LOCAL TOURNAMENT INCENTIVES AND FIRM RISK

By

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ABSTRACT

Using the compensation gap between a CEO and the highest-paid CEO in the same Metropolitan Statistical Area (MSA) as a proxy for local tournament incentives, I document a positive relation between local tournament incentives and firm risk. Specifically, CEOs who face higher local incentives implement riskier policies, including higher R&D expenditures and less diversification. Exploiting quasi-shocks to local incentives and cross-sectional variation in the probability of winning, I show that the incentive effects vary systematically with theoretical predictions. The results are robust to alternative local tournament incentives measures, sample periods, and firm risk proxies.

1. Introduction

Risk taking is important for the long-run competitive advantage of firms. Yet, encouraging risk taking is challenging due to agency problems (Jensen and Meckling, 1976; Fama, 1980; Amihud and Lev, 1981). Unlike a well-diversified shareholder, a typical corporate manager has a significant portion of her wealth and human capital linked to the firm. Managers thus have incentives to reject risky, positive net-present-value projects in order to enjoy a quiet life and play it safe (Hölmstrom, 1979; Bertrand and Mullainathan, 2003; Gormley and Matsa, 2016). Extant literature explores mechanisms that can mitigate managerial risk aversion and reduce agency costs. Firms use equity incentives, corporate governance, internal promotion-based tournament incentives, and *ex-ante* severance contracts to encourage managerial risk taking.[1] While much of the prior work focuses on within-firm incentives, newer literature has expanded the scope, focusing on external incentives arising from relative performance evaluation and industry tournament incentives.[2]

Although an extensive literature has documented the important role of geographically proximate peers in affecting entrepreneurial activity, executive compensation, financial

[1] For example, see Haugen and Senbet (1981), Smith and Stulz (1985), Hirshleifer and Suh (1992), May (1995), Tufano (1996), Guay (1999), Knopf, Nam, and Thornton (2002), Coles, Daniel, and Naveen (2006), Low (2009), Chava and Purnanandam (2010), Edmans and Gabaix (2011), Hayes, Lemmon, and Qiu (2012), Gormley, Matsa, and Milbourn (2013), and Shue and Townsend (2017) for equity incentives, Gompers, Ishii, and Metrick (2003), Bebchuk, Cohen, and Ferrell (2009), and John, Litov, and Yeung (2008) for internal and external governance and investor protection, Kini and Williams (2012) for internal promotion-based tournament incentives, and Cadman, Campbell, and Klasa (2016) for severance contracts.

[2] For example, see Bizjak, Lemmon, and Naveen (2008), Bizjak, Lemmon, and Nguyen (2011), Faulkender and Yang (2010, 2013) for relative performance evaluation and Coles, Li, and Wang (2017), Huang, Jain, and Kini (2015), Huang, Jiang, and Xie (2015), Kubick and Lockhart (2016) for industry tournament incentives.

misconduct, information asymmetry, stock returns, and M&A transactions, little is known about the effect of these local peers on CEO incentives.[3] This paper sheds new light on the executive incentives and risk taking literature by studying whether the presence of highly-paid CEOs in a particular locale affects the risk-taking behavior of other local CEOs.

The effect can happen through two distinct channels. First, the presence of a highly-paid CEO may provide other local CEOs with promotion-like tournament incentives. Specifically, the compensation gap between each CEO and the highest-paid CEO serves as the prize when winning the tournament.[4] The tournament literature documents that higher tournament incentives lead to greater risk taking (see Bronars, 1987; Hvide, 2002 for theoretical evidence; Brown, Harlow, and Starks, 1996; Chevalier and Ellison, 1997; Kini and Williams, 2012 for empirical evidence). If local tournament incentives influence CEOs, then a lower-paid CEO may increase risk taking to increase her chance of winning the tournament.

Second, as proximity facilitates social interaction, the presence of highly-paid CEOs may affect other local CEOs through social comparison and envy (e.g., Duesenberry, 1949; Persky and Tam, 1990; Glaeser, Sacerdote, and Scheinkman, 1996; Ferrer-i-Carbonell, 2005; Luttmer, 2005). The literature on social comparison suggests that envy often leads to greater risk taking (Festinger,

[3] For example, see Giannetti and Simonov (2009) for entrepreneurial activity; Kedia and Rajgopal (2009), Bouwman (2013), Francis, Hasan, John, and Waisman (2017) for CEO compensation; Parsons, Sulaeman, Titman (2016) for financial misconduct; Coval and Moskowitz (1999, 2001), Malloy (2005), Ivković and Weisbenner (2005), Hong, Kubik, and Stein (2005) for information asymmetry; Pirinsky and Wang (2006), Parsons, Sabbatucci, Titman (2016) for stock return; Cai, Tian, and Xia (2016) for M&A transactions.

[4] While CEOs compete in the national labor market, due to information asymmetry, the external tournament incentives can still come from the pay gap relative to the highest-paid local CEOs. As shown in Bouwman (2013), a CEO's total compensation is strongly correlated with that of geographically-close CEOs.

1954; Frank, 1985a,b; Robson, 1992; Goel and Thakor, 2005, 2010). This channel also predicts that CEOs will increase risk taking to catch up with higher-paid local peers.

Based on these predictions, I examine whether CEOs respond to local incentives by altering their risk taking. Empirically, I use the compensation gap between a CEO and the second-highest-paid CEO in the same Metropolitan Statistical Area (MSA) as my main proxy for local tournament incentives.[5] I document a positive and significant relation between local tournament incentives (*Local gap*) and firm risk. In terms of economic significance, a one standard deviation increase in *Local gap* results in a 2.7% increase in stock return volatility and a 1.9% increase in idiosyncratic volatility in comparison to the sample mean. This finding is robust to controlling for within-firm tournament incentives, industry tournament incentives, CEO equity-based incentives (delta and vega), firm-level controls, macro-level controls, and CEO-by-firm and year fixed effects.

Because firms design managerial compensation in anticipation of a particular risk environment, the possibility of simultaneity and reverse causality is hard to exclude (e.g., Roberts and Whited, 2013). To alleviate such concerns, I always include CEO-by-firm fixed effects, which remove the effects of time-invariant CEO and firm characteristics and allow me to interpret the results as how changes in external tournament incentives affect firm risk. In addition, I lag all incentive variables by a year to alleviate the extent of endogeneity problem arising out of the simultaneous determination of CEO compensation and risk taking (Kini and Williams, 2012).

[5] Following Coles, Li, and Wang (2017), the total compensation of the highest-paid CEO may due to some transitory shocks, such as a large stock grant. Therefore, the total compensation of the highest-paid CEO may not be the representative compensation that a CEO will get when she is "promoted" to the highest-paid-CEO position.

Besides using these model specifications to avoid simultaneity and omitted variable bias, I perform a matched sample analysis to assure that my results are not driven by omitted variables related to nonlinear forms of my control variables. I create a propensity score matched sample by matching treatment CEOs with control CEOs on industry, year, and firm characteristics. Treated CEOs are defined as those with a *Local gap* that is in the upper quartile of the *Local gap* distribution. Estimation results from the propensity score matched sample continue to suggest a positive and significant effect of local incentives on firm risk.

To further address the endogeneity problem, I exploit CEO awards as quasi-shocks to local incentives. The prior literature documents that nonpecuniary benefits and status awards are effective mechanisms that can motivate employees (Jensen and Meckling, 1976; Auriol and Renault 2008; Besley and Ghatak, 2008). When the second-highest-paid CEO receives a CEO award, the award provides extra incentives to lower-paid CEOs by widening the status gap. I document that the positive effect of local incentives on risk taking is stronger the year after the second-highest-paid CEO receives the award, supporting the envy-based explanation of local incentives.

I next investigate whether the positive effect of local incentives on firm risk exhibits heterogeneity in the cross-section. This investigation is motivated by the predictions from the tournament literature, which emphasizes that the effect of tournament incentives should vary with the probability of winning (Lazear and Rosen, 1981; Rosen, 1986). Using various proxies for the probability of winning, I document that the incentive effect is indeed stronger when the CEO has

a higher probability of winning. This evidence supports the tournament-based explanation for local incentives.

The second source of cross-sectional heterogeneity is motivated by the literature on social comparison, which predicts the effect should be stronger when CEOs are more similar and more likely to share a social connection (Festinger, 1954; Ferrer-i-Carbonell, 2005). Using firm size difference, CEO age differences, the geographic distance between headquarters, same industry dummy, and share a director dummy as proxies for CEO similarity, I find the positive effect of local incentives on firm risk is stronger when the CEOs are more similar. This cross-sectional evidence further alleviates endogeneity concerns because any omitted variable that jointly affects *Local gap* and firm risk must be likewise correlated with cross-sectional variation.

I next explore the specific investment and financing choices through which CEOs can alter firm risk. I find a positive relation between *Local gap* and both R&D expenditures and firm focus. Evidence also suggests that CEOs who face higher local incentives are more likely to receive an increase in total compensation, which supports the notion that CEOs demand pay increases to catch up with higher paid local peers.

My findings hold up to a battery of robustness tests. First, I verify that the results are robust to using alternative measures of local tournament incentives, including (1) incentives adjusted for firm size, (2) incentives at the city-level, and (3) incentives relative to the highest-paid CEO. Second, I show that the results exist in different sample periods and both large and small MSAs. Third, I conduct placebo tests to show that local incentives from a randomly assigned MSA do not affect firm risk.

This paper contributes to four strands of literature. First, this paper adds to the broad literature on the effect of CEO incentives and contributes specifically to the literature that examines the effect of CEO incentives on risk taking. Prior literature has mostly focused on the role of compensation-related incentives (Coles, Daniel, and Naveen, 2006), corporate governance (John, Litov, and Yeung, 2008), internal tournament incentives (Kale, Reis, and Venkateswaran, 2009; Kini and Williams, 2012), severance contracts (Cadman, Campbell, and Klasa, 2016), and external industry tournament incentives (Coles, Li, and Wang, 2017). My results shed new light on this literature by documenting that geography-based incentives also affect CEO risk taking.

Second, this paper brings a new dimension to the emerging literature on geography and firm behaviors. Kedia and Rajgopal (2009) document that social interaction with neighboring firms explains variation in stock option plans. Bouwman (2013) finds that CEO pay is strongly correlated with that of geographically-close CEOs. Pirinsky and Wang (2006) and Parsons, Sabbatucci, and Titman (2016) find that comovement in the stock returns of firms headquartered in the same geographic area. This paper adds to this literature by documenting that tournament-like competition and social interaction among local CEOs shape CEO risk-taking behaviors.

Third, this paper makes a contribution to the tournament literature. Whereas existing empirical work mostly focus on VPs who are competing for the CEO position and CEOs who are competing for the highest-paid CEO position within an industry (Kale, Reis, and Venkateswaran, 2009; Kini and Williams, 2012; Coles, Li, and Wang, 2017), this paper provides new empirical evidence that tournament incentives can also come from higher-paid local CEOs. As such, this paper extends

the work of Coles, Li, and Wang (2017) by looking at tournament incentives that arise outside the firm.

Finally, this paper provides empirical support to the literature on social comparison and relative wealth concerns. While prior studies provide theoretical predictions that relative wealth concerns may lead to higher risk taking (e.g., Robson, 1992), empirical evidence is rather scarce. Recent studies provide evidence through studying neighbors of lottery winners and World War II pilots (Kuhn, Kooreman, Soetevent, and Kapteyn, 2011; Agarwal, Mikhed, and Scholnick, 2016; Ager, Bursztyn, and Voth, 2016). To the best of my knowledge, this paper is the first to provide empirical evidence that social comparison affects risk-taking behaviors among CEOs.

2. Hypothesis Development

Both rank-order tournament theory and social comparison theory offer reasons to expect a positive relationship between local incentives and CEO risk taking. First, tournament theory predicts that tournament induces excessive risk taking (Bronars, 1987; Hvide, 2002). Empirical evidence supporting this notion includes studies on NASCAR drivers, golfers, NBA and NFL players, U.S. broiler producers, sales workers, and mutual fund managers (Ehrenberg and Bognanno, 1990; Becker and Huselid, 1992; Knoeber and Thurman, 1994; Taylor and Trogdon, 2002; Delfgaauw, Dur, Sol, and Verbeke, 2013; Ozbeklik and Smith, 2017; Brown, Harlow, and Starks, 1996; Chevalier and Ellison, 1997).

In a corporate setting, studies document that internal tournament among VPs leads to better firm performance and higher risk taking, likelihood of lawsuits, fraud, tax aggressiveness, and information distortion (Main, O'Reilly, and Wade, 1993; Bognanno, 2001; Kale, Reis, and Venkateswaran, 2009; Kini and Williams, 2012; Haß, Müller, and Vergauwe, 2015; Kubick and Masli, 2016; Burns, Minnick, and Starks, 2017). Recent evidence suggests that external industry tournament among CEOs have similar effects on firm policies (Coles, Li, and Wang, 2017, Huang, Jain, and Kini, 2015; Huang, Jiang, and Xie, 2015; Kubick and Lockhart, 2016).

Social comparison theory also predicts that local incentives should increase CEO risk taking. The theory suggests that people have a basic drive to compare themselves to others in the same social group (Festinger, 1954; Kulik and Ambrose, 1992). Such comparison often diminishes individual well-being and inspires envy (Duesenberry, 1949; Luttmer, 2005; Ferrer-i-Carbonell, 2005; Mas, 2006; Charness and Kuhn, 2007), which causes people with a lower relative standing to increase risk taking to catch up (Frank, 1985a,b; Robson, 1992; Goel and Thakor, 2005, 2010). The negative effect is especially strong when people have relative wealth concerns (Veblen; 1899; Frank, 1985a,b; Akerlof and Yellen, 1990; Abel, 1990; Campbell and Cochrane, 1999; DeMarzo, Kaniel, and Kremer, 2004, 2008; DeMarzo and Kaniel, 2016).[6]

Empirical studies suggest that envy and status competition lead to higher risk taking, including crime, household conspicuous consumption, personal bankruptcy, and even death among WWII fighter pilots (Glaeser, Sacerdote, and Scheinkman, 1996; Grinblatt, Keloharju, and Ikäheimo,

[6] DeMarzo, Kaniel, and Kremer (2004) show that when agents are competing for scarce good whose prices increase with the wealth of others, relative wealth concerns can arise in a fully rational equilibrium model.

2008; Card, Mas, Moretti, and Saez, 2012; Georgarakos, Haliassos, and Pasini, 2014; Agarwal, Mikhed, and Scholnick, 2016; Bertrand and Morse, 2016; Ager, Bursztyn and Voth, 2016). In a corporate setting, Meneghetti and Williams (2017) show that the incentives to join the *Fortune 500* affect corporate acquisition decisions.

The above evidence suggests that both local tournament incentives and social comparison can change lower-paid CEOs' risk preference. Both theories predict lower-paid CEOs to implement riskier firm policies to increase their chances of winning the local tournament. Winning can happen through an external promotion to a higher-paid CEO position or through an internal pay raise.[7] In addition, if the effect is driven by tournament incentives, the effect should be stronger when the probability of winning the tournament is high. If social comparison is driving the effect, the effect should be stronger when the need for social comparison is high. I empirically test these hypotheses in the rest of the paper.

3. Data, Variable Construction, Sample Selection

3.1 Sample Selection

The initial sample consists of all Execucomp firms from 1992 to 2014. Following Kale, Reis, and Venkateswaran (2009), I require each firm to have an identifiable CEO (*CEOANN* = CEO) and at least three non-CEO executives to ensure sufficient internal tournament incentives within

[7] While firms have a tendency to promote CEOs from inside, upward mobility in the labor market is an important determinant of CEO decisions (Parrino, 1997; Fee and Hadlock, 2003; Agrawal, Knoeber, and Tsoulouhas, 2006; Graham, Harvey, and Rajgopal, 2005).

each firm. I further exclude utility (SIC codes 4900 – 4999) and financial firms (SIC codes 4900 – 4999) to allow direct comparison to the results from the tournament literature. I obtain financial data from Compustat, stock return data from CRSP, executive compensation data from Execucomp, and board data from BoardEx.

Because Compustat only reports the most recent headquarter information, I use a computerized text search algorithm written in Perl to collect historical headquarter information from 10-K filings listed on the SEC Edgar website.[8] I next match each headquarter ZIP code to a Metropolitan Statistical Area (MSA) using the crosswalk provided by the United States Department of Labor. I exclude MSAs with fewer than three Execucomp firms to ensure enough participants in the local tournament. This sample represents 93% of Execucomp firm-year observations.

3.2 Dependent Variable

Following prior literature, I use *Stock return volatility* and *Idiosyncratic volatility* as the primary measures of firm risk (Coles, Daniel, Naveen, 2006; Low, 2009). *Stock return volatility* is the annualized standard deviation of daily stock returns over the fiscal year. *Idiosyncratic volatility* is the annualized standard deviation of the residuals from the regression of daily stock returns on the Fama and French three factors over the fiscal year. The mean (median) value of *Stock return volatility* and *Idiosyncratic volatility* is 0.027 (0.024) and 0.013 (0.009).

[8] Pirinsky and Wang (2006) document that 118 firms relocated corporate headquarters. Klasa, Ortiz-Molina, Serfling, and Srinivasan (2017) show that 9.3% of the firms in their sample relocated corporate headquarters. Using the historical headquarter location reduces the noise in calculating the local tournament incentives. Electronic filings are voluntary until 1996. I use the headquarters information from the oldest 10-K filing for missing values prior to 1996.

3.3 Measures of Tournament Incentives

The main variable of interest is local tournament incentives. Following the tournament literature, I define *Local gap* as the natural logarithm of the total compensation differential between the CEO and the second-highest-paid CEO in the same MSA:

$$Local\ gap = \text{Log}\ (TDC1_{\text{2nd highest},j,t} - TDC1_{i,j,t})$$

TDC1 denotes the total compensation of the CEO, *i* denotes firm, *j* denotes MSA, and *t* denotes year. Following Coles, Li, and Wang (2017), I use the total compensation of the second-highest-paid CEO because the extreme compensation of the highest-paid CEO may due to some transitory events (such as a large stock grant) and is unlikely the sustainable compensation of the tournament winner.[9] In addition, I exclude the highest and the second-highest paying firms from my analysis because shocks hitting these firms will affect both the compensation and their volatility. The mean and median value of *Local gap* is $18.835 million and 13.342 million.

To assure that *Local gap* is measuring incentives that are in addition to the within-firm and within-industry tournament incentives, I include these measures as control variables. Following Kale, Reis, and Venkateswaran (2009), I define *Firm gap* as the natural logarithm of the total compensation differential between the firm's CEO and its median-paid VP.[10] Following Coles, Li, and Wang (2017), I define *Industry gap* as the natural logarithm of the total compensation

[9] For robustness, Table 10 presents estimation results using the highest-paid CEO.

[10] There are firm-year observations that the CEO's total compensation is lower than the total compensation of the median-paid VP. Following Kini and Williams (2012), I drop those observations.

differential between the CEO and the second-highest-paid CEO within the Fama-French-30 industry. The mean and median values of *Firm gap* is $2.646 million and $1.542 million, which are similar to the values reported in Kale, Reis, and Venkateswaran (2009). The mean and median value of *Industry gap* is $24.178 million and $18.783 million, which are also similar to those reported in Coles, Li, and Wang (2017).

3.4 Control Variables

I include a number of CEO and firm characteristic as control variables. Following Coles, Daniel, and Naveen (2006) and Kini and Williams (2012), *Log assets* is calculated as the natural logarithm of total assets. *Book leverage* is the book value of long-term debt plus the debt in current liabilities divided by book value of assets. *Market-to-book* is the market value of the firm divided by book value of assets. *ROA* is the net income divided by total assets. *Sales growth* is the percentage increase in sales from year $t - 1$ to year t. *CEO age* is the natural logarithm of CEO age. *CEO tenure* is the natural logarithm of CEO tenure. Following Core and Guay (2002), I define *CEO delta* as the change in the dollar value of the CEO's wealth for a one percentage point change in stock price and *CEO vega* as the change in the dollar value of the CEO's wealth for a 0.01 change in the annualized standard deviation of stock returns.[11]

I include GDP growth rate, political balance, and the number of Execucomp firms in the MSA

[11] My results are robust to normalizing all the incentive variables by total compensation and using the natural logarithm of all the incentive variables.

as additional macroeconomic controls. I obtain GDP data from the Bureau of Economic Analysis (BEA). *GDP growth* the percentage change in state GDP from year *t*-1 to year *t*.[12] *Political Balance* is the fraction of a state's congress members representing their state in the U.S. House of Representatives that belong to the Democratic Party, which captures the political leaning in the state.[13] *# firms in the MSA* is the number of Execucomp firms that headquarter in the MSA. I winsorize all continuous accounting variables at their 1st and 99th percentiles. Dollar values are expressed in 2010 dollars. Panel A of Table 2 presents summary statistics for the full sample. Appendix B reports the Pearson correlation table of the main variables.

4. Empirical Results

4.1 Univariate Analysis

I start by presenting univariate statistics to describe the relation between local incentives and firm risk. Figure 1 presents a box plot of the CEO total compensation within each MSA in 2010. The box plot shows the minimum, lower quartile, median, top quartile, and CEO total compensation that is 1.5 IQR (interquartile range) higher than the MSA upper quantile value (shown in dots). One notes several trends in the data: (1) The distribution of CEO total compensation within each MSA is convex. This distribution is similar to those observed in the

[12] I use state-level GDP because it is available throughout the sample period. MSA-level GDP is only available after 2001, leading to a much smaller sample. Results are robust to using MSA-level GDP.
[13] History, Art & Archives, U.S. House of Representatives available at http://history.house.gov/Congressional-Overview/Profiles/1st/.

within-firm and within-industry distribution of compensation; (2) The total compensation of the lowest-paid, 25th percentile-paid, median-paid, and the 75th percentile-paid CEO is similar across MSAs, while the total compensation of the highest-paid and second-highest-paid CEO vary substantially across MSAs; (3) There is substantial variation in the local distribution of CEO total compensation across MSAs. Table 1 presents summary statistics of CEO compensation by MSA.

Panel B and C of Table 2 presents descriptive statistics on the subsample of firms divided based on the median value of *Local gap.* Statistics in column (2) correspond to firms with a below-median *Local gap*, and statistics in column (5) correspond to firms with an above-median *Local gap*. Columns (7) and (8) present sample mean difference and *t*-value for statistical differences between the two samples. The results suggest that firms with an above-median *Local gap* have higher *Stock return volatility* and *Idiosyncratic volatility*, invest more in R&D, and have more focused operations. In addition, these firms are smaller, have higher growth opportunities, and a lower operating profitability. Panel C of Table 2 presents similar results using a Wilcoxon median test. Overall, the univariate results are consistent with the prediction that higher local incentives are positively associated with firm risk.

Figure 2 presents graphical analyses of the relation between local incentives and firm risk. The y-axis is firm risk measured by either *Stock return volatility* or *Idiosyncratic volatility*. The x-axis is *Local gap*. The gray area represents the 90% confidence intervals of the linear estimation. The figure shows that *Local gap* is positively associated with both *Stock return volatility* and *Idiosyncratic volatility*. The magnitude of these correlations is sizable. Relative to the sample averages, a one-standard-deviation increase in *Local gap* is associated with an 8.2% increase in

Stock return volatility (*t* = 14.92, adjusted for clustering at the firm level) and an 8.3% increase in *Idiosyncratic volatility* (*t* = 6.89, adjusted for clustering at the firm level). These correlations results are also consistent with the hypothesis that CEOs increase risk taking when local incentives are high.

4.2 Multivariate Analysis

To estimate the effect of local incentives on firm risk, I estimate the following OLS regression:

$$Risk_{i,t} = \beta_0 + \beta_1\, Local\ gap_{i,t-1} + \gamma Incentive\ controls_{i,t-1} + \delta Firm\ controls_{i,t}$$
$$+ \rho Macro\ controls_{i,t} + CEO\_Firm\ FE + Year\ FE$$

Here *i* indexes firms and *t* indexes years. All the control variables are discussed in Section 3 and defined in the Appendix A. Incentive variables are lagged by a year alleviates the extent of endogeneity problem arising out of the simultaneous determination of CEO compensation and risk taking (Kini and Williams, 2012). Following prior studies (Bertrand and Schoar, 2003; Bennedsen, Perez-Gonzalez, and Wolfenzon, 2006; Coles, Li, and Wang, 2017), I include CEO-by-firm fixed effects to absorb omitted time-invariant CEO and firm characteristics and year fixed effects to absorb unobserved heterogeneity across years. For example, a powerful CEO could extract a higher total compensation (low *Local gap*) and take less risk. In this case, omitted CEO characteristics are correlated with both Local gap and firm risk. The inclusion of CEO-by-firm fixed effects absorbs such time-invariant CEO-firm pair characteristics and allows me to interpret the results as how changes in *Local gap* within a CEO-firm pair affect risk taking.

Heteroscedasticity-robust standard errors are clustered at the CEO-firm level to account for the correlation of residuals within CEO-firm pairs (Petersen, 2009).

Table 3 presents estimation results. The dependent variable is the *Stock return volatility* in columns (1) to (3) and *Idiosyncratic volatility* in columns (4) to (6). I start by only including CEO and firm characteristics as control variables. Estimation results from columns (1) and (4) suggest a positive and significant relation between *Local gap* and firm risk. In terms of economic significance, the estimated coefficients on *Local gap* imply that a one standard deviation increase in *Local gap* leads to a 2.9% increase in *Stock return volatility* and a 2.0% increase in *Idiosyncratic volatility* centered on its mean.[14] The signs on the control variables are similar to those documented in the prior literature. *Log assets*, *Book leverage*, *ROA*, *CEO delta*, *CEO age*, and *CEO tenure* are negatively related to firm risk. *Market-to-book* and *Sales growth rate* are positively related to firm risk.

To assure that the effect of local incentives on firm risk is not driven by firm-level and industry level tournament incentives, columns (2) and (5) of Table 3 include these as additional controls. Adding these controls does not affect the statistical and economic significance of the effect of *Local gap* on firm risk. *Local gap* continues to load positive and significant at the 1% level, suggesting that local incentives have a positive effect on firm risk. In addition, both *Firm gap* and *Industry gap* load positive and significant, which is consistent with the findings in Kini and

[14] To calculate the economic significance, I follow Kini and Williams (2012). I first compute the level of local pay gap that is 0.5 standard deviations above and below the mean. I then calculate the difference between the natural logarithm of the high pay gap (mean +0.5 s.d.) minus the natural logarithm of the low pay gap (mean -0.5 s.d). I next apply this difference to the coefficient on *Local gap* to compute economic significance.

Williams (2012) and Coles, Li, and Wang (2017).

Finally, to account for the possibility that local economic condition is driving my results, columns (3) and (6) include political and macroeconomic variables as additional controls. The inclusion of these macro controls does not affect my results. *Local gap* continues to load positive and significant. In terms of economic significance, the coefficient estimates with the full set of controls in columns (3) and (6) imply that a one standard deviation increase in *Local gap* centered on its mean results in a 2.7% increase in *Stock return volatility* and a 1.9% increase in *Idiosyncratic volatility*. This last model with the full set of control variables is my main specification used throughout the rest of the paper.

4.3 Endogeneity Concerns

Although the inclusion of CEO-by-firm and year fixed effects absorb omitted time-invariant CEO and firm characteristics and time-varying heterogeneity across years, my results are still prone to endogeneity concerns. First, as shown in Panel B and C of Table 2, there are substantial differences in firm characteristics between CEOs with above and below median *Local gap*. If the linear controls fail to account for such differences, *Local gap* could be picking up nonlinear firm characteristics on the measures of firm risk.

Second, time-varying omitted variables could explain my results. Negative industry shocks could decrease CEO compensation and increase future stock return volatility. Consider the bursts of the dot-com bubble in the early 2000s. During that time, the stock price of technology firms

becomes more volatile and the total compensation of technology firms' CEOs drops, leading to a high *Local gap*. I address these concerns in the following tests.[15]

4.3.1 Propensity Score Matched Sample Analysis

I start by addressing the concern that my results are driven by *Local gap* is picking up nonlinear firm characteristics on the measures of firm risk. To address this issue, I create a propensity score matched sample where CEOs have similar covariates but differ only on the external pay gap (Rosenbaum and Rubin, 1983; Dehejia and Wahba, 2002; Hirano, Imbens, and Ridder, 2003). In my context, I consider "treatment" to be having a *Local gap* that is in the upper quartile of the *Local gap* distribution. I start by estimating a logistic regression to calculate the probability of being in the treatment group. Specifically, I regress the treatment indicator on CEO total compensation, Log assets, Book leverage, ROA, Market-to-book ratio, and Sales growth rate. I next match each treatment firm with a control firm on the same Fama-French-30 industry, year, and the closest propensity score. I match without replacement and require the propensity scores for the matched pair to be within 1% of each other. The matched sample consists of 6,734 firm-year observations.

[15] Because managers' compensation is arguably designed in anticipation of a particular risk environment, the possibility of reverse causality is hard to exclude. There have been several attempts to solve this identification challenge. A number of studies approach this question by using instrumental variables, structure modeling, and estimating a system of simultaneous equations (see Kale, Reis, and Venkateswaran, 2009; Coles, Daniel, and Naveen, 2006; Kini and Williams, 2012). It is difficult to use local variables as instruments because they are likely to directly affect firm risk. Therefore, I do not use GMM IV estimations. Instead, I explore quasi-exogenous shocks to the prize of the local incentives and provide cross-sectional evidence showing that the effect of local incentives varies systematically with the probability of winning.

To evaluate the successfulness of the matching process, I conduct a *t*-test to compare the means of each matched variable between the two groups. If the matching is successful, the two groups should have similar CEOs and firms characteristics except for *Local gap*. The results in Panel A of Table 4 show that the mean values of the matched control variables are statistically the same across the two samples, suggesting that the sample is a good match.

Panel B of Table 4 reports the estimation results using the propensity score matched sample. Despite a smaller sample size, I continue to document a positive and significant effect of *Local gap* on firm risk. In terms of economic significance, a one standard deviation increase in *Local gap* centered on its mean results in a 1.8% increase in *Stock return volatility* and a 1.9% increase in *Idiosyncratic volatility*. The results from the propensity score matched sample suggest that omitted variables related to the endogenous selection on observable characteristics do not drive the results.

4.3.2 Results from Exogenous Award

I next exploit CEO awards featured in *Fortune* magazine as quasi-shocks to local incentives to further address the endogeneity concern. Empirically, I examine the effect of local incentives the year after the second-highest-paid CEO receives a CEO award. The motivation for this test is that, if CEOs gain utility from non-pecuniary benefits such as a status award, witnessing higher-paid CEOs receiving such awards may provide additional incentives to the lower-paid CEOs. The effect of local incentives should, therefore, be stronger after the highest-paid CEO receive the award.

An extant literature provides both theoretical and empirical evidence that supports this hypothesis. Theoretical studies show that the demand for non-pecuniary benefit and status competition affects corporate investment, merger activities, and other risk choices (Jensen and Meckling, 1976; Robson, 1992; Moldovanu, Sela, and Shi, 2007; Auriol and Renault 2008; Besley and Ghatak, 2008; Goel, and Thakor, 2005, 2010). Empirically, Kosfeld and Neckermann (2011) conduct laboratory experiments and find that symbolic awards such as a congratulatory card increase performance by about 12 percent on average. Kuhn, Kooreman, Soetevent, and Kapteyn (2011) and Agarwal, Mikhed, and Scholnick (2016) show that the neighbors of lottery winners spend more on conspicuous consumption and have a higher risk of bankruptcy. Ager, Bursztyn, and Voth (2016) show that status competition among German pilots in the World War II increase future risk taking measured by pilot death rate.

In a corporate setting, Nippa (2010) show that the pursuit of social recognition and status shapes managers' behaviors. Ammann, Horsch, and Oesch (2016) and Shi, Zhang, and Hoskisson (2017) show that the competitors of superstar CEOs increase future risk taking to increase their chances of receiving similar social recognition and status. Meneghetti and Williams (2017) show that the incentives to join the *Fortune 500* affect corporate decisions as firms closer to the cutoff engage in more M&A activities, suggesting that CEOs respond to status competition.

To test whether CEOs respond to such quasi-shocks in local incentives, I focus on the annual "100 Best Companies to Work for in America" award listed on the *Fortune* magazine (Edmans,

2011).[16] To the extent that such prestigious awards are largely unanticipated by other local firms, they serve as positive quasi-exogenous shocks to local incentives. In addition, it is difficult to argue that a prestigious award to one CEO can directly affect risk-taking behaviors of other local CEOs except through the social comparison channel, thus the instrument satisfies the exclusion condition. I create an indicator variable that equals one if the second-highest-paid CEO is awarded the "100 Best Companies to Work for in America" in that year and zero otherwise. I then regress firm risk on *Local gap*, the award indicator, the interaction term between *Local gap* and the award indicator, and the same set of control variables as used in the main tests. If status awards provide additional incentives to lower-paid CEOs, I expect a positive coefficient on the interaction term.

Table 5 presents estimation results. The positive coefficient on the *Local gap* suggests that local incentives have positive effects on firm risk. Specifically, for a one standard deviation increase in *Local gap*, *Stock return volatility* (*Idiosyncratic volatility*) increases by 1.8% (1.5%). In addition, the coefficient estimates on the interaction term suggest that the effect of local incentives is almost twice as strong when the second-highest-paid CEO is the award winners. The economic significance of the interaction term is 3.9% for *Stock return volatility* and 3.6% for *Idiosyncratic volatility*. In untabulated tests, I confirm my results are robust to defining award winner equals one if any of the top three highest-paid CEOs in the MSA receives the award. Overall, the results in Table 5 provide further evidence that local incentives have a causal effect on firm risk.

[16] I thank Alex Edmans for his generosity in sharing data.

4.4 Cross-sectional Variation

In this section, I investigate whether the relation between local incentives and firm risk varies cross-sectionally with the theoretical predictions. First, social comparison theory predicts that the effect should be stronger when CEOs are more alike (Festinger, 1954). Second, tournament theory predicts that the effect should be stronger when the CEO is more likely to win.

4.4.1 Effects of Local Incentives Conditional on Similarity

Table 6 examines how the effect of local incentives on firm risk varies with the similarity between CEOs. The dependent variable in Panel A is *Stock return volatility* and the dependent variable in Panel B is *Idiosyncratic volatility*. Following Festinger (1954), I create variables that measure the demographic similarity and physical proximity between the CEO and the second-highest-paid CEO in the MSA.

The first proxy is the company size difference. CEOs who manage small companies are different from CEOs who manage multinational corporations, the effect of social comparison is therefore weaker. Consistent with this notion, the interaction term between *Local gap* and size gap is negative and significant in column (1) of Table 6, suggesting that the effect of local incentives weakens with the company size difference.

The second proxy is the CEO age difference. A younger CEO may not see herself directly comparable to the older CEOs. Therefore the incentive effect of *Local gap* should be weaker when the CEO age difference is larger. I test this cross-section in column (2) of Table 6. The estimated coefficient on the interaction term is negative and significant, suggesting that the effect of local

incentives weakens as the CEO age difference gets larger.

The third proxy is the geographic proximity. A number of studies document the role of geographic proximity in facilitating social interaction (e.g., Persky and Tam, 1990; Glaeser, Sacerdote, and Scheinkman, 1996; Ferrer-i-Carbonell, 2005; Luttmer, 2005), reducing information asymmetry, and affecting both personal and corporate decision making (Coval and Moskowitz, 1999, 2001; Ivković and Weisbenner, 2005; Hong, Kubik, and Stein, 2005; Malloy, 2005; Pool, Stoffman, and Yonker, 2015). *Ceteris paribus*, two geographically close CEOs are more likely to have social interaction, therefore the social comparison and relative wealth concerns should be stronger.

Following Pool, Stoffman, and Yonker (2015), I calculate the geographic distance between company headquarters as a proxy for the geographic proximity. To obtain the accurate headquarter latitude and longitude information needed for the calculation, I write a program in Perl that uses the Google Maps application program interface (API) to convert the address listed in the "Address of principal executive offices" section in 10-K filings into accurate latitude and longitude information. I then use the Vincenty formula to calculate the distance.[17] The mean and median distance is 11.51 and 16.13 miles. Column (3) of Table 6 presents the estimation results. The interaction term between *Local gap* and distance gap loads negative and significant, suggesting that the effect of local incentive is weaker when the CEO and the second-highest-paid CEO are

[17] Distance $= 3963.19 \times \arctan\left(\frac{\sqrt{(\cos\phi_2 \sin(\lambda_2-\lambda_1))^2(\cos\phi_1\sin\phi_2-\sin\phi_1\cos t\phi_2 \cos(\lambda_2-\lambda_1))^2}}{sin\phi_1 sin\phi_2+cos\phi_1 cos\phi_2\cos(\lambda_2-\lambda_1)}\right)$, where (ϕ_i, λ_i) is the latitude and longitude value for company *i*.

more geographically apart. This is consistent with the hypothesis that proximity facilitates social comparison.

The fourth proxy is an indicator variable that equals one if the CEO and the second-highest-paid CEO work in the same Fama-French-30 industry. CEOs from the same industry are similar and have more social interaction, thus the effect of local incentives through social comparison should be stronger. I examine this cross-section in column (4) of Table 6. Consistent with this notion, estimation results suggest that the effect of *Local gap* on firm risk is stronger when the CEO and the second-highest-paid CEO work in the same industry.

My last proxy is an indicator variable that equals one if the lower-paid CEO's firms share a director with the second-highest-paid CEO's firm. A shared director can reduce the information asymmetry between CEOs and increase social comparison. I obtain director information from the BoardEx database. Because the BoardEx data starts in 2000, the sample period in this test is from 2000 to 2014. Estimation results from column (5) of Table 6 show that the interaction term between *Local gap* and share director indicator is positive and significant, suggesting that the effect of local incentives on firm risk is stronger when the two firms share a local director.

In sum, evidence from the above cross-sectional analyses supports the hypothesis that local incentives affect firm risk through a social comparison channel. Specifically, local incentives have a stronger effect when the CEO and the second-highest-paid CEO are more similar and are more likely to have social interaction.

4.4.2 Effects of Local Incentives Conditional on the Probability of Winning

Theoretical tournament models in Lazear and Rosen (1981) and Rosen (1986) predict that the effect of tournament incentives should be stronger when the probability of winning is high. Empirically, Kale, Reis, and Venkateswaran (2009) study the internal tournament incentives on VPs and find that the effect is stronger when the CEO is retiring and weaker when the CEO is new. Coles, Li, and Wang (2017) study industry tournament incentives on CEOs and find the effect also varies with the probability of winning the external tournament. Following this literature, the effect should be stronger among CEOs with more outside options and thus more likely to win the tournament prize. Table 7 examines the cross-sectional variation with regard to CEO's probability of winning. The dependent variable in Panel A is *Stock return volatility* and the dependent variable in Panel B is *Idiosyncratic volatility*.

The first proxy for the probability of winning is an indicator variable that equals one if the CEO is a generalist. As argued in Murphy and Zabojnik (2004, 2007), general managerial skills have become more important and CEOs with general managerial skills have more career opportunities. Therefore, I expect that the effect of local incentives should be stronger among generalist CEOs because they can switch to higher paying firms relatively easy. On the other hand, specialist CEOs should be more motivated by the industry tournament incentives because their skills are more firm or industry specific. Following Custódio, Ferreira, Matos (2013), I define a CEO is a generalist if her *General Ability Index* is above the sample median.[18] Columns (1) and (2) of Table 7 separately

[18] I thank Cláudia Custódio, Miguel Ferreira, and Pedro Matos for making the index available.

examines the effect of local incentives on firm risk among generalist and specialist CEOs. Estimation results suggest that *Local gap* only positively affects CEO risk among generalist CEOs, which support the hypothesis that the effect of local incentives is stronger when outside opportunities are high.

Second, I examine the effect of *Local gap* on firm risk among retiring CEOs. CEOs who are approaching retirement are less likely to seek external CEO positions and are less likely to win local tournaments. Coles, Li, and Wang (2017) show that the effect of industry tournament incentives is weaker among retiring CEOs. I split the sample based on *CEO Retire*, which is an indicator variable that equals one if the CEO is above 62 years old. The results in columns (3) and (4) of Table 7 suggest that *Local gap* increases risk taking only among non-retiring CEOs. *Local gap* is insignificantly related to firm risk in the subsample of firms led by CEOs who are approaching retirement, suggesting that retiring CEOs do not respond to local incentives.

Third, I test the effect of *Local gap* on firm risk among new CEOs. I expect the effect of *Local gap* on firm risk to be weaker among new CEOs because they are less likely to actively seek outside jobs, therefore, the probability of an external promotion is lower. A CEO is a new CEO if her tenure is less than 3 years. I split sample based on whether the CEO is a new CEO and estimate the effect in columns (5) and (6) of Table 7. The estimation results suggest that *Local gap* only significantly relates to firm risk among the subsample of CEOs with tenure greater than 3 years.

Overall, the evidence in this section suggests that the magnitude of the local incentives varies with the probability of winning: the effect is stronger among generalist CEOs and the effect is weaker when the CEO is retiring or the CEO is new. These cross-sectional variations are consistent

with the predictions from the rank-order tournament theory.

4.5 Corporate Outcomes

In this section, I examine the specific investment and financing policies through which CEOs can alter firm risk. Following Coles, Daniel, and Naveen (2006), I test R&D expenditures, firm focus, capital expenditures, and financial leverage. First, I examine R&D expenditures. Successful R&D investments can bring a higher future return, but they also have high probabilities of failure (Hölmstrom, 1989). If a CEO wants to increase her chance of winning the local tournament, she could increase R&D expenditures. I estimate the effect of *Local gap* on *R&D* in column (1) of Table 8. *R&D* equals to the research and development expenditures scaled by total assets. Missing R&D expenditures are set to zero. The estimated coefficient on *Local gap* is positive and significant at the 1% level, suggesting that CEOs who face higher local incentives invest more in R&D expenditures. In terms of economic significance, a one standard deviation increase in the *Local gap* results in a 9% increase in *R&D*.

I next examine the relation between *Local gap* and firm focus. Focusing on a small number of businesses may increase a firm's competitive advantage at the risk of less diversification (Amihud and Lev, 1981; May, 1995; Tufano, 1996). In the presence of high local incentives, a risk-averse CEO may implement increased firm focus instead of diversifying operations across multiple business segments. Following Coles, Daniel, and Naveen (2006), I use the segment sales-based Herfindahl index (*Segment HHI*) and the total number of business segments (*# Segments*). A more focused firm will have a higher *Segment HHI* and a lower *# Segments* as proxies for firm focus.

Columns (2) and (3) of Table 8 report the estimation results. The dependent variable in column (2) of Table 8 is *Segment HHI*. Coefficient estimates suggest a positive and significant relation between *Local gap* and *Segment HHI*. The positive relation suggests that CEOs who face higher local incentives implement more firm focus. In terms of economic significance, a one standard deviation increase in the *Local gap* increases *Segment HHI* by 3%. I next estimate the effect of *Local gap* on the number of different businesses in which the firm operates. Column (3) of Table 8 examines the effect of local incentives on *# Segments*. The negative coefficient on *Local gap* suggests that CEOs who face higher local incentives focus on a small number of businesses. In terms of economic significance, a one standard deviation increase in *Local gap* decreases *# Segments* by 5.5%. In sum, results in columns (2) and (3) of Table 8 are consistent with the hypothesis that higher local incentives motivate CEOs to implement riskier policies through a higher degree of firm focus.

I next examine capital expenditures. Capital expenditures are investments in more tangible assets, which usually provide more stable cash flow. If a CEO wants to increase risk taking, she can decrease capital expenditures and reallocate investment dollars to risky assets. I examine the relation between *Local gap* and *CAPX* in column (4) of Table 8. *CAPX* equals to capital expenditures divided by total assets. The estimated coefficient on *Local gap* is insignificantly different from zero, suggesting that CEOs do not change firm risk by altering capital expenditure decisions. Finally, I examine whether CEOs increase firm risk by implementing riskier financial policies through an increase in *Book leverage*. The estimation results in column (5) of Table 8 suggest that *Local gap* is positively related to *Book leverage* but the effect is not statistically

significant. Overall, results from Table 8 suggest that CEOs increase firm risk by investing more in R&D and increasing firm focus. However, CEOs do not reduce capital expenditure or use financial leverage to alter their firms' overall risk.

4.6 CEO Outcomes

In this section, I test whether local incentives make CEOs more likely to demand a pay increase so their compensation can "catch up" with that of the higher paid local peers. Empirically, I study the relationship between local incentives and changes in CEO compensation. The dependent variable in column (1) of Table 9 is an indicator variable that equals one if the CEO receives an increase in total compensation from year *t-1* to *t*. Control variables are based on prior research in the CEO compensation literature (Core, Holthausen, and Larcker, 1999; Murphy, 1999; Frydman and Jenter, 2010; Peters and Wagner, 2014). The estimation results suggest that *Local gap* is positively related to the pay increase dummy, suggesting that CEOs who face high local incentives are more likely to receive a pay raise.

I next examine the magnitude of the pay raise. The dependent variable in column (2) of Table 9 is the percentage change in total compensation from *t-1* to *t*. The estimated coefficient on *Local gap* is positive and significant, suggesting that CEOs who face higher *Local gap* receive a larger increase in total compensation. Specifically, a one standard deviation increase in *Local gap* results in a 9% increase in total compensation. These results are consistent with the prediction that CEOs who face higher local incentives are more likely to receive an increase in total compensation.

I further explore the source of the pay increase by examining both short-term and long-term compensation. I define short-term compensation as the sum of salary, bonus, and other annual payment. Long-term compensation equals to the total compensation minus the short-term compensation. I estimate the effect of local incentives on changes in short-term compensation in columns (3) and (4) of Table 9. The dependent variable in columns (3) of Table 9 is an indicator variable that equals one if the CEO receives an increase in short-term compensation from year *t-1* to *t*. The estimated coefficient on *Local gap* is negative but statistically insignificant, suggesting that local incentives do not increase a CEO's short-term compensation. I next examine whether higher local incentives positively affect the percentage change in the short-term compensation. The dependent variable in column (4) of Table 9 is the percentage change in short-term compensation from year *t-1* to *t*. Estimation results suggest that *Local gap* is insignificantly related to the percentage change in the short-term compensation. In sum, the increase in total compensation is not through an increase in the short-term compensation.

Columns (5) and (6) of Table 9 examine whether the pay increase is through long-term compensation. The dependent variable in column (5) is an indicator variable that equals one if a CEO receives an increase in long-term compensation from year *t-1* to *t*. The estimated coefficient on *Local gap* is positive and significant, suggesting that CEOs who face higher local incentives are more likely to receive an increase in long-term compensation. Column (6) estimates the percentage changes in long-term compensation from year *t*-1 to *t*. The estimation results suggest that *Local gap* is also positively and significantly related to the percentage change in long-term compensation.

Overall, the evidence above suggests that CEOs who face higher local incentives are more likely to receive an increase in total compensation. The increase comes from changes in long-term compensation, but not short-term compensation. These findings support the notion that CEOs demand a higher compensation when to catch up with higher paid local peers.

5. Robustness Tests

5.1 Alternative Measures of Local Incentives

I use alternative measures of local incentives to check the robustness of my results. The first measure is the *Size-adjusted local gap*. This measure takes into consideration that CEOs of small firms are not directly comparable to CEOs of large firms; therefore, they may not compete in the same tournament. Following Coles, Li, and Wang (2017), I calculate *Size-adjusted local gap* as the pay gap between the CEO and the second-highest-paid CEO in the same MSA and company size group. I estimate the effect of *Size-adjusted local gap* on firm risk in column (1) of Table 10. The dependent variable is *Stock return volatility* in Panel A and *Idiosyncratic volatility* in Panel B. Estimation results suggest a positive and significant relation between *Size-adjusted local gap* and firm risk. In terms of economic significance, a one standard deviation increase in *Size-adjusted local gap* leads to a 1.4% increase in *Stock return volatility* and a 1.0% increase in *Idiosyncratic volatility*.

The second proxy measures local incentives at the city level. The purpose of this proxy is to ensure that my results are robust to alternative definitions of "local". *City gap* measures the pay

gap between the CEO and the second-highest-paid CEO in the same city. I require at least three Execucomp firms in each city so that there are enough participants in a tournament for a given city. I estimate the effect of *City gap* on *Stock return volatility* in column (2) of Table 10. Estimation results suggest that CEOs also respond to *City gap*. In terms of economic significance, a one standard deviation increase in *City gap* centers on it mean results in a 1.8% increase in *Stock return volatility* and a 1.0% increase in *Idiosyncratic volatility.*

The third proxy calculates local incentives as the pay differential between the CEO and the highest-paid CEO in the MSA. Core, Guay, and Larcker (2008) show that business press coverage is positively related to the total compensation of the CEO. Therefore, the highest-paid CEO is more likely to receive media coverage and local CEOs can learn about her total compensation with relatively less information asymmetry. One anecdote is that *U.S. News* actually has an annual article for the highest-paid CEO by the state.[19] I estimate the effect in column (3) of Table 10. Estimation results continue to suggest a positive relationship between local incentives and firm risk. Specifically, a one standard deviation increase in *Local gap highest* leads to a 2.2% increase in *Stock return volatility* and a 2.6% increase in *Idiosyncratic volatility.*

Collectively, evidence from Table 10 suggests that my earlier results are robust to using alternative measures of local incentives. The economic significance is also similar. A one standard deviation increase in local incentives is associated with a one-to-two percent increase in firm risk, measured by either *Stock return volatility* or *Idiosyncratic volatility.*

[19] For example, see https://www.usnews.com/news/business/articles/2017-05-25/the-highest-paid-ceos-by-state

5.2 Placebo Tests

I conduct placebo tests where I randomly assign (with replacement) an MSA to each firm based on the sample distribution of MSAs to further check the robustness of my results. If the observed effect is local, I should reject the null of a zero coefficient at the 5% significance level, 5% of the time. I calculate the placebo *Local gap*, re-estimate the baseline fixed-effects OLS regression with the full set of controls, record the coefficient and significance level, and repeat the process 500 times. Columns (1) and (2) of Table 11 report the average coefficient on *Local gap* over the 500 repetitions and the percentage of coefficients that are significant at the 5% level. The average coefficient on *Local gap* from a randomly assigned MSA is -0.001 for *Stock return volatility* and -0.051 for *Idiosyncratic volatility*. Further, the coefficient is significant for less than 3.2% of the time for *Stock return volatility* and 3% of the time for *Idiosyncratic volatility*. Overall, the test results reject the notion that *Local gap* calculated based on a randomly assigned MSA is significantly related to firm risk. Evidence from placebo tests suggests that the measure of local incentives utilized in the paper likely reflects an economically meaningful characterization of geographically based tournament incentives.

5.3 Subsample Analysis

Finally, I examine whether my results hold in various subsamples. First, I split the sample in the middle of my sample period to ensure that my results exist in both sample periods. Columns (1) and (2) of Table 12 report estimation results using sample period from 1992 to 2003 and from

2004 to 2014. The coefficient estimates on *Local gap* is positive and significant in both periods, suggesting that the effect of local incentives exists throughout the sample periods. In addition, the coefficient estimates are not significantly different from each other, suggesting that the magnitude of the effect is similar in both periods.

Second, I examine whether the results exist in both large and small MSAs. The purpose of this test is to show that the effect is generalizable and is not driven by a few large MSAs. I split the sample base on the sample median MSA size, which is measured by the number of firms headquartered in the MSA in that year. I estimate the effect of local incentives on firm risk in both samples and report the results in columns (3) and (4) of Table 12. Estimation results suggest that the effect of local incentives on firm risk is positive and significant in both small and large MSAs, suggesting that the effect is generalizable.

6. Conclusion

This paper documents the effect of local tournament incentives on CEO risk taking. Using the compensation gap between the CEO and the second-highest-paid CEO in the same MSA as a proxy for local incentives, I show that local incentives positively affect both stock return volatility and idiosyncratic volatility. CEOs implement riskier investment choices via higher R&D expenditures and increased firm focus. Using prestigious CEO awards as quasi-shocks to CEO status, I show that the effect is stronger when both the monetary and status gap is high. Cross-sectional evidence suggests that the effect of local incentives varies systematically with the prize of the promotion,

the probability of winning, and the similarity between the CEOs, consistent with both tournament channel and social comparison channel. Finally, the results are robust to alternative measures of local tournament incentives, subsample analyses, and placebo checks.

Appendix A: Variable Definitions

Variable	Source	Definitions
Incentives Variables:		
Local gap ($ 000)	Execucomp	The pay gap between the CEO and the second-highest-paid CEO in the same MSA.
Firm gap ($ 000)	Execucomp	The pay gap between the CEO and the median-paid VP.
Industry gap ($ 000)	Execucomp	The pay gap between the CEO and the second-highest-paid CEO in the Fama-French-30 industry.
Size-adjusted local gap ($ 000)	Execucomp	The pay gap between the CEO and the second-highest-paid CEO in the same MSA and size group.
City gap ($ 000)	Execucomp	The pay gap between the CEO and the second-highest-paid CEO in the same city.
Local gap highest ($ 000)	Execucomp	The pay gap between the CEO and the highest-paid CEO in the same MSA and CEO's total compensation.
Executive Characteristics:		
CEO delta	Execucomp	The change in the dollar value of the CEO's wealth for a one percentage point change in stock price.
CEO vega	Execucomp	The change in the dollar value of the CEO's wealth for a 0.01 change in the annualized standard deviation of stock returns.
CEO tenure	Execucomp	CEO's tenure.
CEO age	Execucomp	CEO's age.
Short-term compensation ($ 000)	Execucomp	Salary + bonus + other annual payments.
Long-term compensation ($ 000)	Execucomp	Restricted stock grants + option grants long-term incentive payouts + other payments.
Total compensation ($ 000)	Execucomp	Short-term compensation + long-term compensation.
Firm Characteristics:		
Stock return volatility	CRSP	The variance of one-year daily stock returns.
Idiosyncratic volatility	CRSP	The annualized standard deviation of the residuals from the regression of daily stock returns on the Fama and French three factors.
Log assets	Compustat	Natural logarithm of total assets.

Sales growth	Compustat	The percentage increase in net sales from year t-1 to year t.
Book leverage	Compustat	The book value of long-term debt plus debt in current liabilities divided by book value of assets.
Market-to-book	Compustat	(Market value of equity + book value of debt) / book value of total assets.
ROA	Compustat	Net income over total assets.
RD	Compustat	R&D expenditures divided by total assets.
CAPX	Compustat	Capital expenditures divided by total assets.
Segment HHI	Compustat	Segment HHI is the business segment sales-based Herfindahl–Hirschman Index calculated by summing the squares of the ratios of individual segment sales to the firm's total sales.
# segment	Compustat	The number of business segments.
Macro-level Controls:		
GDP growth	Bureau of Economic Analysis	State GDP growth rate.
# firms in the MSA	Compustat	The number of Execucomp firms headquartered in the MSA.
Political balance	U.S. House of Representatives	The fraction of a state's congress members representing their state in the U.S. House of Representatives that belong to the Democratic Party.
Geographic distance	Vincenty formula	$3963.19 \times \arctan\left(\frac{\sqrt{(\cos\phi_2 \sin(\lambda_2 - \lambda_1))^2(\cos\phi_1\sin\phi_2 - \sin\phi}}{sin\phi_1 sin\phi_2 + cos\phi_1 cos\phi_2 \cos}\right.$ where φi denotes latitude and λi denotes longitude

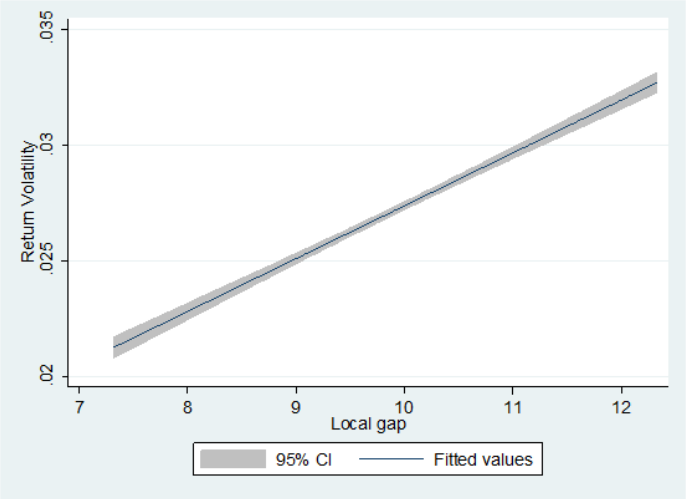
Figure 1: CEO Pay by MSA

Figure 1 plots the distribution of CEO total compensations within each MSA during the fiscal year 2010. MSAs are ranked based on the number of Execucomp firms that are headquartered in the MSA. The box plot shows the minimum, lower quartile, median, upper quartile, and CEO total compensation that is 1.5 IQR (interquartile range) higher than the MSA upper quantile value (shown in dots).

Figure 2: Univariate Analysis

Figure 2 presents linear fit plots of firm risk on *Local gap*. The *x*-axis is *Local gap*. The *y*-axis in Graph A and B is *Stock return volatility* and *Idiosyncratic volatility*. The gray area represents the 90% confidence intervals of the linear estimation. Estimation is based on the full sample period from 1992 to 2014. Appendix A provides definitions of all the variables.

Graph A: Stock Return Volatility



Graph B: Idiosyncratic Volatility

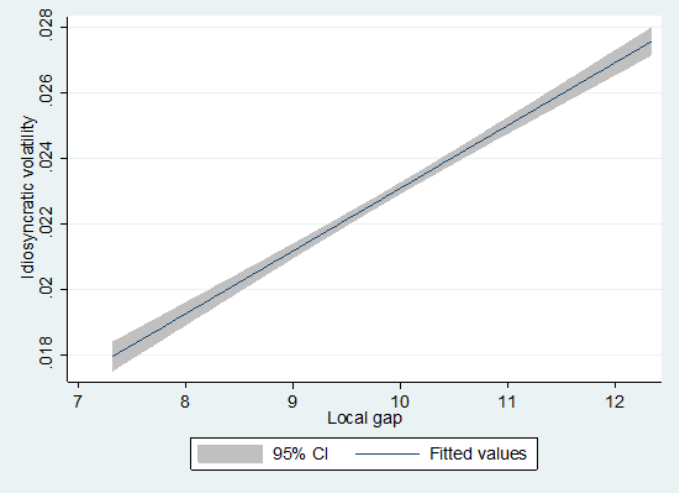


Table 1: CEO Pay by MSA

This table presents summary statistics of CEO compensation within each MSA in 2010. Column (1) presents the number of Execucomp firms headquartered in the MSA. Columns (2) to (5) present the lowest, 25th percentile, median, 75th percentile, second highest, and the highest value of CEO total compensation. CEO total compensation is measured in thousands of dollars. Dollar values are expressed in 2010 dollars.

MSA Name	N (1)	Lowest (2)	25th (3)	Median (4)	75th (5)	2nd Highest (6)	Highest (7)
New York-Northern New Jersey-Long Island	175	380	2,403	5,548	10,032	80,305	84,469
Chicago-Naperville-Joliet	86	635	2,616	4,448	7,220	20,023	20,783
Los Angeles-Long Beach-Santa Ana	82	316	1,602	3,050	6,024	28,017	46,857
San Jose-Sunnyvale-Santa Clara	75	299	1,958	4,003	7,702	23,862	29,545
Boston-Cambridge-Quincy	67	524	1,718	3,111	6,093	19,968	21,173
Houston-Sugar Land-Baytown	65	341	2,451	4,936	7,704	18,798	19,264
Dallas-Fort Worth-Arlington	54	425	2,216	3,858	6,304	20,246	21,476
San Francisco-Oakland-Fremont	51	712	1,802	4,005	9,158	32,207	77,559
Minneapolis-St. Paul-Bloomington	48	592	2,015	3,645	6,960	19,738	23,885
Philadelphia-Camden-Wilmington	47	1,057	1,987	3,262	6,590	15,121	28,155
Atlanta-Sandy Springs-Marietta	41	357	1,955	3,023	5,393	11,464	19,244
Washington-Arlington-Alexandria	37	1,410	2,361	4,876	9,620	19,118	30,879
Pittsburgh	25	1,388	3,137	5,140	9,896	15,647	15,678
St. Louis	24	921	3,301	4,527	8,278	12,396	22,943
Denver-Aurora	24	797	2,343	5,216	8,477	20,337	42,589
Bridgeport-Stamford-Norwalk	23	602	1,752	5,531	8,822	10,634	10,929
Seattle-Tacoma-Bellevue	20	675	1,585	3,447	5,594	8,884	21,733
Cleveland-Elyria-Mentor	20	970	3,033	4,436	6,546	9,605	15,296
Miami-Fort Lauderdale-Pompano Beach	19	833	1,965	3,631	6,765	9,663	11,498
Cincinnati-Middletown	19	816	2,430	5,598	6,813	11,782	13,115
Phoenix-Mesa-Scottsdale	19	277	2,248	4,804	6,301	10,019	13,314
Milwaukee-Waukesha-West Allis	19	374	1,255	5,340	6,653	8,731	15,234
San Diego-Carlsbad-San Marcos	19	1,197	1,975	3,287	5,887	11,605	17,534
Detroit-Warren-Livonia	16	630	2,911	5,819	8,752	13,712	26,520
Charlotte-Gastonia-Concord	15	1,252	2,927	4,193	6,572	8,798	8,977
Nashville-Davidson-Murfreesboro-Franklin	15	303	1,719	4,807	5,383	8,152	12,775
Portland-Vancouver-Beaverton	14	902	1,653	2,777	3,975	9,921	11,030
Kansas City	12	1,084	2,847	4,034	5,970	6,968	9,068
Richmond	12	1,511	2,762	5,076	10,148	14,953	20,773

Baltimore-Towson	12	398	2,013	4,929	6,306	7,724	7,844
Hartford-West Hartford-East Hartford	11	1,041	1,483	6,118	18,447	19,499	32,570
Columbus	11	2,564	3,587	6,022	14,702	20,508	22,513
Austin-Round Rock	11	45	1,948	2,742	4,352	5,537	6,636
Mean	36	777	2,241	4,401	7,680	16,786	23,693
Median	20	675	2,015	4,448	6,765	13,712	20,773

Table 2: Summary Statistics

Panel A presents summary statistics for the full sample. Panels B and C present summary statistics (mean and median) in subsamples with below and above median *Local gap*. *Local gap* is the natural logarithm of the pay gap between the CEO and the second-highest-paid CEO in the MSA. Panel B presents *t*-test of whether the two samples have equal means. Panel C presents Wilcoxon test of whether the two samples have equal medians. Continuous variables are winsorized at their 1st and 99th percentiles, and dollar values are expressed in 2010 dollars. Appendix A provides definitions of all the variables.

Panel A: Summary Statistics Full Sample

	N	Mean	Std. Dev.	P25	Median	P75	Min	Max
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent Variables								
Stock return volatility	23,405	0.027	0.014	0.017	0.024	0.034	0.009	0.080
Idiosyncratic volatility	23,405	0.023	0.013	0.014	0.020	0.028	0.006	0.076
Main Explanatory Variable								
Local gap	23,442	18,835	19,472	6,460	13,342	23,466	439	113,693
Control Variables								
Log assets	23,442	7.482	1.724	6.212	7.308	8.582	4.173	12.27
Book leverage	23,334	0.217	0.182	0.053	0.198	0.334	0	0.803
ROA	23,440	0.0353	0.102	0.0113	0.0433	0.0828	-0.481	0.259
Market-to-book	23,441	1.939	1.284	1.142	1.499	2.201	0.774	8.123
Sales growth	21,925	0.111	0.245	-0.004	0.077	0.186	-0.476	1.243
CAPX	22,691	0.053	0.054	0.018	0.037	0.068	0.000	0.288
RD	23,442	0.030	0.055	0.000	0.000	0.036	0.000	0.264
# segments	20,493	2.891	2.277	1	2	4	1	11
Segment HHI	21,466	0.813	0.244	0.585	1	1	0.233	1
Firm gap	23,440	2,646	3,188	622.8	1,542	3,472	0	17,236
Industry gap	23,005	24,178	23,170	10,307	18,783	30,083	1,220	131,578
CEO age	23,442	55.58	7.262	51	56	60	39	76
CEO tenure	23,442	4.561	3.378	2	4	6	1	16
CEO delta	23,442	672	1,510	81.44	215.2	572.6	3.269	11,141
CEO vega	23,442	129.7	203.1	17.07	53.71	146.8	0	1,177
Macro Variables:								
# firms in the MSA	23,442	57.51	44.52	20	51	77	6	185
State GDP growth	23,442	0.048	0.030	0.033	0.047	0.065	-0.040	0.122
Political balance	23,442	52.22	12.85	40.98	51.61	62.5	30.3	87.5

Panel B: Compare Sample Means

	Below Median *Local gap*			Above Median *Local gap*				
	N	Mean	Std. Dev.	N	Mean	Std. Dev.	Diff	T-value
Stock return volatility	11,713	0.026	0.013	11,692	0.028	0.015	-0.002	-12.556
Idiosyncratic volatility	11,713	0.022	0.011	11,692	0.024	0.012	-0.002	-10.519
RD	11,727	0.023	0.047	11,715	0.037	0.061	-0.014	-19.972

CAPX	11,309	0.055	0.053	11,382	0.050	0.054	0.005	6.643
# Segments	10,111	2.989	2.315	10,382	2.795	2.236	0.194	6.087
Segment HHI	10,715	0.796	0.250	10,751	0.830	0.236	-0.034	-10.176
Book leverage	11,687	0.230	0.176	11,647	0.204	0.188	0.027	11.231
Log assets	12,222	7.688	1.690	13,211	7.535	1.840	0.153	6.880
Market-to-book	11,726	1.846	1.159	11,715	2.032	1.391	-0.186	-11.102
ROA	11,726	0.039	0.093	11,714	0.032	0.110	0.007	5.112

Panel C: Compare Sample Medians

	Below Median Incentive			Above Median Incentive				
	N	Median	Std. Dev.	N	Median	Std. Dev.	Diff	Z-value
Stock return volatility	11,713	0.023	0.013	11,692	0.0244	0.015	-0.002	-10.665
Idiosyncratic volatility	11,713	0.018	0.011	11,692	0.020	0.012	-0.002	-10.563
RD	11,727	0.000	0.047	11,715	0	0.061	0.000	-14.750
CAPX	11,309	0.039	0.053	11,382	0.0349	0.054	0.005	9.352
# Segments	10,111	3.000	2.315	10,382	2	2.236	1.000	6.642
Segment HHI	10,715	1.000	0.25	10,751	1	0.236	0.000	-9.708
Book leverage	11,687	0.221	0.176	11,647	0.181	0.188	0.040	14.251
Log assets	12,222	7.530	1.69	13,211	7.327	1.84	0.203	8.965
Market-to-book	11,726	1.454	1.159	11,715	1.55	1.391	-0.096	-8.947
ROA	11,726	0.044	0.093	11,714	0.0432	0.11	0.001	1.769

Table 3: Multivariate Analysis

This table presents results from OLS regressions relating local incentives to firm risk from 1992 to 2014. The dependent variable in columns (1) to (3) is *Stock return volatility* x 100. The dependent variable in columns (4) to (6) is *Idiosyncratic volatility* x 100. *Local gap* is the natural logarithm of the pay gap between the CEO and the second-highest-paid CEO in the MSA. All regressions include CEO-by-firm and year fixed effects. Continuous variables are winsorized at their 1st and 99th percentiles, and dollar values are expressed in 2010 dollars. Appendix A provides definitions of all the variables. Standard errors, adjusted for clustering at the firm level, are reported in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

	Stock Return Volatility			Idiosyncratic Volatility		
	(1)	(2)	(3)	(4)	(5)	(6)
Local gap $_{t-1}$	0.070***	0.068***	0.063***	0.039***	0.031***	0.037***
	(0.011)	(0.012)	(0.012)	(0.011)	(0.011)	(0.011)
Firm gap $_{t-1}$		0.021***	0.021***		0.012*	0.013*
		(0.007)	(0.007)		(0.007)	(0.007)
Industry gap $_{t-1}$		0.086***	0.087***		0.096***	0.095***
		(0.012)	(0.012)		(0.011)	(0.011)
Log assets $_{t}$	-0.104***	-0.112***	-0.114***	-0.176***	-0.179***	-0.178***
	(0.033)	(0.034)	(0.034)	(0.025)	(0.024)	(0.024)
Book leverage $_{t}$	0.480***	0.501***	0.504***	0.581***	0.591***	0.593***
	(0.116)	(0.116)	(0.116)	(0.108)	(0.107)	(0.107)
ROA $_{t}$	-2.055***	-2.025***	-2.026***	-2.838***	-2.806***	-2.812***
	(0.138)	(0.138)	(0.138)	(0.148)	(0.148)	(0.148)
Market-to-book $_{t}$	0.064***	0.061***	0.060***	0.088***	0.084***	0.083***
	(0.014)	(0.014)	(0.014)	(0.013)	(0.013)	(0.013)
CEO delta $_{t-1}$	0.001	0.001	0.001	0.003	0.002	0.002
	(0.003)	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)
CEO vega $_{t-1}$	0.016	0.017	0.017	-0.008	-0.007	-0.007
	(0.021)	(0.020)	(0.020)	(0.019)	(0.019)	(0.018)
Sales growth rate $_{t}$	0.072**	0.070**	0.067**	0.151***	0.157***	0.156***
	(0.034)	(0.034)	(0.034)	(0.033)	(0.033)	(0.033)
Log CEO tenure $_{t}$	0.041	0.044	0.044	-0.021	-0.019	-0.019
	(0.029)	(0.029)	(0.029)	(0.016)	(0.016)	(0.016)
Log CEO age $_{t}$	-2.005**	-1.764*	-1.741*	-0.223*	-0.229*	-0.232*
	(0.990)	(1.031)	(1.030)	(0.130)	(0.129)	(0.129)
State GDP growth rate $_{t}$			0.822**			0.282
			(0.386)			(0.390)
# firms in the MSA $_{t}$			0.001			-0.058
			(0.001)			(0.039)
Political balance $_{t}$			0.000			-0.002
			(0.002)			(0.002)
CEO-Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
N	20,736	20,307	20,307	20,736	20,307	20,307
Adj_R2	0.758	0.758	0.758	0.660	0.661	0.661

Table 4: Propensity Score Matching

This table explores the effect of local incentives on firm risk using a propensity score matched sample. Treatment group consists of firms that are ranked in the upper quartile of the *Local gap* distribution. I estimate propensity scores using CEO total compensation, *Log assets*, *Book leverage*, *ROA*, *Market-to-book*, and *Sales growth rate*. I match each treatment firm to a control firm (with replacement), on year, Fama-French-30 industry, and the closest propensity score. Columns (1) and (2) of Panel A tabulates the means of the matched variables and propensity scores for the treatment and control groups. Column (3) reports the difference of the mean values between the treatment and control groups. Column (4) and (5) reports the *p*-value (*t*-value) of the difference between treatment and control firms. Panel B presents results from OLS regressions relating local incentives to firm risk on the propensity score matched sample from 1992 to 2014. The dependent variable in columns (1) and (2) is *Stock return volatility* x 100 and *Idiosyncratic volatility* x 100. *Local gap* is the natural logarithm of the pay gap between the CEO and the second-highest-paid CEO in the MSA. Continuous variables are winsorized at their 1st and 99th percentiles, and dollar values are expressed in 2010 dollars. Appendix A provides definitions of all the variables. Standard errors, adjusted for clustering at the firm level, are reported in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

Panel A: Post-Match Comparison of Means across Matched Samples

	Treatment Group (Obs.=3,367)	Control Group (Obs.=3,367)	Difference	Pr(|T|>|t|)	T-Value
	(1)	(2)	(3)	(4)	(5)
Propensity score	0.288	0.288	0.000	0.000	0.03
CEO total compensation	4903.015	4813.582	89.433	0.436	0.779
Log assets	7.858	7.825	0.033	0.348	0.938
Book leverage	0.238	0.238	0.000	0.951	-0.061
ROA	0.041	0.040	0.001	0.565	0.576
Market-to-book	1.798	1.789	0.008	0.701	0.383
Sales growth rate	0.147	0.127	0.019	0.399	0.843

Panel B: Post-Match Estimation Results

	(1) Stock Return Volatility	(2) Idiosyncratic Volatility
Local gap $_{t-1}$	0.042***	0.036**
	(0.015)	(0.017)
Firm gap $_{t-1}$	0.031	-0.043
	(0.153)	(0.183)
Industry gap $_{t-1}$	0.039**	0.062***
	(0.017)	(0.017)
Control variables	Yes	Yes
CEO-Firm FE	Yes	Yes
Year FE	Yes	Yes
N	6,734	6,734
Adj R2	0.744	0.656

Table 5: Exogenous Media Award

This table presents the results from OLS regressions relating local incentives to firm risk from 1992 to 2012. The dependent variable in columns (1) and (2) is *Stock return volatility* x 100 and *Idiosyncratic volatility* x 100. *Local gap* is the natural logarithm of the pay gap between the CEO and the second-highest-paid CEO in the MSA. *Winner* is an indicator variable that equals one if the second-highest-paid CEO's firm is listed on the "100 Best Companies to Work for in America" in *Fortune* magazine in that year and zero otherwise. All regressions include CEO-by-firm and year fixed effects. Continuous variables are winsorized at their 1st and 99th percentiles, and dollar values are expressed in 2010 dollars. Appendix A provides definitions of all the variables. Standard errors, adjusted for clustering at the firm level, are reported in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

	Stock Return Volatility	Idiosyncratic Volatility
	(1)	(2)
Local gap $_{t-1}$	0.042***	0.029**
	(0.010)	(0.012)
Winner $_{t-1}$	-0.953***	-0.704***
	(0.198)	(0.210)
Local gap $_{t-1}$ x Winner $_{t-1}$	0.092***	0.070***
	(0.019)	(0.021)
Firm gap $_{t-1}$	0.074	0.011
	(0.063)	(0.061)
Industry gap $_{t-1}$	0.072***	0.101***
	(0.012)	(0.013)
Control variables	Yes	Yes
CEO-Firm FE	Yes	Yes
Year FE	Yes	Yes
N	18,858	18,858
Adj R2	0.760	0.519

Table 6: Effects of Local Incentives Conditional on Similarity

This table presents the results from OLS regressions relating local incentives to firm risk from 1992 to 2014. The dependent variable in Panel A and B is *Stock return volatility* x 100 and *Idiosyncratic volatility* x 100. *Local gap* is the natural logarithm of the pay gap between the CEO and the second-highest-paid CEO in the MSA. |*Size gap*| is the absolute value of the difference in the total asset between the firm and the second-highest-paid CEO's firm. |*Age gap*| is the absolute value of the difference in CEO age between the firm and the second-highest-paid CEO's firm. *Distance gap* is the geographic distance between the firm and the second-highest-paid CEO's firm. It is calculated using the Vincenty formula for distances on ellipsoids. *Same Industry* is an indicator variable that equals one if the firm and the second-highest-paid CEO's firm share the Fama-French-30 industry. *Share director* is an indicator variable that equals one if the firm and the second-highest-paid CEO's firm share at least one director. All regressions include CEO-by-firm and year fixed effects. Continuous variables are winsorized at their 1st and 99th percentiles. Dollar values are expressed in 2010 dollars. Appendix A provides definitions of all the variables. Standard errors, adjusted for clustering at the firm level, are reported in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

Panel A: Stock Return Volatility

	(1)	(2)	(3)	(4)	(5)
Local gap $_{t-1}$	0.184***	0.056***	0.104***	0.050***	0.044***
	(0.046)	(0.011)	(0.015)	(0.011)	(0.014)
Local gap $_{t-1}$ x Log |size gap| $_{t-1}$	-0.017***				
	(0.006)				
Local gap $_{t-1}$ x Log |CEO age gap| $_{t-1}$		-0.003***			
		(0.001)			
Local gap $_{t-1}$ x Distance gap $_{t-1}$			-0.002***		
			(0.000)		
Local gap $_{t-1}$ x Same industry $_{t-1}$				0.057***	
				(0.019)	
Local gap $_{t-1}$ x Share director $_{t-1}$					0.060***
					(0.018)
Control variables	Yes	Yes	Yes	Yes	Yes
CEO-Firm FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
N	20,307	20,307	20,307	20,307	16,347
Adj_R2	0.758	0.758	0.758	0.758	0.749

Panel B: Idiosyncratic Volatility

	(1)	(2)	(3)	(4)	(5)
Local gap $_{t-1}$	0.095**	0.023**	0.063***	0.023**	0.034**
	(0.046)	(0.010)	(0.014)	(0.011)	(0.014)
Local gap $_{t-1}$ x Log |size gap| $_{t-1}$	-0.009*				
	(0.006)				
Local gap $_{t-1}$ x Log |CEO age gap| $_{t-1}$		-0.002**			
		(0.001)			
Local gap $_{t-1}$ x Distance gap $_{t-1}$			-0.001**		
			(0.000)		
Local gap $_{t-1}$ x Same industry $_{t-1}$				0.006	
				(0.018)	
Local gap $_{t-1}$ x Share director $_{t-1}$					0.028*
					(0.016)
Control variables	Yes	Yes	Yes	Yes	Yes

CEO-Firm FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
N	20,307	20,307	20,307	20,307	16,347
Adj_R2	0.758	0.758	0.758	0.758	0.749

Table 7: Effects of Local Incentives Conditional on the Probability of Winning

This table presents the results from OLS regressions relating local incentives to firm risk from 1992 to 2014. The dependent variable in Panel A and B is *Stock return volatility* x 100 and *Idiosyncratic volatility* x 100. *Local gap* is the natural logarithm of the pay gap between the CEO and the second-highest-paid CEO in the MSA. *Generalist* is an indicator variable that equals one if the CEO is a generalist, defined following Custódio, Ferreira, and Matos (2013). *CEO retire* is an indicator variable that equals one if the CEO is above 62 years old. *New CEO* is an indicator variable that equals one if the CEO's tenure is less than 3 years. All regressions include CEO-by-firm and year fixed effects. Continuous variables are winsorized at their 1st and 99th percentiles, and dollar values are expressed in 2010 dollars. Appendix A provides definitions of all the variables. Standard errors, adjusted for clustering at the firm level, are reported in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

Panel A: Stock Return Volatility

	Generalist		CEO Retire		New CEO	
	No	Yes	No	Yes	No	Yes
	(1)	(2)	(3)	(4)	(5)	(6)
Local gap $_{t-1}$	0.008	0.084***	0.058***	0.012	0.054***	0.024
	(0.015)	(0.017)	(0.013)	(0.017)	(0.012)	(0.020)
Firm gap $_{t-1}$	0.033***	0.034***	0.124*	-0.022	0.021**	0.018
	(0.012)	(0.010)	(0.069)	(0.165)	(0.009)	(0.015)
Industry gap $_{t-1}$	0.128***	0.126***	0.060***	0.067***	0.085***	0.033
	(0.017)	(0.020)	(0.013)	(0.022)	(0.013)	(0.022)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
CEO-Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
N	5,943	6,112	15,649	4,658	15,627	4,686
Adj_R2	0.804	0.779	0.755	0.756	0.744	0.834

Panel B: Idiosyncratic Volatility

	Generalist		CEO Retire		New CEO	
	No	Yes	No	Yes	No	Yes
	(1)	(2)	(3)	(4)	(5)	(6)
Local gap $_{t-1}$	0.009	0.044**	0.037***	-0.001	0.021**	0.028
	(0.013)	(0.017)	(0.013)	(0.018)	(0.011)	(0.022)
Firm gap $_{t-1}$	-0.004	0.016	0.009	0.028	0.008	-0.001
	(0.011)	(0.010)	(0.070)	(0.133)	(0.007)	(0.013)
Industry gap $_{t-1}$	0.082***	0.081***	0.062***	0.066***	0.075***	0.016
	(0.016)	(0.022)	(0.012)	(0.023)	(0.011)	(0.023)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
CEO-Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
N	5,943	6,112	15,649	4,658	15,627	4,686
Adj_R2	0.719	0.705	0.755	0.756	0.744	0.834

Table 8: Effects of Local Incentives on Firm Policy

This table presents the results from OLS regressions relating local incentives to investment and financial policy from 1992 to 2014. The dependent variable in columns (1) to (5) is R&D, the number of business segments, segment sales-based HHI, capital expenditures to assets, and book leverage. *Local gap* is the natural logarithm of the pay gap between the CEO and the second-highest-paid CEO in the MSA. All regressions include CEO-by-firm and year fixed effects. Continuous variables are winsorized at their 1st and 99th percentiles. Dollar values are expressed in 2010 dollars. Appendix A provides definitions of all the variables. Standard errors, adjusted for clustering at the firm level, are reported in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

	R&D	# Segments	Segment HHI	CAPX	Book Leverage
	(1)	(2)	(3)	(4)	(5)
Local gap $_{t-1}$	0.002**	-0.062*	0.010***	0.037	-0.003
	(0.001)	(0.032)	(0.004)	(0.055)	(0.002)
Firm gap $_{t-1}$	0.001**	-0.016	-0.001	0.011	-0.001
	(0.000)	(0.019)	(0.002)	(0.033)	(0.001)
Industry gap $_{t-1}$	0.006***	-0.033	0.022***	0.129**	-0.007***
	(0.001)	(0.039)	(0.004)	(0.060)	(0.003)
Log assets $_{t}$	-0.003***	0.406***	-0.041***	-0.191***	0.030***
	(0.001)	(0.036)	(0.004)	(0.056)	(0.002)
Book leverage $_{t}$	-0.036***	-0.082	-0.033	-0.393	
	(0.004)	(0.196)	(0.023)	(0.423)	
ROA $_{t}$	-0.152***	-0.066	-0.013	2.295***	-0.393***
	(0.009)	(0.214)	(0.024)	(0.455)	(0.029)
Market-to-book $_{t}$	0.010***	-0.173***	0.017***	0.327***	-0.004
	(0.001)	(0.028)	(0.003)	(0.055)	(0.003)
CEO delta $_{t-1}$	-0.000**	0.000	-0.000	0.000*	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
CEO vega $_{t-1}$	0.000***	-0.000	0.000	0.000	-0.000**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Sales growth rate $_{t}$	0.000	-0.138*	0.049***	0.626***	0.021***
	(0.002)	(0.073)	(0.008)	(0.176)	(0.006)
Log CEO tenure $_{t}$	0.001*	-0.017	-0.007*	-0.037	0.001
	(0.001)	(0.038)	(0.004)	(0.055)	(0.002)
Log CEO age $_{t}$	-0.011*	-0.925**	-0.013	-1.438*	-0.087***
	(0.006)	(0.427)	(0.047)	(0.852)	(0.031)
State GDP growth $_{t}$	-0.025	0.138	0.045	6.090***	-0.092
	(0.017)	(1.161)	(0.122)	(2.247)	(0.078)
# firms in the MSA $_{t}$	0.000	0.001	-0.000	-0.004***	-0.000
	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)
Political balance $_{t}$	0.000***	-0.006**	0.001***	-0.002	-0.000**
	(0.000)	(0.003)	(0.000)	(0.004)	(0.000)
R&D $_{t}$					-0.554***
					(0.068)
CEO-Firm FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
N	20,307	19,673	19,673	20,307	20,307
Adj R2	0.532	0.196	0.212	0.463	0.355

Table 9: Effects of Local Incentives on CEO Compensation

This table presents the results from OLS regressions relating local incentives to CEO compensation from 1992 to 2014. The dependent variable in columns (1), (3), and (5) is an indicator variable that equals one if the CEO receives an increase in total compensation, short-term compensation, and long-term compensation in that year and zero otherwise. The dependent variable in columns (2), (4), and (6) is the percentage change in total compensation, short-term compensation, and long-term compensation in that year. *Local gap* is the natural logarithm of the pay gap between the CEO and the second-highest-paid CEO in the MSA. All regressions include CEO-by-firm and year fixed effects. Continuous variables are winsorized at their 1st and 99th percentiles. Dollar values are expressed in 2010 dollars. Appendix A provides definitions of all the variables. Standard errors, adjusted for clustering at the firm level, are reported in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

	Total Compensation		Short-term Compensation		Long-term Compensation	
	Indicator	%Change	Indicator	%Change	Indicator	%Change
	(1)	(2)	(3)	(4)	(5)	(6)
Local gap $_{t-1}$	0.066***	0.212***	0.001	0.007	0.081***	0.479***
	(0.006)	(0.018)	(0.007)	(0.007)	(0.007)	(0.050)
Firm gap $_{t-1}$	-0.092***	-0.168***	-0.016***	-0.015***	-0.092***	-0.663***
	(0.006)	(0.020)	(0.004)	(0.005)	(0.006)	(0.068)
Industry gap $_{t-1}$	0.062***	0.165***	0.002	-0.000	0.061***	0.346***
	(0.007)	(0.017)	(0.007)	(0.007)	(0.008)	(0.051)
Log assets $_{t}$	-0.063***	-0.108***	-0.065***	-0.041***	-0.034***	-0.186**
	(0.011)	(0.035)	(0.013)	(0.015)	(0.012)	(0.091)
Book leverage $_{t}$	-0.179***	-0.548***	-0.223***	-0.475***	-0.067	-0.478
	(0.052)	(0.170)	(0.067)	(0.076)	(0.060)	(0.468)
ROA $_{t}$	0.010**	0.059***	-0.009	-0.028***	0.029***	0.086**
	(0.005)	(0.018)	(0.006)	(0.006)	(0.005)	(0.042)
Market-to-book $_{t}$	0.022	-0.282	-0.080	-0.159*	-0.101	-1.049
	(0.083)	(0.197)	(0.094)	(0.084)	(0.097)	(0.652)
CEO delta $_{t-1}$	-0.001	0.017	-0.006	0.013**	-0.013**	0.073*
	(0.005)	(0.016)	(0.006)	(0.006)	(0.006)	(0.043)
CEO vega $_{t-1}$	0.014	0.067**	0.020	0.019	0.026**	0.041
	(0.011)	(0.030)	(0.013)	(0.012)	(0.013)	(0.086)
Sales growth rate $_{t}$	-0.000	-0.000	0.000	0.000	-0.000	0.001
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Log CEO tenure $_{t}$	-0.005	-0.005	0.001	0.008***	-0.005	-0.052**
	(0.003)	(0.008)	(0.004)	(0.003)	(0.004)	(0.025)
Log CEO age $_{t}$	0.097***	0.044	-0.043***	-0.064***	0.057***	0.045
	(0.012)	(0.031)	(0.014)	(0.013)	(0.014)	(0.101)
GDP growth $_{t}$	0.324	0.531	1.324***	0.487	0.175	2.729
	(0.373)	(0.883)	(0.491)	(0.325)	(0.410)	(3.102)
# firms in the MSA $_{t}$	0.035	-0.182	0.394*	0.218	0.001	-2.245
	(0.219)	(0.564)	(0.236)	(0.224)	(0.245)	(1.653)
Political balance $_{t}$	-0.001**	-0.004***	-0.000	-0.000	-0.001***	-0.008***
	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)	(0.003)
CEO-Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
N	18,249	18,249	18,249	18,249	18,249	18,249
Adj R2	0.043	0.064	0.091	0.017	0.034	0.066

Table 10: Robustness: Alternative Measures of Local Incentives

This table presents the results from OLS regressions relating local incentives to firm risk from 1992 to 2014. The dependent variable in Panel A and B is *Stock return volatility* x 100 and *Idiosyncratic volatility* x 100. *Size-adjusted local gap* in column 1 is the pay gap between second highest CEO total compensation in the same MSA and size group and CEO total compensation. *City gap* in column 2 is the pay gap between second highest CEO total compensation in the same city and CEO total compensation. *Local gap highest* in column 3 is the pay gap between highest CEO total compensation in the same MSA and CEO total compensation. All regressions include CEO-by-firm and year fixed effects. Continuous variables are winsorized at their 1st and 99th percentiles. Dollar values are expressed in 2010 dollars. Appendix A provides definitions of all the variables. Standard errors, adjusted for clustering at the firm level, are reported in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

Panel A: Stock Return Volatility

	(1)	(2)	(3)
Size-adjusted local gap $_{t-1}$	0.033***		
	(0.008)		
City gap $_{t-1}$		0.043***	
		(0.011)	
Local gap highest $_{t-1}$			0.051***
			(0.010)
Control variables	Yes	Yes	Yes
CEO-Firm FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
N	19,680	11,170	20,120
Adj R2	0.761	0.713	0.759

Panel B: Idiosyncratic Volatility

	(1)	(2)	(3)
Local gap size adjusted $_{t-1}$	0.020***		
	(0.008)		
City gap $_{t-1}$		0.018*	
		(0.010)	
Local gap highest $_{t-1}$			0.015*
			(0.009)
Control variables	Yes	Yes	Yes
CEO-Firm FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
N	19,680	11,170	21,120
Adj R2	0.705	0.675	0.707

Table 11: Robustness: Placebo Test of Random Assignment of Headquarters

This table presents the results from OLS regressions relating local incentives to firm risk from 1992 to 2014. The dependent variable in columns (1) and (2) is *Stock return volatility* x 100 and *Idiosyncratic volatility* x 100. Firms are randomly assigned an MSA based on the observed distribution of MSAs. *Local gap* is the natural logarithm of the pay gap between the CEO and the second-highest-paid CEO in the randomly assigned MSA. I estimate the main regression with the full set of controls, record the coefficient and p-value, and repeat the procedure 500 times. The reported coefficient is the mean coefficient across 500 replications. % > 5% significance reports the percentage of coefficient estimates that are positive and significant at the 5% level. All regressions include CEO-by-firm and year fixed effects. Continuous variables are winsorized at their 1st and 99th percentiles. Dollar values are expressed in 2010 dollars. Appendix A provides definitions of all the variables. Standard errors, adjusted for clustering at the firm level, are reported in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

	Stock Return Volatility	*Idiosyncratic Volatility*
	(1)	(2)
Local gap $_{t-1}$	-0.001	-0.051
% > 5% significance	3.2%	3%
Controls	Yes	Yes
CEO-Firm FE	Yes	Yes
Year FE	Yes	Yes

Table 12: Robustness: Subsample Analysis

This table presents the results from OLS regressions relating local incentives to firm risk from 1992 to 2014. The dependent variable in Panel A and B is *Stock return volatility* x 100 and *Idiosyncratic volatility* x 100. *Local gap* is the natural logarithm of the pay gap between the CEO and the second-highest-paid CEO in the randomly assigned MSA. Columns (1) and (2) present estimation results in the pre-2004 and post-2004 sample period. Columns (3) and (4) present estimation results in small and large MSAs, which is based on the number of firms headquartered in the MSA. All regressions include CEO-by-firm and year fixed effects. Continuous variables are winsorized at their 1st and 99th percentiles. Dollar values are expressed in 2010 dollars. Appendix A provides definitions of all the variables. Standard errors, adjusted for clustering at the firm level, are reported in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

Panel A: Stock Return Volatility

	Pre-2004	Post-2004	Large MSAs	Small MSAs
	(1)	(2)	(3)	(4)
Local gap $_{t-1}$	0.031***	0.050***	0.076***	0.025**
	(0.010)	(0.016)	(0.016)	(0.012)
Firm gap $_{t-1}$	0.018**	-0.019*	0.017*	0.023**
	(0.008)	(0.011)	(0.009)	(0.010)
Industry gap $_{t-1}$	0.111***	-0.030**	0.082***	0.062***
	(0.014)	(0.015)	(0.015)	(0.016)
Control variables	Yes	Yes	Yes	Yes
CEO-Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
N	9,573	10,824	10,764	9,983
Adj_R2	0.822	0.746	0.776	0.679

Panel B: Idiosyncratic Volatility

	Pre-2004	Post-2004	Large MSAs	Small MSAs
	(1)	(2)	(3)	
Local gap $_{t-1}$	0.026**	0.030**	0.028*	0.029**
	(0.012)	(0.013)	(0.016)	(0.012)
Firm gap $_{t-1}$	-0.001	0.011	0.012	0.004
	(0.007)	(0.009)	(0.009)	(0.010)
Industry gap $_{t-1}$	0.051***	0.075***	0.096***	0.057***
	(0.015)	(0.012)	(0.013)	(0.014)
Control variables	Yes	Yes	Yes	Yes
CEO-Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
N	9,573	10,824	10,764	9,983
Adj_R2	0.767	0.631	0.679	0.752

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