)	(-0.47)	
1994	-0.465	-0.015	0.100	0.266	0.194	**0.658**	-0.145	0.171	-0.026	0.202	0.480	**0.625**
	(-2.81)	(-0.08)	(0.83)	(0.97)	(0.67)		(-0.78)	(0.58)	(-0.11)	(0.61)	(1.80)	
1995	-0.523	0.167	-0.357	-0.216	-0.679	**-0.156**	-0.537	-0.174	0.314	-0.037	-0.023	**0.514**
	(-1.51)	(0.26)	(-0.44)	(-0.34)	(-1.35)		(-1.15)	(-0.33)	(0.40)	(-0.07)	(-0.03)	
1996	-0.614	-0.155	0.266	0.326	0.462	**1.076**	-0.249	0.173	0.083	0.050	1.175	**1.425**
	(-3.55)	(-0.63)	(0.85)	(1.57)	(1.07)		(-1.14)	(0.78)	(0.22)	(0.13)	(5.13)	
1997	-0.491	-0.194	0.250	0.151	0.709	**1.200**	0.169	-0.052	-0.211	-0.156	1.651	**1.482**
	(-1.09)	(-0.39)	(0.74)	(0.55)	(1.67)		(0.70)	(-0.21)	(-0.46)	(-0.27)	(2.25)	
1998	0.088	-0.193	0.435	0.785	1.224	**1.137**	0.672	-1.080	0.285	-0.162	1.821	**1.149**
	(0.09)	(-0.37)	(0.95)	(1.74)	(2.94)		(1.72)	(-1.45)	(0.43)	(-0.25)	(1.29)	
1999	-0.023	0.875	0.258	0.880	0.907	**0.931**	-0.504	0.558	0.206	0.606	-0.380	**0.124**
	(-0.12)	(2.05)	(0.60)	(2.41)	(2.39)		(-0.77)	(1.42)	(0.33)	(1.16)	(-0.24)	
2000	-0.137	0.816	2.015	2.826	1.793	**1.930**	0.871	0.395	-0.664	0.830	-0.542	**-1.413**
	(-0.20)	(0.89)	(2.57)	(3.28)	(2.81)		(1.22)	(0.46)	(-0.72)	(0.50)	(-0.38)	
2001	0.099	0.500	0.668	1.108	1.211	**1.111**	0.072	0.148	-0.079	0.682	0.293	**0.221**
	(0.32)	(1.19)	(1.11)	(2.09)	(2.71)		(1.32)	(0.31)	(-0.18)	(0.72)	(0.38)	
2002	0.651	0.550	0.776	1.322	1.367	**0.716**	0.048	-0.071	0.132	0.348	0.855	**0.807**
	(1.88)	(1.99)	(1.83)	(4.06)	(4.29)		(0.28)	(-0.18)	(0.41)	(0.66)	(1.41)	
2003	-0.839	-0.589	-0.677	-0.128	-0.746	**0.093**	0.001	-0.212	-0.639	0.152	-0.354	**-0.355**
	(-3.38)	(-2.65)	(-2.43)	(-0.39)	(-2.39)		(0.01)	(-1.45)	(-1.30)	(0.25)	(-0.71)	
2004	-0.183	0.312	0.330	0.185	0.440	**0.623**	-0.531	0.691	0.558	0.204	0.467	**0.997**
	(-0.65)	(0.99)	(2.10)	(0.44)	(1.58)		(-2.57)	(1.73)	(3.43)	(0.46)	(1.04)	
Overall	-0.128	0.084	0.312	0.568	0.719	**0.847**	-0.006	0.119	-0.027	0.568	0.578	**0.584**