CEO Labor Market Incentives and the Cost of Equity Capital

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Abstract

We examine how industry tournament incentives in the external labor market motivate chief executive officers (CEOs) and influence their firm's cost of equity capital. Using a large sample of firms over the period 1992-2019, we find that firms with CEOs who are highly incentivized in their labor market exhibit a low cost of equity capital. The association is strong and robust to alternative measurements of both tournament incentives and the cost of equity capital, as well as endogeneity alleviation. Further evidence indicates that the negative association between CEO tournament incentives and the cost of equity capital is moderated by CEOs' upward immobility but is strengthened in the presence of weaker external monitoring mechanisms, environments that are more cash rich, and the early stages of a product life cycle. Additional path analysis suggests that the relationship between CEO tournament incentives and the cost of equity capital exists as a reliable mediated link via improved firm performance. Collectively, our findings provide evidence that tournament incentives in the external labor market motivate CEOs to exert greater effort, ultimately yielding a positive impact on the cost of equity capital.

Keywords: CEO industry tournament incentives, External labor market, Cost of equity capital, Upward mobility, External monitoring

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1. Introduction

One vital inducement that motivates chief executive officers (CEOs) in making managerial decisions is the desire to maintain their upward or intra-industry mobility in the external labor market. This external labor market provides CEOs with strong incentives to deliver outstanding performance, due to the attractiveness of high compensation, enhanced span of control, greater visibility, and status as the CEO of a leading company in the industry (Coles et al., 2018). Over 75% of the CEOs in one survey of US companies deemed industry tournament incentives from the external labor market to be more important in making decisions than the compensation scheme at their current firm (Graham et al., 2005). Research on CEOs' industry tournament incentives indicates that the dynamics of the external labor market have a significant impact on a company's internal policies and strategies. This is because CEOs may be driven to adopt decisions at the firm level that enhance their visibility in the labor market (Coles et al., 2018; Huang et al., 2019; Kubick & Lockhart, 2016). For example, concurrent research finds that CEOs' industry tournament incentives are associated with their firms' financial performance (Coles et al., 2018), cash-holding policies (Huang et al., 2019), accounting techniques (Chowdhury et al., 2020), and audit fees, which are closely tied to the perceived risk of firm and agency problems (Tan, 2021). Although this stream of research has acknowledged the substantial role of the tournament incentives from the external labor market in influencing a CEO's decision-making, the link between CEO industry tournament incentives and the cost of equity capital has not been explored and is an area our study seeks to address.

The cost of equity capital summarizes investors' risk-return trade-off in their resource allocation decisions (Pástor et al., 2008) and serves as a key benchmark used by investors, managers, analysts, and other stakeholders to evaluate the risk and return of an investment. Research shows that CEOs' incentives have a significant influence on firms' cost of equity capital (e.g., Chen et al., 2013; Chen et al., 2016; Shen & Zhang, 2020). However, the incentives literature is mainly from the perspective of those inducements being an inherent part of the governance

mechanisms or of purposely designed compensation packages and has largely ignored the influence of CEOs' incentives stemming from the external labor market. Consequently, there is a lack of empirical evidence on whether these external incentives have an impact on firms' cost of equity. Given the significance of the external labor market in incentivizing CEOs, understanding how CEO labor market incentives affect the cost of equity is crucial, as the cost of equity is one of the key considerations for managers in their capital budgeting and corporate financing decisions. Moreover, the cost of equity is deemed a more direct yardstick of corporate investment and financing decisions than firm valuation (Cao et al., 2015). If these external incentives were to be structured in a way that optimizes the cost of equity, they could lead to better overall financial performance and shareholder value.

In this study, we investigate the relationship between CEO industry tournament incentives from external labor markets and the cost of equity, addressing a notable gap in the literature. Industry tournament incentives may motivate CEOs to exert greater effort or take higher risks to achieve a more desirable position at another company (Coles et al., 2018), potentially leading to varying effects on the cost of equity. On the one hand, the desire to move upward and the opportunity for employment incentivizes labor to exert effort, which is expected to increase with the size of the tournament prize (Lazear & Rosen, 1981; Prendergast, 1999). Increased effort can have three-fold effects on investors' required return on equity investment. First, CEO effort can mitigate the moral hazard issue arising from the agency problem. After signing a contract, the agent can exert less effort without bearing the full consequences of their actions, due to the information asymmetry (Holmström, 1979; Jensen & Meckling, 1976). The moral hazard issue is particularly pertinent given that the effort of CEOs, who lead the daily operations of their company, is crucial yet difficult to measure, due to their position and the largely unobservable nature of their decision-making process. Prior studies elaborate that firms bearing lower (higher) agency problems are subject to a lower (higher) cost of equity (Chen et al., 2013; Easley & O'Hara, 2004; Lambert et al., 2015). Second,

the more effort CEOs devote to their firm, the more they are alert to the firm's idiosyncratic operational and strategic risks and can, therefore, better control the uncertainty arising from business operations. This can reduce investors' perceived risk associated with the firm, making them more willing to accept a lower discount rate of future return, thus reducing the cost of equity. Third, managerial effort is pivotal in shaping a company's future trajectory and its ability to achieve better performance. CEOs who exert more effort are more likely to translate this effort into better performance and demonstrate growth and profitability, increasing investor confidence and reducing the demand for a high discount rate as a compensation for risk. In a similar vein, Kale et al. (2009) find supporting evidence that promotion to the next level provides managers with an incentive to expend higher effort, which, in turn, increases their chances of promotion, as well as the firm's output, by using an internal-promotion-based tournament.

On the other hand, the ambition to move upward and the availability of external employment opportunities can induce greater risk-taking, as CEOs may attempt to enhance their chances of winning the promotion tournament by making risker decisions. Empirical findings indicate that the riskiness of firms is positively associated with their CEOs' industry tournament incentives (e.g., Kini & William, 2012; Kubick & Lockhart, 2016; Kubick et al., 2018). Higher risk-taking by the CEO can lead to greater volatility in the company's future cash flows and earnings. This increased volatility can stem from various sources, such as the uncertainty surrounding the success of new investment projects, the potential for financial distress due to excessive leverage, or the exposure to market fluctuations resulting from aggressive financial policies. In response to this heightened perception of risk, investors may demand a higher rate of return on their investment to compensate for the added uncertainty, thereby increasing the cost of equity.

In sum, effort-making theory predicts a negative relationship between CEO industry tournament incentives and cost of equity because hard work can alleviate agency problems, pay heed to risks, and increase expected performance, leading investors to accept a lower rate of return. In contrast, risk-taking theory predicts a positive relationship between CEO industry tournament incentives and cost of equity because risk is a fundamental determinant of cost of equity and greater risk is expected to lead to a higher required rate of return by equity holders. Concurrent research provides empirical evidence of both effort-making and risk-taking effects incentivized by the industry tournament prize from CEOs' external labor market (for examples, see Coles et al., 2018; Kini & William, 2012; Kubick & Lockhart, 2016; Kubick et al., 2018). In addition, from the perspective of wealth maximization, there is a trade-off between motivating effort and encouraging risk-taking when reaching a targeted goal (Sprinkle et al., 2008). Given these countervailing arguments, which demonstrate that both effects exist but exert opposite influences on the association between CEO industry tournament incentives and cost of equity, determining the predominant effect ultimately remains an empirical question.

In line with Coles et al. (2018) and Kubick and Lockhart (2016), we measure CEO industry tournament incentives as the difference between the second-highest CEO's total compensation in the industry and the focal CEO's total compensation. For the measure of cost of equity capital, we first estimate the implied cost of equity from four accounting-based models (i.e., Claus & Thomas, 2001; Easton, 2004; Gebhardt et al., 2001; Ohlson & Juettner-Nauroth, 2005) and then, to ensure that our findings are not driven by the assumptions of a specific model, we follow prior literature (e.g., Boubakri et al., 2012; Cao et al., 2015; Chen et al., 2016; Dhaliwal et al., 2016; Dhaliwal et al., 2011; Hail & Leuz, 2006, 2009; Truong et al., 2021) and consolidate them by taking the average value of the four estimates as our main measure of cost of equity capital. Using a large sample of firms from 1992-2019, we find that higher CEO industry tournament incentives are negatively associated with the firm-level cost of equity. The findings are consistently robust across each of the four cost of equity models, as well as two

alternative measures of industry tournament incentives. To alleviate endogeneity concerns, we construct two instrumental variables, *Ind CEO Comp* and *Higher-Paid Ind CEOs* and employ two-stage regressions using the generalized method of moments (GMM) estimator (Brockman et al., 2010). Our instruments pass a series of validity tests and the regression results show that the link between CEO industry tournament incentives and cost of equity continues to be negative and statistically significant, even after accounting for the endogeneity of industry tournament incentives.

We augment our analysis with several cross-sectional tests examining the heterogeneity in the negative relation between industry tournament incentives and the cost of equity. First, the impact of CEO industry tournament incentives is conditional on the likelihood of CEOs' upward mobility (Kale et al., 2019) and should be weaker for CEOs with limited upward mobility, such as those who are older and those with fewer promotion opportunities. Second, as CEOs in firms with weak corporate governance are less motivated and prefer a "quiet life" (Bertrand & Mullainathan, 2003), the benefit of industry tournament incentives could be particularly strong for these firms. Third, we expect the benefit of industry tournament incentives to be stronger in cash-rich firms, as agency problems are more severe when firms have high free cash flow (Jensen, 1986). Fourth, the negative association between industry tournament incentives and cost of equity could be particularly valuable for firms in the early stages of their life cycle, as managerial effort/entrepreneurial actions are likely to be critical for success and agency costs are likely to be high earlier in the cycle (Bitler et al., 2005). We find that the negative association between CEO industry tournament incentives and cost of equity is moderated by CEOs' upward immobility but is more pronounced in weaker external monitoring settings, in firms that are more cash rich, and in firms that are in the early stages of the product life cycle. Overall, the cross-sectional tests provide further support for our main findings, which are consistent with effort-making theory. The results suggest that the effort-making effect dominates the risk-taking effect, leading to a lower cost of equity capital. The findings also indicate that firms

with CEOs incentivized by greater external labor market opportunities are more likely to achieve a net benefit in the form of a lower cost of equity capital, particularly when CEOs have more upward mobility and firms have weaker governance, higher cash holdings, and are in the early stages of their life cycle.

To corroborate our findings and provide further support for an effort-making theory, we employ path analysis to explore whether firm performance acts as a mediator in the relationship between CEO industry tournament incentives and cost of equity. According to effort-making theory, industry tournament incentives motivate CEOs to work hard and achieve visibility in the external labor market through improved firm performance, leading to a lower required rate of return among investors. We employ two measures of firm performance, namely, Tobin's q and return on assets (ROA), as mediator variables in our path analysis. We expect that external labor market incentives motivate a CEO to exert extra effort, consequently improving firm performance and reducing the cost of equity capital. As expected, we find that CEO industry tournament incentives have a significant and positive effect on both Tobin's q and ROA, which, in turn, has a significant negative effect on cost of equity. The results of our path analysis collectively suggest that there exists a reliable mediated link between CEO industry tournament incentives and cost of equity via firm performance.

Our study makes several contributions to the emerging literature on CEO tournament incentives in the external labor market. First, to the best of our knowledge, our study is the first to examine the effects of CEO external labor market incentives on cost of equity. Literature that has recently emerged examines the effects of CEO tournament incentives on corporate behavior and firm value. For example, Kubick & Lockhart (2016) find that external labor market incentives motivate CEOs to adopt more aggressive tax policies, and Coles et al. (2018) find that external labor market incentives are positively associated with firm performance, firm risk, and the riskiness of firm investment and financial policies. However, these studies tend to focus primarily on the risk-taking arguments and do not fully acknowledge the different effects of tournament incentives on effort and risk-

taking. Our study extends this emerging literature by investigating the impact of tournament incentives on the cost of equity capital, a fundamental determinant of firm financing and investment policies. We complement prior studies by showing that the reconciled effort and risk effects from industry tournament incentives have positive consequences for the cost of equity, demonstrating a net benefit of the existence of such incentives.

Second, our study contributes to the literature on the determinants of firms' cost of equity capital. A large number of studies analyze the impact of a firm's characteristics on its cost of equity capital, such as customer satisfaction (Truong et al., 2020), patented knowledge capital (Hegde & Mishra, 2023), customer concentration risk (Dhaliwal et al., 2016), annual report readability (Rjiba et al., 2021), and company reputation (Cao et al., 2015). With regard to the incentive aspect, there is a growing body of literature investigating the impact of incentives inherently embedded within a firm's existing governance mechanisms or compensation contracts, such as executive pay disparity (Chen et al., 2013), CEO inside debt (Shen & Zhang, 2020), and directors' and officers' liability insurance (Chen et al., 2016). In our study, the focus extends beyond these contractual frameworks to explore additional dimensions outside the contract nexus, which is how external labor market incentives influence the cost of equity. Our study is the first to delve into this field and provide evidence for a relationship between CEO tournament incentives and cost of equity.

Third, our findings evoke the importance to firms of CEOs as critical intangible assets (Bell et al., 2002; Matolcsy & Wyatt, 2008) and demonstrate how the external labor market can activate the value of CEOs by motivating them to work hard for a tournament prize. Our findings are consistent with the evidence provided by Gudell (2011), who finds that CEOs who performed better in their previous firms are rewarded with higher compensations at their next firms. This insight emphasizes the role of the external labor market in recognizing and rewarding managerial talent, thereby incentivizing CEOs to exert greater effort and improve firm performance.

Our evidence also provides important practical implications for alleviating principal-agent problems. The additional analysis of weak corporate governance monitoring, settings that are more cash rich, and the early stages of the product life cycle suggests that the external labor market can somehow serve as a substitute governance mechanism when internal governance is insufficient or agency problems are severe. Our results further underscore the role of competitive dynamics in the labor market in aligning CEO incentives with shareholder interests, which can provide useful guidance when the board designs a CEO's internal incentive package. By considering the incentives provided by the external labor market, firms can develop more effective compensation structures that optimize the balance between effort-making and risk-taking incentives.

2. Data and variables

2.1 Sample selection and data sources

We begin assembling our sample by downloading all CEO compensation data from the ExecuComp database[4] and accounting data from the Compustat North America database. We collect analyst earnings forecasts and stock prices, used to calculate the implied cost of equity capital, from the Institutional Brokers' Estimate System (I/B/E/S) and the Center for Research in Security Prices (CRSP). We excluded firms from the financial (SIC 6000-6999) and utility (SIC 4900-4999) industries. We further require there to be no missing data for the firm-level variables in our main regression model, reducing the sample to 18,164 firm-year observations from 1992 to 2019.

2.2 Measure of industry tournament incentives

[4] The ExecuComp database covers all public firms in the S&P 1500 index and firms that were previously included in the index. Representing 90% of the US stock market capitalization, the S&P 1500 index includes all stocks in the S&P 500, S&P MidCap 400, and S&P SmallCap 600 indexes.

In line with Coles et al. (2018), we define industry tournament incentives (*ITI*) as the natural logarithm of the difference between the compensation of the CEO under consideration and the compensation of the second-highest-paid CEO in the same industry, as defined using the Fama-French 48-industry classification scheme (FF48). Higher pay for the CEO position at other companies in the same industry provides incentives to CEOs at their own companies.

2.3 Measure of the cost of equity capital

We estimate a firm's cost of equity capital using the implied cost of equity. The implied cost of equity is the internal rate of return of a firm that equates the stock price of the firm to the present value of future cash flows to equity holders (Gebhardt et al., 2001). The literature points out that realized stock returns could be a deficient proxy for firms' cost of equity capital (Elton, 1999; Fama & French, 1997). When compared to realized returns, the implied cost of equity explicitly controls for the variation in expected cash flows by design (e.g., Gebhardt et al., 2001; Hail & Leuz, 2006) and is a superior measure of expected returns (e.g., Elton, 1999; Pástor et al., 2008).

In our study, we deduce four individual estimates of the implied cost of equity measures, from models in Gebhardt et al. (2001) (*COE_GLS*), Claus and Thomas (2001) (*COE_CT*), Ohlson and Juettner-Nauroth (2005) (*COE_OJ*), and Easton (2004) (*COE_MPEG*). To ensure that our findings are not driven by the assumptions of a specific model, we follow some of the earlier literature (e.g., Boubakri et al., 2012; Cao et al., 2015; Chen et al., 2016; Dhaliwal et al., 2016; Dhaliwal et al., 2011; Hail & Leuz, 2006, 2009; Truong et al., 2021) and conduct our analyses using the average of the four individual implied cost of equity estimates (*COE*).

2.4 Control variables

Following the literature on the implied cost of equity capital, we include a comprehensive set of control variables that might affect a firm's implied cost of equity (e.g., Chen et al., 2016; Dhaliwal et al., 2016; Goh et al., 2016).

In particular, to capture the factors that influence firm risk, we control for a firm's market beta (*Beta*), size (*Size*), book-to-market ratio (*BM*), stock return volatility (*IVOL*), and leverage (*Leverage*). We control for analyst forecast bias (*Forecast Bias*) and analyst forecast dispersion (*Forecast Dispersion*), since Mohanram and Gode (2013) show that a firm's information environment affects the cost of equity capital. Finally, we include price momentum (*MMT*), and long-term growth rates (*FLTG*), both of which may shift investors' required returns. To ensure our results are not driven by other CEO characteristics, we further control for the sensitivities of a CEO's wealth to changes in stock prices (*CEO Delta*), the sensitivities of a CEO's wealth to changes in stock volatility (*CEO Vega*), and the age (*CEO Age*), gender (*Female CEO*), and tenure (*CEO Tenure*) of a CEO. More detailed definitions of the variables are available in Appendix 1.

3. Main empirical results

3.1 Descriptive statistics

In Table 1, we present descriptive statistics for all the variables used in our main empirical analyses. The sample period for our main regression model is 1992-2019. To mitigate the effect of outliers, all continuous variables are winsorized at the 1% and 99% levels. The mean value (standard deviation) of *COE* is 6.219 (6.260). The summary statistics for *COE* closely resemble those reported in prior research (e.g., Chen et al., 2016; Shen & Zhang, 2020). The mean for *ITI* is 9.378. Its standard deviation, 25th percentile, and 75th percentile are 0.993, 8.833, and 9.964, respectively, suggesting that industry tournament incentives span a very wide range for our sample firms.

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3.2 Primary regression analysis

We examine the link between industry tournament incentives and cost of equity in a multivariate framework by estimating the following panel regression:

$$Cost\ of\ Equity(COE)_{j,t} = \beta_0 + \beta_1 Industry\ Tournament\ Incentives\ (ITI)_{j,t} + \Gamma' X_{j,T} + \mu_{j,t} + \varepsilon_{j,t} \quad (1)$$

where the dependent variable, cost of equity (*COE*), is the average of four implied cost of equity estimations (*COE_GLS*, *COE_CT*, *COE_OJ*, and *COE_MPEG*) in excess of the risk-free rate as a percentage. Our independent variable of interest is industry tournament incentives (*ITI*). *X* is a vector of the control variables described in Section 2.4. We include year times industry ($\mu_{j,t}$) fixed effects in the regressions to control for unobserved heterogeneity across industries each year. We rely on the standard errors with firm clustering, which are heteroskedasticity-consistent and account for the potential correlation of error terms within each firm.

Table 2 provides the estimation results of the regression in Equation (1). In column (1), we regress *COE* on *ITI* after controlling for a set of firm-level characteristics and year times industry fixed effects. The estimated coefficient for *ITI* is significantly negative at less than the 1% significance level (*t*-statistic = -2.89). Not only is it statistically significant, but a one standard deviation increase in the *ITI* is also associated with a decrease in *COE* by around 45 basis points each year, indicating the economic significance of the impact. The estimated coefficients on the control variables are generally comparable with those in earlier studies (e.g., Chen et al., 2016; Dhaliwal et al., 2016; Rjiba et al., 2021; Shen & Zhang, 2020). We find that firms with higher leverage, more stock return volatility, wider analyst forecast dispersion, and greater analyst forecast bias incur a higher cost of equity capital. Recent studies suggest that some managerial traits are related to the cost of equity capital (e.g., Chen et al., 2015; Kannan-Narasimhan et al., 2023; Shen & Zhang, 2020). Chen et al. (2015) find an inverse relationship between executives' delta and firms' cost of equity capital, whereas a positive association emerges between executives' vega and cost of equity. In a similar spirit, Kannan-Narasimhan et al. (2023) find that powerful founder CEOs are likely to raise the firm's cost of capital. In column (2), we estimate the full regression of Equation (1) by further controlling for a set of CEO-characteristic-related control variables. The estimated coefficient for *ITI* remains significant at less than the 1% level (*t*-statistic = -3.19). The results indicate that industry tournament incentives are negatively associated with the firm-level cost of equity capital. These findings are consistent with effort-making theory in that higher industry tournament incentives can motivate CEOs to exert greater effort, thereby boosting firms' performance and reducing firms' cost of equity capital.

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3.3 Alternative measures of industry tournament incentives

We primarily measure industry tournament incentives with industry being defined on the basis of the FF48. Next, we assessed the robustness of our primary findings by examining two alternative measures of industry tournament incentives, based on the Fama-French 30-industry classification scheme (FF30) and the Fama-French 12-industry classification scheme (FF12), respectively. We re-estimate our primary regression model by replacing *ITI* with these two alternative measures. We report the estimation results in Panel A of Table 3. Corroborating our main evidence, the coefficients on the two alternative measures of industry tournament incentives are negative and highly significant in columns (1)-(4), implying that our results still hold after using narrower industry classifications than the FF48.

3.4 Alternative measures of the cost of equity

In our primary regression analysis presented in 3.2, the dependent variable (*COE*) is the average value of four alternative implied cost of equity estimates (i.e., *COE_GLS*, *COE_CT*, *COE_MPEG*, and *COE_OJ*). To further test the robustness of our findings, we evaluate whether our baseline result is robust to using the individual cost of equity estimates. We re-estimate Equation (1) using these four alternative measures of cost of equity capital and report the results in Panel B of Table 3. The sign of *ITI* is unchanged across all four cost of equity capital specifications, and the *t*-statistics continue to demonstrate statistical significance.

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3.5 Endogeneity threats

Our evidence thus far implies that industry tournament incentives are negatively associated with the cost of equity capital. However, this analysis is vulnerable to potential endogeneity between industry tournament incentives and cost of equity capital for several reasons. First, although we control for observable firm characteristics in our main regressions, there might exist unobservable heterogeneity when omitted unobservable variables affect both the industry tournament incentives and the cost of equity capital. For example, it is also possible that the differences in CEO pay and the cost of equity in different firms might be endogenously determined by firm culture or some soft CEO characteristics that we are not able to capture from the observable factors we included in the regressions. In addition, given that firms do not usually dramatically alter their compensation policies, industry tournament

incentives tend to be autocorrelated across years. Therefore, our results could spuriously reflect potential endogeneity biases. Accordingly, in this section, we present the results of a two-stage regression using the GMM estimator (Brockman et al., 2010)[5] to alleviate endogeneity concerns. Similar to Coles et al. (2018), Huang et al. (2019), and Lonare et al. (2022), we employ two instruments for industry tournament incentives: the sum of total compensation received by all other CEOs in the same industry, excluding the highest-paid CEO for a given year (*Ind CEO Comp*), and the natural logarithm of the total number of CEOs with higher total compensation within the same industry for a given year (*Higher-Paid Ind CEOs*). The first-stage results, reported in column (1) of Table 4, show that our instruments are both statistically significant, as expected. Further diagnostic tests, including the *F*-test for the joint significance of the instruments and the Hansen test for overidentification, confirm the validity of these instruments. In comparing the *F*-statistics to the critical values in Stock and Yogo (2005) for the weak instrument test, we reject the null hypothesis that our instruments are weak. In column (2), we report the results of the second-stage regression estimating Equation (1) after replacing the independent variables of interest with their fitted values from the first-stage regressions. The coefficient estimates on instrumented *ITI* remain negative and statistically significant. In columns (3) and (4), we further control for a set of CEO-characteristic-related control variables and obtain similar findings, showing that the relationship between industry tournament incentives and the cost of equity capital remains negative and statistically significant after controlling for the endogeneity of industry tournament incentives.

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4. Additional tests

[5] The two-stage GMM estimator we use provides efficient coefficient estimates in the presence of heteroskedasticity and autocorrelation. It is more efficient than the traditional two-stage instrumental variable (IV) estimator or the two-stage least squares (2SLS) estimator when the error terms are not independently and identically distributed.

4.1 The role of CEO upward mobility

Innate to tournament incentives, the different levels of upward mobility that a CEO faces should have an impact on the association between *TII* and *COE*. Specifically, we should observe a weaker association when CEOs have a low level of upward mobility and a stronger association when the level is high. We explore the two settings in this section. As older CEOs, especially those close to retirement, have a lower likelihood of immediate promotion to another firm (see also Coles et al., 2018; Huang et al., 2022), these CEOs have decreased upward mobility. The upward mobility of CEOs is also associated with outside promotion opportunities. The promotion opportunities of CEOs increase with the number of higher paid CEO positions (i.e., the number of CEOs with higher total compensation) within the same industry. Therefore, the upward mobility of CEOs is higher if there are more CEOs with higher total compensation in the same industry. If industry tournament incentives are indeed effective at altering a firm's cost of equity capital by motivating the incumbent CEO to exert more effort and dedication, we would anticipate the impact to be less pronounced for CEOs who are less responsive to industry tournament incentives due to their immobility. In Table 5, we revise our baseline model by including an *Older CEO Dummy* (*High Higher-Paid Ind CEOs*) and its interaction term with *ITI*. The *Older CEO Dummy* is a binary variable that equals one if a CEO's age is greater than or equal to the sample median, and zero otherwise. Similarly, *High Higher-Paid Ind CEOs* is a binary variable that equals one if the total number of CEOs with higher total compensation within the same industry is greater than or equal to the sample median, and zero otherwise. Consistent with our expectations, in Table 5, we find that the impact of industry tournament incentives is weaker for older CEOs and CEOs with fewer outside promotion opportunities. Our findings suggest that the impact of CEO industry tournament incentives on the cost of equity capital is less pronounced for CEOs who are less responsive to such incentives due to their upward immobility.

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4.2 Corporate governance

Given that firms with weaker corporate governance systems are less motivating for their CEO to work hard and leads them to a preference for a "quiet life" (Bertrand & Mullainathan, 2003), the benefit of industry tournament incentives as an incentive scheme independent of the firm's governance mechanisms could be particular stronger for these firms. In this subsection, we employ two proxies for the strength of governance mechanisms of a firm, namely, the sales-based Herfindahl-Hirschman Index (HHI) and a hostile takeover index (Cain et al., 2017). We can thus test how the impact of industry tournament incentives on the cost of equity capital varies with the external corporate governance of firms. In Table 6, we augment our baseline model in Equation (1) by adding a *Low Competition Dummy* and its interaction term with *ITI* in column (1), and a *Low Hostile-Takeover Index Dummy* and its interaction term with *ITI* in column (2). The *Low Competition Dummy* equals one if the sales-based HHI of a firm is higher than or equal to the sample median, and zero otherwise. The *Low Hostile-Takeover Index Dummy* equals one if the hostile takeover index of a firm is higher than or equal to the sample median, and zero otherwise. Consistent with our expectations, the coefficients on *ITI*Low Competition Dummy* and *ITI*Low Hostile-Takeover Index Dummy* are all negative and statistically significant, suggesting that the negative impact of industry tournament incentives on the cost of equity capital is particularly strong for firms with weaker corporate governance mechanisms.

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4.3 The role of cash holdings

In this subsection, we examine how the impact of industry tournament incentives on a firm's cost of equity varies with the cash holdings of the firm. Huang et al. (2019) find that industry tournament incentives have the potential to alleviate agency conflicts and provide CEOs with strong incentives to exploit the product-market benefits of cash holdings. Industry tournament incentives increase the value of cash by incentivizing CEOs to deploy cash strategically. Consequently, we expect the benefit for the cost of equity from industry tournament incentives to be particularly strong in cash-rich firms. We use two indicators to measure the extent of cash holdings, namely, a *High Cash-Holdings Dummy* and a *High Industry-Adjusted-Cash-Holdings Dummy*. The *High Cash-Holdings*

Dummy is an indicator variable that takes on the value of one if a firm's cash holdings ratio is greater than or equal to the sample median. Similarly, the *High Industry-Adjusted-Cash-Holdings Dummy* is an indicator variable that equals one if a firm's industry-adjusted cash holdings ratio is higher than or equal to the sample median. The industry-adjusted cash holdings ratio of a firm is calculated by subtracting the industry-average ratio for the corresponding industry in a given year from its own cash holdings ratio.

In Table 7, we revise our baseline model in Equation (1) by including the *High Cash-Holdings Dummy* (*High Industry-Adjusted-Cash-Holdings Dummy*) and its interaction term with *ITI*. As expected, in column (1) the coefficient on *High Cash-Holdings Dummy*ITI* is negative and significant. The results suggest that the negative impact of industry tournament incentives on the cost of equity is stronger among firms with high cash holdings. In column (2), we obtain similar results when we measure a firm's cash holdings using the *High Industry-Adjusted-Cash-Holdings Dummy*.

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4.4 The role of the product life cycle

A firm's prime input required and incentives to invest vary with its product life cycle (Abernathy & Utterback, 1978; Hoberg & Maksimovic, 2022). In this subsection, we explore how the impact of industry tournament incentives varies with the life cycle stages of a firm. We argue that industry tournament incentives, which encourage the adoption of value-enhancing corporate policies (Coles et al., 2018), could be particularly valuable for firms in the early stages, as research and development and capital expenditure sensitivity are high early in the cycle (Hoberg & Maksimovic, 2022). However, in the mature and declining phases, firms are more established with fewer growth opportunities, and the benefits from industry tournament incentives become less obvious.

Hoberg and Maksimovic (2022) propose a novel 10-K text-based model of product life cycles. They construct a four-stage product life cycle in accordance with Abernathy and Utterback's seminal work (1978). These stages

are identified as follows: product innovation as Life-Cycle 1, process innovation as Life-Cycle 2, maturity as Life-Cycle 3, and decline as Life-Cycle 4. In Table 8, we augment our baseline model in Equation (1) by incorporating interaction terms between industry tournament incentives and the four distinct product life cycle stages. The results demonstrate that tournament incentives exhibit a heightened impact on the cost of equity capital during the early phases of the product life cycle but not in the late phase, corroborating our hypothesis.

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5. Path analysis

CEOs are driven by industry tournament incentives to exert effort and adopt decisions at the firm level that enhance their visibility in the labor market (Coles et al., 2018; Huang et al., 2019; Kubick & Lockhart, 2016). The literature suggests that CEOs may achieve visibility in the external labor market through improved firm performance (Coles et al., 2018; Huang et al., 2019). In this section, we employ path analysis to establish whether firm performance is a mechanism underlying the relation between industry tournament incentives and the cost of equity capital. Specifically, we investigate whether enhanced firm performance, the mediator variable driven by industry tournament incentives, leads to a decrease in the cost of equity capital. Higher industry tournament incentives enhance the effort and expected performance of incumbent CEOs. We expect that, if our hypothesis that an external industry pay gap motivates CEOs to exert extra effort stands, we should observe enhanced firm performance when industry tournament incentives are high. Improved firm performance indicates more efficient effort from managers and higher expected future cash flows, in turn leading to a decrease in the required return by equity investors. To perform the path analysis, we estimate a structural equation model (SEM) to decompose the relation between industry tournament incentives and the cost of equity capital into a direct path and an indirect (mediated) path mediated by firm performance. The SEM estimation comprises two regressions: one that regresses cost of equity capital on industry tournament incentives and the mediating variable (i.e., firm performance) and

the other regressing firm performance on industry tournament incentives, with both regressions controlling for the list of variables included as control variables in Equation (1). The indirect effect of industry tournament incentives on the cost of capital is estimated as the product of the effect of industry tournament incentives on the mediating variable and the effect of the mediating variable on the cost of equity capital. We adopt Sobel (1982) test statistics to determine the statistical significance of the direct and indirect effects. We adopt two alternative mediator variables as proxies for a firm's performance. First, we employ *Tobin's q* as a proxy for firm performance. Similar to Gompers et al. (2003), we calculate *Tobin's q* as total assets minus the book value of equity plus the market value of equity, scaled by total assets. Panel A of Table 9 shows that industry tournament incentives have a negative and statistically significant direct effect on the cost of equity capital, consistent with our main finding. In the mediated path analyses, we find that industry tournament incentives have a positive and statistically significant relation with *Tobin's q*, and *Tobin's q* has a significantly negative effect on the cost of equity capital. More importantly, we find that the total indirect effect of industry tournament incentives on the cost of equity capital, through *Tobin's q* as a mediating variable, is statistically significant for the cost of equity capital.

We use *ROA* as our second mediator variable. Following Barber and Lyon (1996), we calculate *ROA* as net income divided by the book value of total assets. Panel B of Table 9 presents the results of our path analysis using *ROA* as a mediating variable. In the SEM, industry tournament incentives have a negative and statistically significant direct effect on the cost of equity capital. The results of the mediated path analyses indicate that industry tournament incentives have a positive and statistically significant effect on *ROA*, and *ROA* has a negative effect on the cost of equity capital. The total indirect effect of the industry tournament incentives on the cost of equity capital, through *ROA* as a mediating variable, is statistically significant for the cost of equity capital.

Taken together, the results presented in Table 9 collectively suggest that there exists a reliable mediated link via firm performance between industry tournament incentives and the cost of equity capital.

-------Insert Table 9 ------

6. Conclusion

In conclusion, our study represents a pioneering effort to explore the influence of CEO labor market incentives, industry tournament incentives specifically, on the cost of equity capital. Through extensive research and robust analytical methods, we have demonstrated that higher CEO industry tournament incentives are associated with a lower cost of equity in firms. This negative association persists even after addressing potential endogeneity concerns using instrumental variables and the GMM estimator.

Being motivated by external labor market opportunities can result in greater effort or higher risk. Our findings suggest that effort-making outweighs the risk-taking effect, leading to a reduction in the cost of equity. This is further evidenced by our path analysis showing firm performance as a mediating factor in this relationship. The study also delves into various moderating factors, such as CEOs' upward immobility, strength of corporate governance, cash richness, and the stage in the product life cycle, enhancing our understanding of the conditions under which this relationship is more pronounced.

We contribute to the existing body of literature in three key areas. First, this study extends the understanding of CEO tournament incentives from their effects on corporate behavior and firm value to a fundamental determinant of firm policies: the cost of equity. Second, it adds a new dimension to the determinants of the cost of equity, traditionally focused on CEO incentives from within compensation designs or mechanisms inherent in the governance system. Finally, our study bridges the gap in the literature between the areas of corporate finance, executive compensation, and market perception, providing insights into how internal corporate strategies and market competition influence a firm's financial health and investment appeal.

Our work not only fills a critical gap in the existing research, but also offers practical implications for corporate governance and financial strategy, emphasizing the role of competitive dynamics in the labor market in aligning CEO incentives with shareholder interests. This understanding can provide useful guidance when the board designs CEO internal incentive packages.

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Table 1. Summary Statistics

This table reports the number of observations, mean, standard deviation, 25th percentile, 50th percentile, and 75th percentile of the variables used in our baseline sample. Definitions of the variables are given in Appendix 1.

Variable	N	Mean	Sd.	P25	P50	P75
COE	18164	6.219	6.260	3.180	5.413	7.822
ITI	18164	9.378	0.993	8.833	9.452	9.964
Beta	18164	1.165	0.618	0.744	1.085	1.483
IVOL	18164	9.883	4.339	6.747	9.011	11.927
MMT	18164	15.509	39.013	-9.440	11.280	33.969
BM	18164	0.435	0.277	0.239	0.374	0.563
Size	18164	7.733	1.499	6.620	7.582	8.710
Leverage	18164	0.215	0.165	0.066	0.208	0.327
FLTG	18164	14.980	7.107	10.535	13.900	18.000
Forecast Dispersion	18164	0.071	0.144	0.014	0.028	0.063
Forecast Bias	18164	0.522	2.551	-0.238	-0.007	0.457
CEO Delta	18164	5.542	1.386	4.622	5.509	6.444
CEO Vega	18164	3.684	1.838	2.755	3.988	4.995
CEO Age	18164	55.551	7.019	51.000	56.000	60.000
Female CEO	18164	0.026	0.160	0.000	0.000	0.000
CEO Tenure	18164	7.352	6.934	2.000	5.000	10.000

Table 2. Industry Tournament Incentives and the Cost of Equity

This table presents the regression results of the relation between CEO industry tournament incentives (*ITI*) and the cost of equity. The dependent variable is the value of the cost of equity averaged across four different measures (*COE*).Definitions of the variables are given in Appendix 1. The standard errors are clustered at the firm level; ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)
ITI	-0.436***	-0.472***
	(-2.89)	(-3.19)
Beta	0.522***	0.549***
	(3.50)	(3.69)
IVOL	0.112***	0.113***
	(4.35)	(4.29)
MMT	-0.017***	-0.017***
	(-13.28)	(-13.52)
BM	3.059***	2.932***
	(8.15)	(7.59)
Size	-0.114	-0.057
	(-1.56)	(-0.66)
Leverage	4.433***	4.415***
	(7.58)	(7.30)
FLTG	0.010	0.018
	(0.90)	(1.61)
Forecast Dispersion	2.044***	1.977***
	(3.36)	(3.25)
Forecast Bias	0.873***	0.868***
	(12.85)	(12.81)
CEO Delta		-0.109
		(-1.23)
CEO Vega		-0.057
		(-1.04)
CEO Age		0.036***
		(3.21)
Female CEO		1.455
		(1.60)
CEO Tenure		-0.033***
		(-2.74)
Industry-Year Fixed Effects	Yes	Yes
R^2	0.378	0.382
Observations	18,164	18,164

Table 3. Robustness Analyses

This table examines the robustness of the results reported in Table 2 to the alternative measures of industry tournament incentives (*ITI*) and the cost of equity. In Panel A, the dependent variable is *COE*. Industry tournament incentives (ITIs) are calculated based on the Fama-French 30-industry classification scheme in column (1) and column (2), and the Fama-French 12-industry classification scheme in column (3) and column (4). In Panel B, the dependent variable is the cost of equity calculated based on Gebhardt et al. (2001) (*COE_GLS*), Claus and Thomas (2001) (*COE_CT*), Easton (2004) (*COE_MPEG*), and Ohlson and Juettner-Nauroth (2005) (*COE_OJ*), respectively from column (1) to column (4). Definitions of the variables are given in Appendix 1. The standard errors are clustered at the firm level; ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Panel A. Alternative Measures of Industry Tournament Incentives

	ITIs Based on FF30 Industry Classification		ITIs Based on FF12 Industry Classification	
	(1)	(2)	(3)	(4)
ITI	-0.550**	-0.582**	-0.699***	-0.706***
	(-2.40)	(-2.56)	(-2.77)	(-2.84)
Beta	0.526***	0.553***	0.533***	0.560***
	(3.53)	(3.72)	(3.58)	(3.76)
IVOL	0.114***	0.115***	0.117***	0.118***
	(4.44)	(4.38)	(4.53)	(4.48)
MMT	-0.017***	-0.017***	-0.017***	-0.017***
	(-13.27)	(-13.50)	(-13.25)	(-13.47)
BM	3.055***	2.931***	3.058***	2.938***
	(8.12)	(7.56)	(8.06)	(7.53)
Size	-0.112	-0.052	-0.089	-0.031
	(-1.45)	(-0.58)	(-1.17)	(-0.34)
Leverage	4.422***	4.408***	4.417***	4.401***
	(7.56)	(7.28)	(7.54)	(7.26)
FLTG	0.011	0.018*	0.011	0.018*
	(0.95)	(1.66)	(0.97)	(1.67)
Forecast Dispersion	2.035***	1.967***	2.068***	2.000***
	(3.34)	(3.24)	(3.40)	(3.30)
Forecast Bias	0.873***	0.868***	0.872***	0.868***
	(12.85)	(12.81)	(12.87)	(12.83)
CEO Delta		-0.109		-0.105
		(-1.23)		(-1.18)
CEO Vega		-0.058		-0.052
		(-1.07)		(-0.97)
CEO Age		0.035***		0.035***
		(3.17)		(3.17)
Female CEO		1.456		1.457
		(1.59)		(1.58)
CEO Tenure		-0.033***		-0.033***
		(-2.70)		(-2.74)
Industry-Year Fixed Effects	Yes	Yes	Yes	Yes
R^2	0.378	0.382	0.378	0.382
Observations	18,159	18,159	18,156	18,156

Panel B. Alternative Measures of the Cost of Equity

	(1) COE_GLS	(2) COE_CT	(3) COE_MPEG	(4) COE_OJ
ITI	-0.223**	-0.613***	-0.455***	-0.503***
	(-2.38)	(-3.75)	(-2.77)	(-3.58)
Beta	0.313***	0.555***	0.745***	0.485***
	(3.45)	(3.04)	(4.47)	(3.45)
IVOL	0.114***	0.154***	0.127***	0.073***
	(6.79)	(4.75)	(4.26)	(2.91)
MMT	-0.014***	-0.016***	-0.020***	-0.018***
	(-17.06)	(-10.71)	(-13.02)	(-15.00)
BM	5.772***	1.679***	2.366***	2.015***
	(23.36)	(3.65)	(5.49)	(5.84)
Size	-0.107*	-0.049	-0.053	0.034
	(-1.92)	(-0.48)	(-0.56)	(0.41)
Leverage	2.371***	5.517***	4.910***	4.308***
	(6.19)	(7.50)	(7.32)	(8.03)
FLTG	0.003	0.032**	-0.022*	0.063***
	(0.36)	(2.30)	(-1.83)	(6.00)
Forecast Dispersion	-1.547***	-2.790***	9.408***	3.290***
	(-4.79)	(-3.86)	(12.37)	(5.53)
Forecast Bias	0.467***	1.021***	0.949***	0.761***
	(12.29)	(11.72)	(13.17)	(13.48)
CEO Delta	-0.014	-0.114	-0.194**	-0.177**
	(-0.25)	(-1.11)	(-2.01)	(-2.11)
CEO Vega	-0.083**	-0.069	-0.021	-0.013
	(-2.46)	(-1.08)	(-0.35)	(-0.25)
CEO Age	0.025***	0.042***	0.034***	0.034***
	(3.55)	(3.06)	(2.79)	(3.25)
Female CEO	0.870	1.436	1.703*	1.460*
	(1.48)	(1.47)	(1.70)	(1.72)
CEO Tenure	-0.019**	-0.033**	-0.036***	-0.032***
	(-2.45)	(-2.34)	(-2.61)	(-2.71)
Industry-Year Fixed Effects	Yes	Yes	Yes	Yes
R^2 ~~sq~~	0.515	0.303	0.408	0.359
Observations	18,164	18,164	18,164	18,164

Table 4. Instrumental Variables Approach

This table presents the results of two-stage GMM instrumental variable regressions. The dependent variable is the average value of the cost of equity (*COE*); *Ind CEO Comp* and *Higher-Paid Ind CEOs* are the instrumental variables for the industry tournament incentives (*ITI*). Columns (1) and (3) present the first-stage regression results, and columns (2) and (4) show the second-stage regression results. Definitions of the variables are given in Appendix 1. The standard errors are clustered at the firm level; ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	(1) 1st Stage ITI	(2) 2nd Stage COE	(3) 1st Stage ITI	(4) 2nd Stage COE
ITI		-0.743***		-0.822***
		(-3.12)		(-3.50)
Ind CEO Comp	-0.215**		-0.219**	
	(-2.54)		(-2.57)	
Higher-Paid Ind CEOs	0.440***		0.443***	
	(47.07)		(45.70)	
Beta	0.014**	0.536***	0.013**	0.564***
	(2.31)	(3.63)	(2.23)	(3.82)
IVOL	-0.002**	0.109***	-0.002**	0.109***
	(-2.19)	(4.26)	(-1.97)	(4.17)
MMT	-0.000	-0.017***	-0.000	-0.017***
	(-0.19)	(-13.29)	(-0.10)	(-13.57)
BM	-0.012	3.039***	-0.017	2.912***
	(-0.92)	(8.15)	(-1.25)	(7.57)
Size	-0.009**	-0.169**	-0.009**	-0.117
	(-2.37)	(-2.32)	(-2.19)	(-1.38)
Leverage	-0.001	4.381***	-0.009	4.361***
	(-0.04)	(7.47)	(-0.42)	(7.21)
FLTG	-0.001	0.010	-0.000	0.018
	(-1.19)	(0.92)	(-0.85)	(1.62)
Forecast Dispersion	0.006	2.074***	0.005	2.015***
	(0.37)	(3.40)	(0.29)	(3.32)
Forecast Bias	-0.000	0.871***	-0.000	0.866***
	(-0.09)	(12.82)	(-0.15)	(12.78)
CEO Delta			-0.004	-0.103
			(-1.37)	(-1.17)
CEO Vega			0.005**	-0.069
			(2.13)	(-1.27)
CEO Age			-0.000	0.035***
			(-0.02)	(3.17)
Female CEO			-0.022	1.439
			(-0.90)	(1.58)
CEO Tenure			-0.001**	-0.033***
			(-1.97)	(-2.73)
Industry-Year Fixed Effects	Yes	Yes	Yes	Yes
R^2		0.256		0.260
Observations	18,164	18,164	18,164	18,164
Endogeneity, relevance, and overidentification				
Hansen J-test	1.177		1.343	
First-stage F-statistics	1160.203		1089.052	

Table 5. The Effect of CEO Upward Mobility on the Association between CEO Industry Tournament Incentives and the Cost of Equity

This table presents how the association between CEO industry tournament incentives and the cost of equity varies with the mobility of a CEO. The dependent variable is the average value of the cost of equity (*COE*). Definitions of all variables are given in Appendix 1. The standard errors are clustered at the firm level; ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)
ITI*	0.257**	
Older CEO Dummy	(2.06)	
ITI*		-0.372*
High Higher-Paid Ind CEOs		(-1.85)
Older CEO Dummy	-2.205*	
	(-1.90)	
High Higher-Paid Ind CEOs		3.358*
		(1.73)
ITI	-0.627***	-0.435***
	(-3.86)	(-2.83)
Beta	0.549***	0.544***
	(3.70)	(3.68)
IVOL	0.110***	0.111***
	(4.19)	(4.23)
MMT	-0.017***	-0.017***
	(-13.48)	(-13.48)
BM	2.979***	2.893***
	(7.73)	(7.51)
Size	-0.044	-0.099
	(-0.51)	(-1.15)
Leverage	4.431***	4.408***
	(7.34)	(7.28)
FLTG	0.016	0.018
	(1.44)	(1.60)
Forecast Dispersion	1.978***	1.993***
	(3.26)	(3.29)
Forecast Bias	0.868***	0.868***
	(12.81)	(12.83)
CEO Delta	-0.116	-0.110
	(-1.31)	(-1.24)
CEO Vega	-0.059	-0.064
	(-1.09)	(-1.19)
CEO Age		0.036***
		(3.24)
Female CEO	1.431	1.442
	(1.57)	(1.58)
CEO Tenure	-0.022**	-0.033***
	(-2.02)	(-2.71)
Industry-Year Fixed Effects	Yes	Yes
R^2	0.381	0.382
Observations	18,164	18,164

Table 6. The Effect of Corporate Governance on the Association between CEO Industry Tournament Incentives and the Cost of Equity

This table presents how the association between CEO industry tournament incentives and the cost of equity varies with the corporate governance of a firm. The dependent variable is the average value of the cost of equity (*COE*). Definitions of all variables are given in Appendix 1. The standard errors are clustered at the firm level; ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)
ITI*	-0.388*	
Low Competition Dummy	(-1.67)	
ITI*		-0.351*
Low Hostile-Takeover Index Dummy		(-1.96)
Low Competition Dummy	3.719	
	(1.61)	
Low Hostile-Takeover Index Dummy		3.080*
		(1.88)
ITI	-0.246	-0.348*
	(-1.26)	(-1.83)
Beta	0.548***	0.529***
	(3.68)	(3.43)
IVOL	0.114***	0.097***
	(4.31)	(3.39)
MMT	-0.017***	-0.015***
	(-13.49)	(-10.77)
BM	2.941***	2.541***
	(7.61)	(5.86)
Size	-0.054	-0.130
	(-0.62)	(-1.21)
Leverage	4.393***	4.711***
	(7.30)	(6.32)
FLTG	0.018	0.005
	(1.62)	(0.40)
Forecast Dispersion	1.973***	1.927***
	(3.24)	(2.81)
Forecast Bias	0.868***	0.923***
	(12.81)	(12.24)
CEO Delta	-0.108	-0.052
	(-1.22)	(-0.50)
CEO Vega	-0.055	-0.085
	(-1.02)	(-1.11)
CEO Age	0.036***	0.031**
	(3.24)	(2.42)
Female CEO	1.432	1.939
	(1.58)	(1.64)
CEO Tenure	-0.033***	-0.039***
	(-2.74)	(-2.80)
Industry-Year Fixed Effects	Yes	Yes
R^2	0.382	0.376
Observations	18,164	14,478

Table 7. The Effect of Cash Holdings on the Association between CEO Industry Tournament Incentives and the Cost of Equity

This table presents how the association between CEO industry tournament incentives and the cost of equity varies with the cash holdings of a firm. The dependent variable is the average value of the cost of equity (*COE*). Definitions of all variables are given in Appendix 1. The standard errors are clustered at the firm level; ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)
ITI*	-0.258*	
High Cash-Holdings Dummy	(-1.81)	
ITI*		-0.244**
High Industry-Adjusted-Cash-Holdings Dummy		(-1.98)
High Cash-Holdings Dummy	2.677**	
	(2.03)	
High Industry-Adjusted-Cash-Holdings Dummy		2.327**
		(2.01)
ITI	-0.361**	-0.352**
	(-2.21)	(-2.30)
Beta	0.542***	0.554***
	(3.68)	(3.75)
IVOL	0.111***	0.114***
	(4.22)	(4.31)
MMT	-0.017***	-0.017***
	(-13.53)	(-13.52)
BM	2.980***	2.929***
	(7.61)	(7.44)
Size	-0.061	-0.055
	(-0.70)	(-0.63)
Leverage	4.614***	4.414***
	(7.78)	(7.44)
FLTG	0.018	0.018*
	(1.64)	(1.65)
Forecast Dispersion	1.951***	1.980***
	(3.20)	(3.24)
Forecast Bias	0.868***	0.868***
	(12.84)	(12.83)
CEO Delta	-0.105	-0.108
	(-1.19)	(-1.22)
CEO Vega	-0.056	-0.057
	(-1.03)	(-1.05)
CEO Age	0.036***	0.035***
	(3.22)	(3.18)
Female CEO	1.423	1.450
	(1.56)	(1.59)
CEO Tenure	-0.033***	-0.033***
	(-2.76)	(-2.72)
Industry-Year Fixed Effects	Yes	Yes
R^2	0.382	0.382
Observations	18,162	18,162

Table 8. The Effect of Product Life Cycles on the Association between CEO Industry Tournament Incentives and the Cost of Equity

This table presents how the association between CEO industry tournament incentives and the cost of equity varies with the product life cycles of a firm. The dependent variable is the average value of the cost of equity (*COE*). Definitions of all variables are given in Appendix 1. The standard errors are clustered at the firm level; ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)
ITI*Life-Cycle 1	-0.482***	-0.489***
	(-3.01)	(-3.14)
ITI*Life-Cycle 2	-0.418**	-0.454***
	(-2.48)	(-2.73)
ITI*Life-Cycle 3	-0.441***	-0.482***
	(-2.88)	(-3.19)
ITI*Life-Cycle 4	-0.185	-0.247
	(-0.93)	(-1.26)
Beta	0.506***	0.533***
	(3.15)	(3.31)
IVOL	0.095***	0.095***
	(3.71)	(3.61)
MMT	-0.018***	-0.018***
	(-13.84)	(-14.10)
BM	3.295***	3.163***
	(8.77)	(8.17)
Size	-0.100	-0.030
	(-1.33)	(-0.35)
Leverage	4.208***	4.218***
	(7.69)	(7.40)
FLTG	0.020*	0.027**
	(1.77)	(2.49)
Forecast Dispersion	2.346***	2.253***
	(3.50)	(3.38)
Forecast Bias	0.875***	0.871***
	(12.15)	(12.10)
CEO Delta		-0.135
		(-1.57)
CEO Vega		-0.055
		(-1.02)
CEO Age		0.041***
		(3.43)
Female CEO		1.517
		(1.60)
CEO Tenure		-0.032***
		(-2.60)
Industry-Year Fixed Effects	Yes	Yes
R^2	0.381	0.386
Observations	15,506	15,506

Table 9. Path Analysis

This table reports the results of path analyses that examine the relation between CEO industry tournament incentives and the cost of equity through firm performance. We estimate a generalized structural equation model (GSEM) of the direct effect of CEO industry tournament incentives on the cost of equity, as well as the indirect effect through firm performance. Firm performance is measured using Tobin's q in Panel A and ROA in Panel B. The significance of the indirect effect is estimated using Sobel (1982) test statistics. Definitions of all variables are given in Appendix 1. The standard errors are clustered at the firm level; ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Panel A. Mediated Path for Tobin's Q

	Coefficient	z-statistics
Direct Path		
P(COE, ITI)	-0.391	-2.71***
Mediated Path for Tobin's q		
P(COE: Tobin's q)	-0.813	-12.62***
P(Tobin: ITI)	0.256	9.90***
P(COE: Tobin's q)*P(Tobin's q: ITI)	-0.209	-7.85***
Controls		Yes
Observations		18,273

Panel B. Mediated Path for ROA

	Coefficient	z-statistics
Direct Path		
P(COE, ITI)	-0.459	-3.25***
Mediated Path for ROA		
P(COE: ROA)	-3.495	-3.25***
P(ROA: ITI)	0.004	3.08***
P(COE: ROA)*P(ROA: ITI)	-0.013	-2.19**
Controls		Yes
Observations		18,273

Appendix 1. Definitions of the Variables

Variable	Definition	Data Source
COE	The average implied cost of equity capital in excess of the risk-free rate as a percentage. COE = (Cost of Equity GLS + Cost of Equity CT + Cost of Equity MPEG + Cost of Equity OJ) divided by 4. The risk-free rate is measured by the yield of a 10-year US Treasury bond.	Institutional Brokers' Estimate System (I/B/E/S), Center for Research in Security Prices (CRSP), Compustat, and Federal Reserve Economic Data (FRED)
COE_GLS	The implied cost of equity capital in excess of the risk-free rate as a percentage, calculated following Gebhardt et al. (2001), at the end of June of each year. The risk-free rate is measured by the yield of a 10-year US Treasury bond.	I/B/E/S, CRSP, Compustat, and FRED
COE_CT	The implied cost of equity capital in excess of the risk-free rate as a percentage, calculated following Gebhardt et al. (2001), at the end of June of each year. The risk-free rate is measured by the yield of a 10-year US Treasury bond.	I/B/E/S, CRSP, Compustat, and FRED
COE_MPEG	The implied cost of equity capital in excess of the risk-free rate as a percentage, calculated using the modified price-earnings growth ratio model in Easton (2004), at the end of June of each year. The risk-free rate is measured by the yield of a 10-year US Treasury bond.	I/B/E/S, CRSP, Compustat, and FRED
COE_OJ	The implied cost of equity capital in excess of the risk-free rate as a percentage, calculated following Ohlson and Juettner-Nauroth (2005) and Gode and Mohanram (2003), at the end of June of each year. The risk-free rate is measured by the yield of a 10-year US Treasury bond.	I/B/E/S, CRSP, Compustat, and FRED
ITI	The difference between the second-highest chief executive officer's (CEO) total compensation in the industry and a particular CEO's total compensation. Unless otherwise specified, industries are defined based on the Fama-French 48-industry classification scheme.	ExecuComp
Beta	This is estimated for each firm-year observation at the end of June by regressing monthly stock returns on the value-weighted market returns. Monthly returns in the 60 months before the month in which we compute the cost of equity are used in the regression (with a minimum of 24 return observations).	CRSP
IVOL	The standard deviation of the residuals from regressing monthly stock returns as a percentage on the value-weighted market returns as a percentage. Monthly returns in the 60 months before the month in which we compute the cost of equity are used in the regression (with a minimum of 24 return observations).	CRSP
MMT	Momentum measured by the stock return over the 12 months before the month in which we compute the cost of equity.	CRSP
BM	The ratio of the book value of equity to the market value of equity measured at the fiscal year end.	Compustat
Size	The logarithm of a firm's market value of equity measured at the fiscal year end.	Compustat
Leverage	The sum of long-term debt and debt in current liabilities scaled by the value of total assets measured at the fiscal year end.	Compustat
FLTG	The long-term earnings growth rate forecast as a percentage.	I/B/E/S

Forecast Dispersion	The standard deviation of the one-year-ahead earning per share (EPS) analyst forecasts divided by the average one-year-ahead EPS forecast.	I/B/E/S
Forecast Bias	The difference between the one-year-ahead forecast EPS and actual EPS, scaled by share price. When the actual EPS is missing from I/B/E/S, the actual EPS from Compustat is used.	I/B/E/S and Compustat
CEO Delta	The logarithm of a CEO's total portfolio delta, computed as the CEO's dollar increase in wealth for a 1% increase in stock price.	ExecuComp
CEO Vega	The logarithm of a CEO's total portfolio vega, computed as the CEO's increase in option wealth for a 0.01-standard deviation increase in stock volatility.	ExecuComp
CEO Age	The CEO's age in the sample year.	ExecuComp
Female CEO	Dummy variable, set to one for a female CEO, and zero otherwise.	ExecuComp
CEO Tenure	The number of years as the firm's CEO.	ExecuComp
Ind CEO Comp	The sum of total compensation of all other CEOs in each industry, except the highest-paid CEO.	ExecuComp
Older CEO Dummy	A binary variable that equals one if a CEO's age is higher than or equal to the sample median.	ExecuComp
Higher-Paid Ind CEOs	The natural logarithm of the total number of CEOs with higher total compensation within the same industry.	ExecuComp
High Higher-Paid Ind CEOs	A binary variable that equals one if the total number of CEOs with higher total compensation within the same industry is higher than or equal to the sample median.	ExecuComp
Low Competition Dummy	A binary variable that equals one if a firm's sales-based Herfindahl–Hirschman Index is higher than or equal to the sample median.	Compustat
Low Hostile-Takeover Index Dummy	A binary variable that equals one if a firm's hostile takeover index (see Cain et al., 2017) is lower than or equal to the sample median.	Prof. Stephen McKeon's website: https://pages.uoregon.edu/smckeon/
High Cash-Holdings Dummy	A binary variable that equals one if a firm's cash holdings ratio is higher than or equal to the sample median.	Compustat
High Industry-Adjusted-Cash-Holdings Dummy	A binary variable that equals one if a firm's industry-adjusted cash holdings ratio is higher than or equal to the sample median. A firm's industry-adjusted cash holdings ratio is its cash holdings ratio minus the average of this ratio for the corresponding industry in a year.	Compustat
Tobin's q	This is calculated as total assets minus the book value of equity plus the market value of equity, scaled by total assets	Compustat
ROA	Return on assets, calculated as net income divided by the book value of total assets.	Compustat
Life-Cycle 1	A measure of product life cycles as defined in Hoberg and Maksimovic (2023). It measures the intensity of product innovation of a company based on a 10-K text-based model of product life cycles.	Hoberg-Maksimovic Product Life Cycles Data Repository
Life-Cycle 2	A measure of product life cycles as defined in Hoberg and Maksimovic (2023). It measures the intensity of process innovation of a company based on a 10-K text-based model of product life cycles.	Hoberg-Maksimovic Product Life Cycles Data Repository
Life-Cycle 3	A measure of product life cycles as defined in Hoberg and Maksimovic (2023). It measures the intensity of stable and mature products of a company based on a 10-K text-based model of product life cycles.	Hoberg-Maksimovic Product Life Cycles Data Repository

Life-Cycle 4	A measure of product life cycles as defined in Hoberg and Maksimovic (2023). It measures the intensity of product decline (discontinuation) of a company based on a 10-K text-based model of product life cycles.	Hoberg-Maksimovic Product Life Cycles Data Repository