Labor Unemployment Risk and CEO Incentive Compensation

Andrew Ellul
Indiana University, CEPR, CSEF and ECGI

Cong Wang
Chinese University of Hong Kong

Kuo Zhang
Chinese University of Hong Kong

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Abstract

We investigate the impact of workers' unemployment risk, a salient attribute of labor market frictions, on the design of CEO incentive compensation. Through its impact on risk-taking activities, option-based compensation is likely to also influence unemployment risk. Exploiting state-level changes in unemployment insurance benefits as a source of variation in the unemployment costs faced by workers, we find that, after unemployment insurance benefits increase, boards provide managers with more stock option grants that result in more convexity payoffs. This behavior is consistent with the view that CEO's risk-taking incentives are amplified by the board to take advantage of lower costs associated with unemployment risk. The increase in convexity payoff structures is more pronounced in labor-intensive industries and those with higher layoff propensity, but is attenuated by the strength of unionization. The results are also stronger when CEO wealth is more closely tied to firm performance. Finally, the increase in the convexity payoff from option-based compensation induces managers to increase the riskiness of investments and leverage, leading to improved operating performance. Overall, these results suggest that firms respond to unemployment risk by changing their risk taking behavior, and one channel through which they do so is executive compensation.

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Stock options promise executives all of the benefits of share price increases with none of the risk of share price declines…Stock options can encourage excessive risk taking and prompt executives to pursue corporate strategies designed to promote short-term stock price gains to the detriment of long-term performance and stability.[1]

- American Federation of Labor and Congress of Industrial Organizations

I. Introduction

Firms' nonfinancial stakeholders, especially workers, can play a significant role in affecting corporate financial and investment policies. Workers' claims are sizeable: in 2005 the off-balance-sheet pension liabilities for S&P 500 firms stood at $1.25 trillion, and one fourth of the companies in the Compustat database between 1991 and 2003 had defined benefit pension plans, which once consolidated with their financial debt, raised their leverage by about one third (Shidvasani and Stefanescu, 2010). Several studies show, both theoretically and empirically, that unemployment risk faced by rank-and-file employees is one of the drivers of firms' leverage decision (Titman (1984), Berk, Stanton and Zechner (2010), Bae, Kang, and Wang (2011), and Agrawal and Matsa (2013)).

By choosing a more conservative leverage ratio, firms will decrease the probability of financial distress and mitigate workers' exposure to unemployment risk. Recent evidence by Agrawal and Matsa (2013) shows that this is the case: Using changes in state-level unemployment insurance benefits as shocks to unemployment costs, they find evidence that as workers' unemployment risk decreases, firms respond by increasing the use of debt. While a more generous public unemployment insurance should have a first order impact on rank-and-file workers' unemployment risk, it is unlikely that it changes the incentives of risk-averse top-

[1] Comments provided by the "AFL-CIO" on the proposed rule on incentive-based compensation arrangements under Section 956 of the Dodd-Frank Wall Street Reform and Consumer Protection Act. See 'http://www.sec.gov/comments/s7-12-11/s71211-705.pdf'.

ranking managers who are tasked with setting the financial policy. This paper investigates the compensation channel through which boards incentivate risk-averse managers to alter firms' financial policies in response to changes in workers' unemployment risk.[2]

Unlike diversified shareholders, managers are risk-averse because they not only have a large portion of their personal wealth closely tied to their companies' performance, at the same time they also invest heavily their human capital in their respective companies. As a result, managers usually prefer to take less risk that falls below the level desirable for shareholders, including a more conservative financial policy than desired by diversified shareholders Jensen and Meckling (1976), Amihud and Lev (1981), Smith and Stulz (1985), Holmstrom (1999), and Gormley and Matsa (2015)). When costs associated with unemployment decrease, for example when the public provision of unemployment insurance becomes more generous, boards acting in the interests of shareholders will want to take on more risks, including higher financial leverage. Because public unemployment insurance is irrelevant for top-rank managers and does not influence their career concerns they are unlikely to change the conservative stance of the financial policy.

The question that naturally arises is whether – and how - managers can be incentivized to overcome their risk aversion and career concerns and increase the firm's risk-taking activities, including higher leverage, following decreases in the unemployment costs borne by rank-and-file employees. In this paper we fill this gap by investigating whether boards of directors adjust the structure of the Chief Executive Officer's compensation, especially the convexity payoff through the option-based compensation, to increase CEOs' risk-taking incentives following a decline in worker unemployment risk.

[2] It should be noted that leverage needs not be the only lever used by management to increase firm riskiness. The investment strategy is yet another mechanism: Firms could also reduce workers' exposure to unemployment risk by choosing less risky projects (Hennessy and Whited, 2005).

The option-based incentive compensation has long been suggested as a solution to the risk-related agency problem that risk-averse managers tend to pass up risky but positive net present value projects that are desired by diversified shareholders (Smith and Stulz, 1985; Heron and Lie, 2013). Consistent with this conjecture, extant research has examined the *ex-post* economic consequences of the incentive compensation and found a positive association between the risk-taking incentives in managerial compensation and various proxies of firm risk (Agrawal and Mandelker, 1987; Guay, 1999; Rajgopal and Shevlin, 2002; Knopf, Nam, and Thornton, 2002; Coles, Daniel, and Naveen, 2006; Chava and Purnanandam, 2010; Gormley, Matsa, and Milbourn, 2013; Shue and Townsend, 2013).[3] However, although it is beneficial for shareholders to mitigate managerial risk aversion via the use of option-based compensation, the increased risk-taking behavior and financial instability induced by the convex payoff structure of stock options can be detrimental to the firm's rank-and-file employees whose job security can be adversely affected when the risk of financial distress goes up as the quote above suggests.

Studies from labor economics have shown that workers bear substantial costs in the process of involuntary unemployment. For example, those who are laid-off involuntarily experience reductions in personal consumption (Gruber, 1997), go through delays and costly searching before finding another job (Katz and Meyer, 1990), fail to maintain previous wage level even after reemployment (Farber, 2005), and also endure psychological and social costs (Kalil and Ziol-Guest, 2008).[4] Anticipating the significant costs during unemployment, employees care about unemployment risk and ex ante require a premium in salaries or other

[3] Although the vast majority of empirical studies highlight a positive relation between option-based risk-taking incentives and firm risk, the theoretic prediction on that relationship is ambiguous. See Lambert, Larcker, and Verrechia (1991), Carpenter (2000), and Ross (2004).

[4] See the comment letters from displaced workers filed with the SEC describing their losses and sufferings during the economic turmoil, part of which was attributed to the inappropriate risk-taking induced by incentive-based managerial compensation, 'http://www.citizen.org/documents/Public-Citizen-Comments-SEC-956.pdf'.

benefits to compensate for the high level of unemployment risk they face (Abowd and Ashenfelter, 1981; Topel, 1984; Chemmanur, Cheng, and Zhang, 2013). They also take the financial stability and unemployment risk into consideration when they screen the potential employers (Brown and Matsa, 2013).

Given the increasing importance of employees' human capital and firms' reliance on the specific investments made by labor forces (Zingales, 2000), firms bear non-trivial costs of exposing workers to significant unemployment risk. First, the labor costs represent a large proportion of a firm's total expenses and the premium wages a firm has to offer to compensate for the potential job loss increase with the risk environments of a firm's operations. Second, high unemployment risk could reduce employees' willingness to undertake specific human capital investments and undermine firms' productivity to utilize assets in place and exploit future growth opportunities (Titman, 1984; Zingales, 2000). Since the risk-taking incentives embedded in managerial incentive compensation have a crucial impact on a firm's risk environment (see Gormley, Matsa, and Milbourn (2013) for a review of the relevant literature), the board should weigh the benefits of providing risk-averse managers with proper incentives to take more risk and the costs of exposing employees to significant unemployment risk when designing the optimal compensation packages.[5]

Empirically verifying the above conjecture proves challenging due to the lack of an appropriate proxy for labor unemployment risk and the difficulty to establish causality. To mitigate these potential issues, we follow Agrawal and Matsa (2013) and exploit the state-level changes in unemployment insurance benefits as a source of variation in the costs borne by employees during unemployment spells. We investigate whether, and in what way, the board of

[5] In the United States, the Constituency laws extend the fiduciary duty of board of directors to consider the interests of non-shareholder stakeholders when making business decisions.

directors redesigns the structure of CEO compensation and adjusts the level of risk-taking incentives in response to the exogenous shock to labor unemployment risk.

State unemployment insurance (henceforth "UI") benefit laws provide temporary income to eligible workers who become involuntarily unemployed and are still actively looking for new job positions. Although the basic framework of the unemployment insurance provision is set up commonly across the nation, individual states have the autonomy to decide on the specific parameters of the program, such as the eligibility of the applicant, the duration for which the insurance is provided, and the maximum amount of weekly benefits paid. The labor economics literature has shown that state UI benefits have a significant impact on workers' economic behaviors and the aggregate labor supply (Topel, 1984; Meyer, 1990, 1995; Hsu, Matsa and Melzer, 2014). More specifically, more generous state unemployment benefits reduce workers' *ex-post* costs during unemployment spells and can partially mitigate their *ex-ante* concern and required compensation for unemployment risk. As workers become more tolerant of the risk of financial distress, the board of directors can reshape the risk environment of the firm by providing managers with more risk-taking incentives as a way to mitigate the risk-related agency conflicts and better align the interests of executives with those of shareholders.

We empirically test the hypothesis using a comprehensive sample of 32,561 firm-year observations between 1992 and 2013. Following the compensation literature (e.g. Guay, 1999), we measure the risk-taking incentives provided in CEO compensation package by the sensitivity of the CEO's wealth to a firm's stock return volatility (*vega*). Specifically, we calculate the CEO's dollar change in wealth for a 0.01 increase in the annualized standard deviation of a firm's stock returns following Core and Guay (2002). We construct the measure based on the

equity grants in the current fiscal year (*flow vega*) since they are under direct control of the board of directors (Hayes, Lemmon, and Qiu, 2012; Gormley, Matsa, and Milbourn, 2013).

Our multivariate regression analysis shows that CEO flow vega increases following an increase in state UI benefits. This result is robust to controlling for a wide array of firm-specific characteristics and state economic conditions which may influence the decisions about UI benefits in the first place. Importantly, our baseline regressions include firm-level, CEO-level and firm-CEO fixed effects that will absorb any time-invariant unobserved characteristics at the firm, CEO or firm-CEO levels and that may drive the compensation choices. The positive impact of UI benefit generosity on CEO flow vega is also significant economically. A one-standard-deviation increase in the logarithm transformation of maximum UI benefits leads to a 14.6% increase in CEO flow vega. We also examine the channel of the increase in CEO flow vega and find that the increase is driven by stock options rather than restricted stocks in the CEO annual compensation package. These results lend support to our hypothesis that more generous public unemployment insurance reduces workers' concerns over job security and thereby leaves boards of directors more room to increase risk-taking incentives provided to top executives.

The positive effect of UI benefits on CEO flow vega survives a battery of robustness checks. First, we find that the significant relationship between UI benefits and the compensation CEO vega is robust to alternative sampling strategies that include 1) excluding CEO turnover years when the CEO pay is significantly affected by the severance package and thus quite different from normal periods, 2) dropping firms in the financial and utility industries, and 3) excluding firms operating in industries characterized with geographically-dispersed workforce where the measurement error for UI benefits is more likely to be an issue. Our results are also robust to using alternative measures of risk-taking incentives, such as logarithmic transformation

of the CEO vega (Low, 2009), vega scaled by the sensitivity of CEO wealth to stock price (delta) in the spirit of Dittmann and Yu (2010), and vega of the top management team because the CEO may not be the only manager tasked with deciding the financial and investment policies.

To further establish the causal relationship between state UI benefits and CEO vega, we conduct two falsification tests on the timing and location of the UI policy change. An examination on the timing of the relationship between the UI benefit change and CEO flow vega suggests that the board adjusts the level of risk-taking incentives provided in CEO compensation only *after* the change in the generosity of state UI benefits. However, no contemporaneous or reverse patterns are revealed in the data, which suggests that the effect we document is not due to some omitted economic conditions or local investment opportunities that tend to be persistent and sticky over time. In the second test, we compare the changes in CEO vega between a group of treatment firms headquartered in states that experience a large increase in UI benefits and a group of control firms headquartered in neighboring states that do not change UI benefits. We find that there is a significant increase in CEO vega for the treatment firms but not for the control firms. As bordering states tend to have similar economic conditions, the results from this analysis suggest that the positive effect of UI benefits on CEO vega is unlikely driven by some omitted variables related to local economic development and investment opportunities.

We next examine whether the positive relation between the state UI benefit generosity of state UI policy and CEO vega exhibits any cross-sectional variations in terms of labor market characteristics as the hypothesis would predict. If the channel through which UI benefits generosity affects CEO vega is the influence on employees' unemployment risk that is internalized by the board, then we expect its effect to be more pronounced when the layoff probability is high and when labor is more important as a production input factor. Consistent

with this conjecture, we find that the positive effect of UI benefits on CEO vega is more pronounced for firms operating in labor-intensive industries and in sectors that experience frequent layoffs. On the other hand, we also find that this effect is significantly weaker for firms operated in unionized industries, consistent with unionized workforce having strong collective bargaining power and thus the strength to significantly attenuating the board's ability to reshape the risk environment of the firm in the first place. The benefits of providing risk-averse CEOs with convex pay structures might also differ across firms since managers may have different levels of risk aversion. Consistent with Knopf, Nam, and Thornton (2002) who show that managers are more risk-averse when their wealth more sensitive to stock prices (i.e. higher delta), we find that the adjustment in CEO flow after the UI benefit increase is more pronounced when CEO delta is higher.

Finally, we examine whether the provision of more convexity in CEO compensation after the UI policy change has induced more corporate risk-taking behaviors in the future. Recall that leverage needs not be the only lever used by management to adjust the level of firm riskiness. The investment policy can be used as well (Hennessy and Whited, 2005). We find that firms investment more on R&D, less in capital expenditures and liquid assets, are less likely to conduct diversifying acquisitions. Overall these changes correlate with an increase in the stock return volatility after the increase in the generosity of UI benefit policy. We also confirm the findings in Agrawal and Matsa (2013) that higher UI benefits lead to higher leverage ratios. More interestingly, these risk-taking activities are only observed in firms that provide their CEOs with more risk-taking incentives following the UI benefit increase, suggesting that managers do respond to such incentives. Finally, we find that the risk-taking activities are associated with

significant improvement in company performance, but only for firms that provide their CEOs with more risk-taking incentives.

Our study makes two major contributions to the literature. First, we contribute to a growing literature on labor and finance. Existing studies of labor and finance (Titman (1984), Berk, Stanton, and Zechner (2010), and Agrawal and Matsa (2013)) show that unemployment risk faced by workers is one of the drivers of firms' financial policies. We show that the channel through which employee unemployment risk affects corporate financial policies is the adjustment of managerial risk-taking incentives embedded in executive compensation. One interpretation of our results is that boards do consider rank-and-file workers' unemployment risk and adjust the risk-taking incentives given to the firms' top management to reflect such risks. Importantly, this board strategy appears to emerge mostly when workers constitute an important input in the firms' production function: the positive effect of UI benefits on CEO flow vega is more pronounced for firms operating in labor-intensive industries.

Second, we add a new dimension to the executive compensation literature by showing that worker unemployment risk, a salient feature of labor market frictions, can play a significant role in the design of CEO pay. Prior research such as Smith and Watts (1992) and Guay (1999) show that firms tend to use stock options to encourage managers to take more risk when there are more investment opportunities. Recent studies exploit shocks to a firm's risk environment (Gormley, Matsa, and Milbourn, 2013; Angelis, Grullon, and Michenaud, 2013) or regulatory changes (Low, 2009; Hayes et al., 2012; Cohen, Dey, and Lys, 2013) and investigate how boards adjust CEO risk-taking incentives accordingly. We extend this literature by highlighting the role of rank-and-file employees in affecting the level of risk-taking incentives provided to managers.

Our findings suggest that workers' exposure to unemployment risk is important factor to consider when boards design the optimal incentive contracts for managers.

The rest of the paper is organized as follows. Section II describes the sample selection procedure, the construction of key variables, and presents summary statistics for variables used in the paper. The empirical results are presented in Section III. Section IV concludes the paper.

II. Sample construction and variable definition

A. Sample construction

We obtain the executive compensation information from the Compustat ExecuComp database. Our sample period spans from 1992 to 2013 since ExecuComp began covering executive compensation information of S&P 1500 firms in 1992. We obtain firm financial information from Compustat and stock return data from CRSP. Information on companies' historical states of headquarters is from SEC Analytics database which records historical corporate headquarters locations based on companies' 10-k filings.[6] Our final sample consists of 3,050 unique firms and 32,561 firm-year observations.

B. Measuring Unemployment Insurance (UI) benefits

We manually collect the amount of UI benefits for each state-year from the "Significant Provisions of State UI Laws" published by the U.S. Department of Labor[7]. Although the basic framework of the UI provision is set up by the joint federal-state system, the specific program parameters and hence the generosity of UI provision varies significantly across different states

[6] We do not use corporate headquarters locations listed in Compustat because Compustat only reports a firm's current state of headquarters rather than its historical headquarters location.
[7] The information is available on the following website: http://workforcesecurity.doleta.gov/unemploy/statelaws.asp.

and time periods. Two upper bounds of the parameters specified by the state legislation are especially important in determining the generosity of the UI policy. Specifically, the amount of benefits an eligible claimant can receive during the process of unemployment is capped by the allowed maximum amount of weekly benefit and the maximum benefit duration. Therefore, we follow Agrawal and Matsa (2013) and measure the generosity of each state's UI system by the product of the maximum amount of weekly benefit and the maximum benefit duration. While these unemployment benefits can be considered as sizeable when compared to the median wage earned by the rank-and-file employee, they pale in comparison to the median compensation given to top executives. Hence, their impact should influence the behavior of rank-and-file workers but not that of CEOs or top executives.

C. Measuring managerial risk-taking incentives

To capture the risk-taking incentives inherent in a CEO's compensation package, we follow prior studies (e.g., Guay, 1999; Core and Guay, 2002; Coles et al., 2006) and calculate the compensation *vega* of the CEO's stock and option portfolio in the firm. Specifically, *vega* measures the dollar change in the value of a CEO's stock and option portfolio per 0.01 increase in the annualized standard deviation of stock returns. To the extent that *vega* captures the convexity of the relation between a CEO's wealth and the firm's stock performance, it provides a straightforward measure of the CEO's incentive to undertake financing and investment policies that will increase firm risk (Smith and Stulz, 1985; Guay, 1999). Since the current stock and option grants through annual compensation packages are under more direct control of the board, we focus on the newly granted equity incentives, i.e. *flow vega*, based on a CEO's equity grants in the current fiscal year (Hayes et al., 2012; Gormley, Matsa, and Milbourn, 2013). Prior studies

also have shown that the risk-taking incentive provided by the current portion of outstanding compensation can be quickly adjusted in response to regulatory changes (Low, 2009) or shocks to firms' risk environment (Gormley, Matsa, and Milbourn, 2013; Angelis, Grullon, and Michenaud, 2013).[8]

D. Summary statistics

Panel A of Table 1 presents the summary statistics for compensation-related variables.

[Insert Table 1 here]

CEO flow vega has a mean of $26,710 and a median of $6,672. Both numbers are broadly consistent with those (a mean of $29,264 and median of $9,866) reported in Hayes et al. (2012) whose sample period is from 2002 to 2008. A break-down of the equity-based incentive compensation indicates that stock options are the largest component of a CEO's equity holdings. The value-based (number-based) portion of stock options represents approximately 70.0% (75.3%) of the newly-granted equity awards. In dollar terms, cash-component of CEO compensation in the form of salary and bonus account for about 44.4% (37.7%) for the average (median) firm in the sample.

Panel B of Table 1 presents the summary statistics of firm and CEO characteristics. The average (median) firm in our sample has a book value of total assets of $11,697 (1,438) million, a leverage ratio of 22.4% (20.2%), a market-to-book ratio of 1.989 (1.478), a return on assets (ROA) of 0.032 (0.043), and a tangible-to-total assets ratio of 0.272 (0.202). CEO tenure has a mean of 7.5 years and a median of 5 years. 56.2% of CEOs are also chairman of the board.

[8] In unreported results, we find that CEO's vega from her complete stock and option portfolio is also positively related to the generosity of UI benefits but the relationship is not statistically significant at the conventional level. This result is consistent with the conjecture that vega from a CEO's complete stock and option portfolio takes time to change while flow vega from the annual stock and option grants respond much more quickly to external shocks.

Following Coles et al. (2006) and Chava and Purnanandam (2010), we also construct variables that proxy for firms' investment and cash policies. The average (median) firm in our sample has a ratio of R&D to total assets of 2.8% (0%), a ratio of capital expenditure to total assets of 5.4% (3.9%), and a ratio of cash holdings to total assets of 14.2% (7.1%). We also obtain information on firms' acquisition activities from SDC and find that 74.1% of our sample firms acquired targets from a different industry during the sample period. As a measure of the overall risk of firms' assets, the annualized standard deviation of daily stock returns has a mean of 42.6% and a median of 37.7%.

Panel D of Table 1 presents summary statistics for the state-level variables. On average, a state permits a maximum amount of wage benefit of approximately $367 per week and that benefit allowance can be received by an eligible claimant for as long as 26 weeks. Our key variable of interest, the generosity of the UI policy, constructed by multiplying the maximum amount of weekly benefit with the maximum benefit duration, has a mean of $9,679 and a median of $9,022. To account for local economic conditions that may be correlated with state UI benefits, we control for GDP growth rate and unemployment rate in each state-year. The state GDP growth rate has a mean (median) of 4.808% (4.922%) and the state unemployment rate has a mean (median) of 6.019% (5.400%).

III. Empirical results

A. Univariate analysis

A.1. Cross-sectional correlation

We start the empirical analysis with an exploration of the cross-sectional correlation between CEO vega and several proxies for the labor unemployment risk at the industry or state

level. Firms across different industries may have different propensity to dismiss workers. Their dependence on labor as a major input could also vary with production technologies in different sectors. If boards of directors trade off the benefit of incentivizing managers to take risk and the cost of exposing workers to high unemployment risk, we should observe a lower level of risk-taking incentive provided in CEO compensation in those industries characterized with higher layoff propensity and labor intensity. Following Agrawal and Matsa (2013), we measure layoff propensity as the long-run layoff separation rates from the "Mass Layoff Statistics" constructed by U.S. Bureau of Labor Statistics. Specifically, the layoff propensity is calculated as the ratio of workers affected by a mass layoff to total industry employment at the two-digit NAICS level. As for labor intensity at the industry level, we calculate the median ratio of total labor expenses (XLR) to sales (SALE) for all Compustat firms in each two-digit NAICS industry. Then we plot the industry average CEO vega, against these two industry characteristics in 2002, a year in the middle of our sample period. The results are presented in Figure 1 and 2.

Consistent with our prediction, we find a negative correlation between industry average CEO *vega* and layoff separation rate in Figure 1, suggesting that boards tend to provide less risk-taking incentive when companies operate in industries with high layoff propensities. The negative relationship is also observed in Figure 2 when we use labor intensity to capture the importance of labor among the production inputs. The pattern from these two figures suggests that when designing CEO incentive compensation, boards to use less option-based compensation when the unemployment concern for workers is nontrivial.

Besides the industry-specific characteristics, a worker's exposure to unemployment risk is also affected by the generosity of state-level UI policy. A generous UI provision can to a large extent reduce the ex-post costs that workers experience when unemployed. Similar to Figure 1

and 2, we plot the average CEO vega for firms operating in each state against the state-level UI generosity in Figure 3A. We observe a positive relationship between CEO vega and state UI generosity measured by the natural logarithm of the maximum total unemployment insurance benefit under the state's unemployment insurance system. The positive correlation is consistent with the argument that more generous UI benefits reduce workers' concerns over unemployment risk and hence allow firms to provide more risk-taking incentives for their managers. To ensure that the positive correlation between state average CEO vega and state UI benefit is not driven by omitted geographical factors, such as regional economic conditions, we conduct a placebo test and plot in Figure 3B the state average CEO vega against the UI generosity in bordering states, since bordering states tend to have similar macroeconomic conditions. Very interestingly, there is no clear pattern in Figure 3B, suggesting that the positive correlation shown in Figure 3A is not driven by the regional economic environment.

A.2. Event study

To start our analysis and provide preliminary evidence on how UI benefit affects the design of CEO incentive compensation, we conduct an event study designed on a treatment-and-control framework. Specifically, we define an event as a state-year that experiences a large increase (15%) in the maximum amount of UI benefits and identify the treatment firms as those headquartered in the event state. To account for local economic conditions that potentially affect both state UI provisions and firms' compensation policies, we find for each treatment firm control companies that are headquartered in the bordering states that did not change their UI policies during the same time period. This identification strategy yields 19 state-years as events and 40 state-years as controls since a treat state can have multiple bordering states To the extent

that regional economic conditions are similar across geographically-proximate states, the difference in CEO compensation design between the two groups of companies around the event can be only attributed to the reduced exposure to unemployment risk faced by workers of the treatment firms.

Table 2 presents the means of CEO compensation variables for firms in the treatment group versus the control group around the change of state UI policies.

[Insert Table 2 here]

After the large increase in the generosity of UI provisions, firms headquartered in the event states significantly increase CEO vega. The increase in pay convexity is not accompanied by an adjustment in the slope of relation between CEO pay and stock performance as evidenced by the insignificant change in CEO delta. We also examine the channels through which treatment firms increase in CEO vega and find that these companies reduce the use of fixed-claim component (i.e. salary and bonus) and rely more on stock options when designing CEO compensation. Interestingly, we observe no significant changes in both the level of CEO vega and the structure of CEO compensation for the control firms.

These results lend support to the conjecture that boards provide managers with more risk-taking incentives in response to the reduced unemployment risk faced by workers. Increasing convexity payoff in the compensation package should make risk more valuable to managers and the evidence from the event study suggests that boards use this channel to incentivate CEOs to change their business strategies and take on more risks which is a necessary condition to increase returns for shareholders.

B. Baseline regressions

Although the event study approach is straightforward and informative on how the generosity of state UI policy affects CEO compensation, it fails to account for firm-specific characteristics, such as growth opportunities, and other (observed and unobserved) attributes that can potentially affect CEO *vega*.

To address the concern, we conduct a firm-level multivariate regression analysis. Specifically, we regress the level of risk-taking incentive (CEO *flow vega*) in the current year on the logarithm of state-level maximum UI benefits measured in the previous year while controlling for a comprehensive array of firm-, CEO-, and state- variables. Specifically, we estimate the following firm-panel regression:

$$Incentive_{i,s,t} = \alpha_1 Log\ max\ total\ benefit_{s,t-1} + X_{i,s,t}\beta + Y_{s,t}\gamma + v_i + w_t + \varepsilon_{i,s,t} \qquad (1)$$

where $Incentive_{i,s,t}$ represents the level of risk-taking incentive embedded in a CEO's annual compensation package at firm *i* in state *s* and year *t* (i.e., CEO *flow vega*). *Log max total* $benefit_{s,t-1}$ denotes the logarithm of maximum UI benefits in state *s* in the previous year. We also follow the previous literature on the design of CEO incentive-based compensation (Guay, 1999; Hayes et al., 2012; Gormley et al., 2013) and control for a series of contemporaneous firm- and CEO-, and state-level characteristics ($X_{i,s,t}$) that may affect CEO *vega*. The firm-level characteristics we control for include firm size (measured by the logarithm transformation of the book value of total assets), leverage, market-to-book ratio, return on assets (ROA), tangibility (measured by PPE scaled by book value of total assets), and firm risk (measured by logarithm transformation of stock return volatility). The CEO characteristics that we control for include CEO tenure, an indicator for whether the CEO is also chairman of the board, and cash compensation as a portion of the CEO's total annual compensation. In addition to firm and CEO

characteristics, we also control for contemporaneous local economic factors such as state GDP growth rate and unemployment rate ($Y_{s,t}$), because changes in unemployment insurance benefits could be a response to potential changes in future state economic conditions and at the same time these local economic conditions may affect companies' investment opportunities and further influence managers' risk-taking incentives. Finally, we include firm fixed effects (v_i) to account for those unobservable firm-specific but time-invariant attributes and year fixed effects (w_t) to capture any time-trend of CEO compensation. Table 3 reports the results from the baseline regressions.

[Insert Table 3 here]

In column (1) we only include our key independent variable, *Log max total benefit,* and firm fixed effects as well as year fixed effects. The coefficient estimate of *Log max total benefit* is positive and statistically significant at the 5% level, suggesting that CEO *flow vega* increases following an increase in the generosity of state UI benefits. In column (2) we add all the firm-, CEO-, and state-level control variables and continue to find a positive and significant coefficient estimate of *Log max total benefit.* The effect of the increase in state UI benefits on CEO *flow vega* also appears to be economically significant. Specifically, using the coefficient estimate in column (2), we find that a one-standard-deviation increase in the logarithm of maximum UI benefits is associated with a 14.6% increase in CEO flow vega. These results echo the findings from the event study and support the hypothesis that boards of directors increase managerial risk-taking incentives when states increase UI benefits and thus workers are less exposed to the costs associated with unemployment risk. As more generous public unemployment insurance reduces workers' unemployment costs, workers become more tolerant of the risk of financial distress, and the board of directors can reshape the risk environment of the firm by providing managers

with more risk-taking incentives. In this way mitigate the risk-related agency conflicts and better align the interests of executives with those of shareholders.

In columns (3), we replace firm fixed effects with CEO fixed effects, since Graham, Li, and Qiu (2012) show that CEO compensation varies with managers' attributes and styles and CEO fixed effects can explain a significant variation of CEO compensation. We find that the coefficient of *Log max total benefit* is still positive and significant and its magnitude is similar to that reported in column (2). Finally, we control for CEO-firm fixed effects to take into account the potential endogeneity from the firm-manager matching combination while continuing to absorb year fixed effects. The results presented in column (4) show that the coefficient of *Log max total benefit* continues to be positive and statistically significant.[9]

C. Compensation structure

In this section, we investigate the change in CEO compensation structure as the potential channels through which CEO vega increases following an increase in state UI benefits. Prior studies emphasize the crucial role of stock options in mitigating CEO risk aversion and inducing greater risk-taking behaviors (Jensen and Meckling, 1976; Smith and Stulz, 1985; Guay, 1999). Recent work by Kadan and Swinkels (2008) examines the trade-off between options and stocks in inducing CEO efforts at different levels of non-viability risk facing the firm. If firm's viability and continuation as a going concern is not an issue then awarding stock options always dominate the alternative of awarding stocks.

[9] A caveat with the results in column (3) and (4) is that CEO fixed effects and firm-CEO fixed effects can be disentangled from firm fixed effects only when managers change employers. Since only a small number of CEOs switch companies that are covered in the ExecuComp database, the estimation power of these two approaches may be limited.

We focus on the differentiated impact of option and stock awards on managerial risk attitudes by examining the structure of CEO equity-based pay after the UI benefit change. Specifically, we calculate stock options (both number- and value-based) as the proportion of newly awarded equity-based pay. If the convexity payoff structure of stock options is used to encourage more risk-taking activities, we expect boards to shift from stocks towards stock options when designing CEO equity-based pay following a decrease in costs associated with workers' unemployment risk. To test this conjecture, we conduct multivariable regressions where the dependent variable is the ratio of newly granted option value (number) to the total value (number) of CEO equity-based pay during a fiscal year. Table 4 presents the regression results.

[Insert Table 4 here]

The dependent variable in column (1) is the *value* of newly granted options during a fiscal year divided by the value of all equity-based compensation in that year, while the dependent variable in column (2) is the *number* of options divided by the number of stock and option awards to the CEO. The coefficient estimates of the generosity of UI benefits are positive and highly significant (at the 1% confidence level) in both columns, suggesting that boards use more options as the CEO equity-based pay following an increase in the state UI benefits. Note that this result is obtained after the inclusion of firm-level, CEO-level and state-level characteristics and absorbing the firm-level and year fixed effects. We obtain very similar results when we include CEO-level and CEO-firm fixed effects (results are not shown for sake of brevity).

D. Additional analysis

So far, we have established a positive link between the generosity of state UI policies and the convex payoff structure of CEO's annual compensation. In this section, we conduct a battery of sensitivity tests to establish the robustness of our findings.

Our first set of robustness tests are related to different sampling strategies. First, we exclude firm-years with CEO turnovers since the new CEO and her predecessor may have very different compensation contracts. Second, we drop firms in the financial and utility industries since firms in these industries are regulated. Third, to alleviate the concern that a firm may have operations outside the headquarter state. The costs of workers' unemployment risk depend on the generosity of the public insurance system of the state where they work, whereas we measure the UI benefits of the state where the firm is headquartered. To help alleviate any concerns that emerge from this disconnection, we follow Agrawal and Matsa (2013) and exclude firms from industries characterized with geographically-dispersed workforce such as retail, wholesale and transport where the proxy for UI benefits is more likely to suffer from measurement errors. Results are shown in Table 5.

[Insert Table 5 here]

The regression results presented in Panel A of Table 5 show that our findings continue to hold when we (a) exclude CEO turnover years (column (1)), (b) exclude the financial and utility industries (column (2)), and (c) exclude firms in geographically dispersed industries (column (3)). For each of the different specifications, we continue finding that the CEO's flow vega increases following an in increase in UI benefits: both statistical and economic significance of the coefficient estimates of *Log max total benefi*$_{t-1}$ is similar to that reported in Table 3.

In our second set of robustness tests, we use the following alternative measures of managerial risk-taking incentive: (1) the logarithmic transformation of CEO flow vega as in Low (2009); (2) CEO flow vega scaled by CEO flow delta, since delta may have different implications for managerial risk attitudes (Dittmann and Yu, 2010); (3) the flow vega for the entire top management team as in Armstrong, Larcker, Ormazabal, and Taylor (2013). The regression results presented in Panel B of Table 5 show that our findings on the positive effect of UI benefits on managerial risk-taking incentive are robust to using these different measures of risk-taking incentive. The result in column (3), where we show the flow vega for the entire top management team, is particularly important because it shows that any re-calibration that the board does to the compensation structure following the change in UI benefits is not limited to the CEO package but rather targets the top executives. To the extent that financial leverage is not decided exclusively by the CEO, but rather is a shared decision with other executives (such as the Chief Financial Officer), this result shows that board targets the flow vega of the entire top management team in its strategy to provide the appropriate incentive to increase risk taking.

E. Falsification tests

Despite our controlling for firm fixed effects in all regressions, the endogeneity or "omitted variable" problem remains a concern, since firm fixed effects are only able to eliminate unobservable omitted variables that are time invariant. It is possible that some time-varying factors, particularly those related to local investment opportunities or regional economic conditions, result in changes in both state UI benefits and the structure of CEO pay. We have several ways to address this concern. First, we have controlled for state-level GDP growth rates and unemployment rates in all regressions. Second, we conduct two falsification tests in which

we use the different timing of UI benefit change and the change of UI benefits in the bordering states as the "false identifications". Specifically, if the adjustment of compensation *vega* is *caused* by the change of workers' exposure to unemployment risk, then boards would only respond to change of UI benefits in the past, not the contemporaneous change or change of UI benefits in the future. Furthermore, if the results are simply caused by local economic conditions, we would expect the change of UI benefits in the bordering state to have significant effect on CEO *vega* as the bordering states share similar economic environment.

The regression results from these falsification tests are shown in Table 6.

[Insert Table 6 here]

In column (1), we regress CEO vega in year t on UI benefits in year t-1, year t, ad year t+1. We find that only UI benefits in year t-1 have a significantly positive impact on CEO vega, while UI benefits in year t and t+1 have no effect. These results indicate that it is unlikely some omitted economic development variables that drive both the change of the state's UI benefits and managerial risk-taking incentive. In columns (2) and (3), we control for the UI benefits of a firm's bordering states and find that they have no significant impact on CEO vega. The findings help rule out the alternative explanation that some omitted local economic factors are responsible for the change in both UI benefits and the design of CEO compensation since geographically-proximate states tend to have quite similar economic conditions.

F. Cross-sectional variation

So far, we have established a positive link between CEO vega and the generosity of UI benefits. In this section, we explore whether the positive effect of UI benefits on CEO vega varies with the degree of labor's concerns over unemployment risk, the importance of labor as a

production input factor, and the degree of CEO risk aversion. Results from these cross-sectional analyses will shed further light into the channels through which UI benefits affect CEO incentive compensation.

First, we examine whether the positive effect of UI benefits on CEO *vega* is more pronounced when labor's concern over unemployment risk is higher. We use the layoff propensity constructed in section A.1 as the measure of labor's concern over unemployment risk and split the sample based on whether an industry's layoff propensity is above or below sample median. Results are shown in Table 7.

[Insert Table 7 here]

The results reported in Panel A of Table 7 show that the coefficient of UI benefits is positive and highly significant in the subsample of firms from high-layoff propensity industries, while insignificant in the subsample of companies from low-layoff propensity industries. These findings suggest that UI benefits are most valuable for workers from industries characterized with a lower level of job security and boards of directors at firms from these industries are more likely to respond to the increase in UI generosity.

Second, we investigate whether the positive impact of UI generosity on CEO vega is more pronounced in industries where labor is more important as a production input factor. We use the labor intensity measured constructed in section A.1 to proxy for the importance of labor in firms' production technologies and split the sample based on whether an industry's layoff propensity is above or below sample median. Panel B of Table 7 presents the regression results. We find that effect of UI generosity on CEO flow vega continues to be positive and significant in the subsample of firms from industries with a higher level of labor intensity but insignificant in the subsample of firms from low labor intensity industries.

Third, we examine how labor's collective bargaining power affects the relation between CEO vega and UI generosity. Unionized workers can significantly improve their bargaining power over employers and hence have a crucial impact on major corporate decisions, such as leverage (Matsa, 2010), cash holdings (Klasa, Maxwell, and Ortiz-Molina, 2009), and earning management (Bova, 2013). AFL-CIO's comment letter to the SEC by AFL-CIO also suggests that labor unions tend to oppose the use of stock options as a form of managerial equity-based compensation, largely because stock options increase managers' incentives to take risk which may jeopardize worker's job security. Accordingly, we hypothesize that unionized workers represented by collective bargaining agreements could mitigate the board's ability to make prompt and significant adjustment in CEO *vega* following an increase in UI generosity. To test this conjecture, we collect the industry-level unionization rates from the Union Membership and Coverage Database and split the sample based on whether the industry unionization rate is above or below sample median. The unionization rate is defined as the percentage of employed workers in an industry covered by unions in collective bargaining with employers and is available at the level of Census Industry Classification (CIC) industries, which roughly correspond to 3-digit SIC industries. The results presented in Panel C of Table 7 indicate that the positive effect of UI generosity on CEO flow vega is only significant in more unionized industries. This evidence is consistent with our hypothesis and suggests that unionized workers can potentially voice their opinions over CEO compensation policy and constrain boards' ability to increase CEO vega following an increase in UI generosity.

Finally, we investigate whether boards of directors are more responsive to changes in UI generosity when CEOs are more risk-averse and hence need a higher level of risk-taking incentive. Undiversified CEOs who invest most of their human capital in their employers tend to

pass up risky positive-NPV projects. Knopf, Nam, and Thornton (2002) show that a CEO's risk aversion is exacerbated when her wealth is more sensitive to the stock prices (i.e. a high CEO *delta*). Therefore, we expect that the adjustment in CEO incentive compensation after the increase in UI benefits be more pronounced when CEO delta is higher. To test our prediction, we split our sample based on whether CEO portfolio delta is above or below sample median, where CEO portfolio delta is defined as the dollar change in CEO wealth for a 1% increase in the firm's stock price based on the complete equity portfolios held by the CEO. The results from this split-sample analysis are presented in Panel D of Table 7. Consistent with our conjecture, the positive effect of UI benefits on CEO flow vega is only significant when the CEO has a higher portfolio delta. These findings suggest that following an increase in UI benefits, boards use more option-based compensation to incentivize managers to take risk, particularly when CEOs are risk-averse and therefore the benefits of doing so are higher.

G. Robustness checks

We have also conducted a battery of further robustness checks to ensure that our results are robust to using alternative measures of key variables and to address the potential measurement errors of UI benefits.

First, to mitigate the potential impact of inflation, we convert all the variables into 2002 constant dollars using the Consumer Price Index. All the results continue to hold in terms of both statistical and economic significance.

Second, we perform additional tests to further address the concern that some firms may have geographically-disperse workforce and therefore using the UI benefits of the headquartering state is subject to measurement errors. We have addressed this issue in column (3)

of Table 5 but we have carried out additional analysis to rule out this possibility. Specifically, we merge our sample firms with the information gathered from the LexisNexis Corporate Affiliations Database which provides the number of employees a firm has in each state where it has operations. The granularity of this dataset allows us to better address the issue that may arise from geographically-dispersed firms. A number of tests are conducted using this smaller sample where the state-level employment information is available. First, we compute and confirm that the historical headquarters we use in the baseline tests represent a large proportion of enterprise-wide employees (86%). Second, our results continue to hold if we use UI benefits in the state where the majority of a firm's workforce is located. Third, the results are robust to using a weighted-average measure of UI benefits with the proportion of workers in each state as the weight.

Third, we use an alternative measure of the generosity of UI benefits by estimating the replacement rate derived from the labor economics literature. Specifically, the replacement rate is calculated as the state maximum weekly benefit multiplied by 52 and then divided by the median annual wage earned by workers in a particular industry. The industry worker wage information is obtained from the Occupational Employment Statistics (OES) Survey conducted by Bureau of Labor Statistics[10]. Our results indicate that this alternative measure of UI benefits generosity has a positive and significant impact on CEO flow vega. An advantage of using this replacement rate measure is that it has variations within a state, which makes it possible to include a set of state-year fixed effects. We find that the positive and significant effect continues to hold after we include the state-year fixed effects in the specification. The results from the state-year fixed effects regression also suggest that our results are unlikely to be driven by unobserved regional economic conditions.

[10] http://www.bls.gov/oes/

H. Further discussion

Two interesting questions immediately arise from our findings of the positive effect of UI benefits on CEO *vega*. The first is whether firms that increase CEO *vega* undertake more risky investment decisions. The second question is whether these risk-taking activities help the firm to deliver superior operating performance.

To address the first question, we examine the relationship between CEO *vega* and corporate risk-taking activities after the increase in state UI benefits. Following Coles, Daniel, and Naveen (2006), we construct several proxies for the riskiness of a firm's investment and financial policies. Specifically, we obtain from Compustat a firm's R&D, capital expenditure, cash holdings, and book value of total debt, all of which are scaled by the book value of total assets and measured at the end of year t+1. We also construct a firm's stock return volatility during year t+1 as a measure of its overall risk. Finally, we create an indicator variable that is equal to one if a firm makes a diversifying acquisition in year t+1 and zero otherwise. We then split the sample based on whether CEO vega in year t is above sample median or below sample median and in each of the subsample regress the investment and financial outcome variables in year t+1 on UI generosity measured at year t-1.

The regression results are presented in Table 8, where panel A reports the results based on the subsample in which CEO vega is above sample median and panel B reports the results based on the subsample in which CEO vega is below sample median.

[Insert Table 8 here]

We find that firms increase their risk-taking activities following the increase in state UI benefits and such increase is only statistically significant when the CEO flow vega is relatively high. Specifically, following an increase in UI generosity, conditional on the CEO having a high

flow vega, a firm significantly increases its R&D investment and leverage ratio, reduces capital expenditure and cash holding, and is less likely to make diversifying acquisitions. These corporate decisions are associated with a surge in the firm's total risk as evidenced by the significantly positive coefficient estimate of *Stock return volatility*$_{t+1}$. However, there is no significant correlation between firms' risk-taking activities and UI generosity when CEO *flow vega* is relatively low. These findings suggest that increases in UI benefits generate real economic and financial impacts by inducing boards of directors to increase vega embedded in CEO compensation. This evidence suggests that the increase in vega encourages managers to take more risk. In other words, the boards' strategy of increasing the payoff convexity of top management following a reduction of the costs associated with unemployment risk produces the desired outcome: risk-taking activities appear to increase with a consequent improvement of firm performance.

Finally, we examine whether more risk-taking activities following the increase in UI generosity translate into better operating performance for firms that improve managerial risk-taking incentives. Empirically, we regress a firm's operating performance in year t+1, measured either by its raw ROA or industry-adjusted ROA, on UI benefits in year t-1. We present the results in Table 9.

[Insert Table 9 here]

Columns (1) and (2) of Table 9 present the regression results based on the subsample in which CEO vega of year t is above sample median, while columns (3) and (4) show the regression results based on the subsample in which CEO vega of year t is below sample median. We find that increases in UI benefits have a significant and positive effect on firm's operating performance only when CEO *vega* is at a high level. This finding, combined with the results on

firms' risk-taking activities, provides suggestive evidence that by increasing managerial risk-taking incentive in response to a negative shock to workers' exposure to unemployment risk, boards of directors can encourage managers to take more risk and improve the overall firm performance.

IV. Conclusions

In this paper, we uncover the important impact of a salient feature of labor market frictions, i.e. labor unemployment risk, on the design of CEO incentive compensation. Through its impact on risk-taking activities, option-based compensation is likely to also influence rank-and-file workers' unemployment risk. Unlike diversified shareholders, managers are risk-averse because they not only have a large portion of their personal wealth closely tied to their companies' performance, at the same time they also invest heavily their human capital in their respective companies. When costs associated with unemployment decrease, boards acting in the interests of shareholders will want to take on more risks, including higher financial leverage. The question that naturally arises is how managers can be incentivized to overcome their risk aversion and career concerns and increase the use of leverage following decreases in the unemployment costs borne by rank-and-file employees.

Using state-level changes in unemployment insurance benefits as a source of variation in the unemployment costs faced by workers, we show that boards adjust CEO compensation structure and provide managers with more risk-taking incentives following increases in UI benefits. The positive effect of UI benefits on managerial risk-taking incentive is more pronounced in labor-intensive industries and industries with a high layoff propensity, but is significantly attenuated when strong labor unions are present. The results are also stronger for

CEOs whose wealth is more closely tied to firm performance. Finally, we show that the increase in managerial risk-taking incentive largely comes from more option grants to managers following an increase in UI generosity. These option-based pay encourages managers to undertake more risk-taking investment and financial decisions that lead to improved operating performance after increases in UI benefits. Our findings contribute to the literature by showing the importance of workers' exposure to unemployment risk in in the design of optimal managerial compensation.

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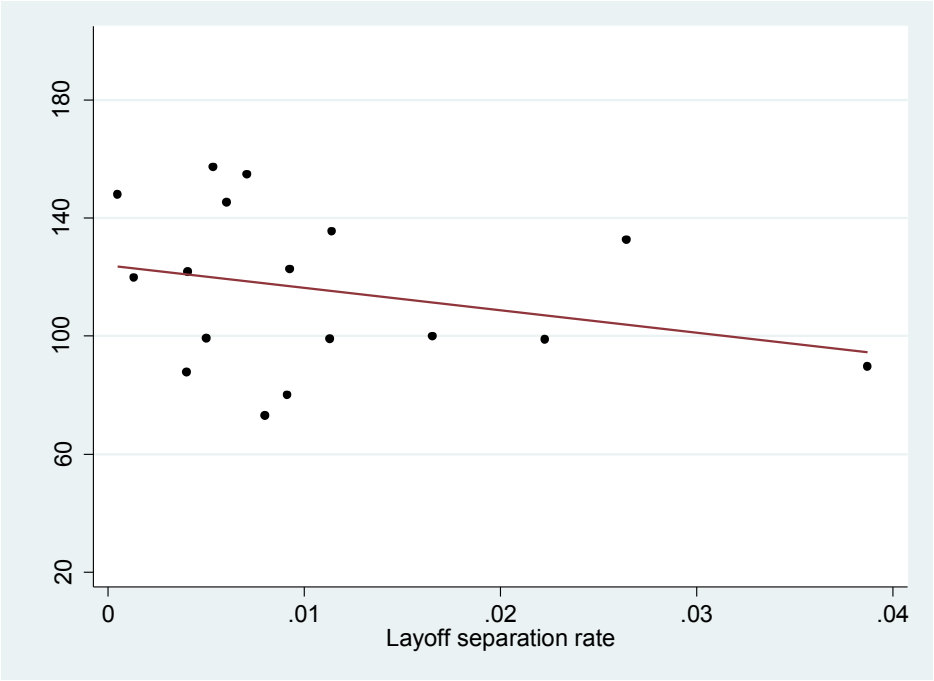

Figure 1. Industry average CEO *vega* and layoff separation rate

This figure plots the cross-sectional correlation between industry average CEO *vega* and long-run layoff separation rate at the two-digit NAICS level in 2002. Vega is calculated as the CEO's dollar change in wealth for a 0.01 increase in the annualized standard deviation of firm's stock returns based on the CEO's complete equity portfolios. Layoff separation rate is the ratio of workers affected by a mass layoff to total industry employment following Agrawal and Matsa (2013).

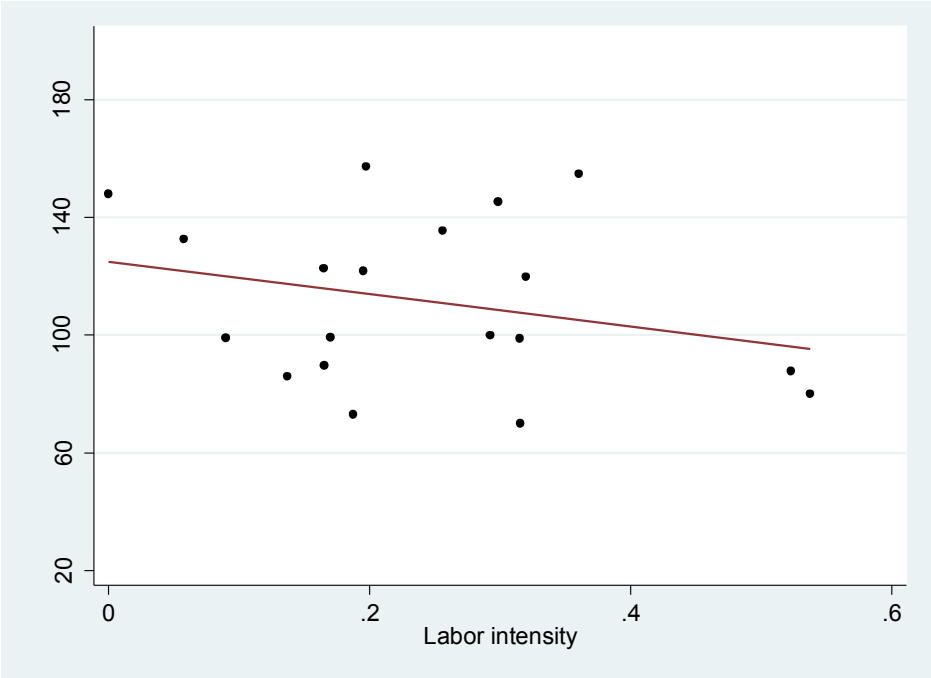

Figure 2. Industry average CEO *vega* and labor intensity

This figure plots the cross-sectional correlation between industry average CEO *vega* and long-run labor intensity at the two-digit NAICS level in 2002. *vega* is calculated as the CEO's dollar change in wealth for a 0.01 increase in the annualized standard deviation of firm's stock returns based on the CEO's complete equity portfolios. Labor intensity is measured as the median ratio of total labor expenses (XLR) to sales (SALE) for all COMPUSTAT firms in each two-digit NAICS industry.

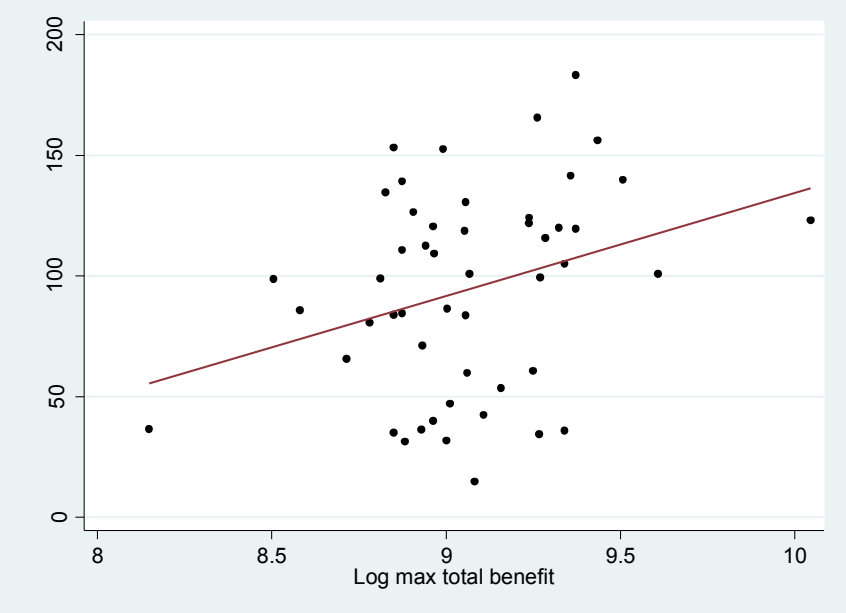

Figure 3A. State average CEO *vega* and maximum UI benefits

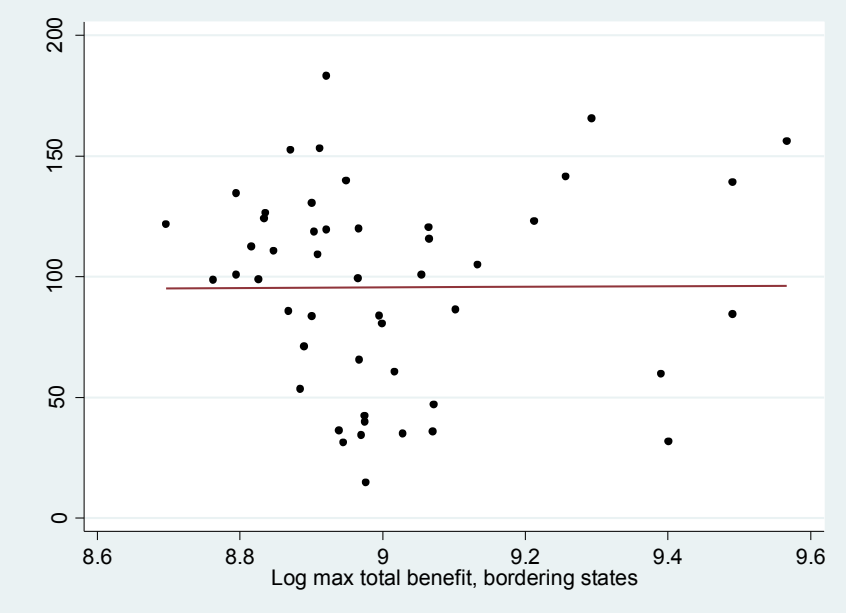

Figure 3B. State average CEO *vega* and maximum UI benefits: placebo

This figure plots the cross-sectional correlation between state average CEO *vega* and the logarithm of state maximum UI benefits in 2002. Figure 3A and 3B plots the state average CEO *vega* against the UI policy in the headquarter state and its bordering states, respectively. *vega* is calculated as the CEO's dollar change in wealth for a 0.01 increase in the annualized standard deviation of firm's stock returns based on the CEO's complete equity portfolios. Log max total benefit is the natural logarithm of the maximum total unemployment insurance benefit under the state's unemployment insurance system.

Table 1. Summary statistics

The table presents the summary statistics for variables used in the paper. The sample consists of 32,561 firm-year observations covered by the COMPUSTAT ExecuComp database from 1992 to 2013. Panel A, B, and C presents the summary statistics for the CEO compensation variables, firm-, and state-level characteristics, respectively. Variable definitions are in Appendix A.

Panel A: CEO compensation

	N	Mean	Std	Q1	Median	Q3
Flow vega (in thousands of $)	32561	26.706	51.936	0.000	6.744	27.571
Options/Equity (value)	26049	0.702	0.390	0.404	1.000	1.000
Options/Equity (number)	26049	0.755	0.368	0.651	1.000	1.000
Cash compensation	32561	0.445	0.297	0.193	0.379	0.662

Panel B: Firm-level characteristics

	N	Mean	Std	Q1	Median	Q3
Size (in $mil)	32561	11003	63129	460	1436	5122
Log(Size)	32561	7.409	1.767	6.133	7.270	8.541
Leverage	32561	0.220	0.181	0.058	0.202	0.336
MB ratio	32561	1.933	1.316	1.138	1.478	2.166
ROA	32561	0.036	0.101	0.012	0.043	0.082
Tangibility	32561	0.273	0.238	0.078	0.202	0.415
Stock return volatility	32561	0.430	0.198	0.278	0.382	0.538
Tenure	32561	7.525	7.295	2.000	5.000	10.000
CEO chairman	32561	0.563	0.496	0.000	1.000	1.000
$R\&D_{t+1}$	29937	0.028	0.053	0.000	0.000	0.031
$CAPEX_{t+1}$	28685	0.054	0.053	0.019	0.039	0.071
$Cash_{t+1}$	29924	0.141	0.167	0.022	0.070	0.201
Diversifying $acquisitions_{t+1}$	10269	0.742	0.438	0.000	1.000	1.000

Panel C: State-level characteristics

	N	Mean	Std	Q1	Median	Q3
Max weekly benefit (in $)	32561	368	127	275	354	438
Max duration (in weeks)	32561	26	0.961	26	26	26
Max total benefit (in $)	32561	9708	3733	7150	9230	11492
Log max total benefit	32561	9.120	0.339	8.875	9.130	9.349
GDP growth rate	32561	4.780	2.819	3.425	4.885	6.568
Unemployment rate	32561	6.022	2.001	4.600	5.400	6.900

Table 2. Labor unemployment risk and CEO incentive compensation: event study

The table presents the means of CEO compensation characteristics for firms in the treatment and control groups. The treatment firms are those headquartered in state-years that experience a large increase (15%) in the maximum amount of UI benefits. The control firms are those headquartered in the neighboring state that does not change the unemployment insurance policy. Panel A and B present the change in CEO compensation characteristics for the treatment and control firms, respectively. Salary, bonus, cash, option, stock, and equity are the proportion of each compensation-category in the CEO pay packages. Other variable definitions are in Appendix A. ***, **, and * stand for statistical significance based on two-sided tests at the 1%, 5%, and 10% level, respectively.

Panel A: Treatment firms

	Before the increase		After the increase		
	N	Mean	N	Mean	Differences
CEO compensation incentives					
Flow vega	748	38.416	737	49.251	-10.834** (0.049)
Flow delta	748	73.425	737	75.296	-1.871 (0.845)
CEO compensation structure					
Salary	746	0.305	737	0.279	0.026** (0.046)
Bonus	746	0.165	737	0.158	0.007 (0.403)
Cash	746	0.470	737	0.437	0.033** (0.034)
Option	746	0.407	737	0.440	-0.033** (0.028)
Stock	746	0.047	737	0.049	-0.001 (0.772)
Equity	746	0.455	737	0.490	-0.035** (0.038)

Panel B: Control firms

	Before the increase		After the increase		
	N	Mean	N	Mean	Differences
CEO compensation incentives					
Flow vega	804	25.510	844	22.661	2.848 (0.221)
Flow delta	804	34.155	844	34.003	0.152 (0.959)
CEO compensation structure					
Salary	803	0.328	843	0.322	0.005 (0.627)
Bonus	803	0.152	843	0.144	0.008 (0.335)
Cash	803	0.480	843	0.467	0.013 (0.333)
Option	803	0.316	843	0.325	-0.009 (0.538)
Stock	803	0.090	843	0.086	0.004 (0.612)
Equity	803	0.406	843	0.411	-0.004 (0.741)

Table 3. Labor unemployment risk and CEO vega: baseline regressions

The table presents the results from regressions of CEO risk-taking incentives on the natural log of the maximum UI benefits in the previous year. The dependent variable is the Flow Vega defined as the CEO's dollar change in wealth for a 0.01 increase in the annualized standard deviation of firm's stock returns based on the CEO's equity grants in the current fiscal year. Other variable definitions are in Appendix A. In parentheses are p-values based on standard errors adjusted for heteroskedasticity (White, 1980) and clustering at the state level (Petersen, 2009). ***, **, and * stand for statistical significance based on two-sided tests at the 1%, 5%, and 10% level, respectively.

	(1)	(2)	(3)	(4)
Dependent variables	Flow Vega	Flow Vega	Flow Vega	Flow Vega
Log max total benefit$_{t-1}$	5.545**	11.478***	9.696**	8.483**
	(0.023)	(0.001)	(0.012)	(0.044)
Firm size		11.207***	12.462***	12.788***
		(0.000)	(0.000)	(0.000)
Leverage		-7.260**	-9.632**	-9.249**
		(0.033)	(0.018)	(0.017)
MB ratio		4.928***	5.105***	5.004***
		(0.000)	(0.000)	(0.000)
ROA		-0.182	-2.438	-2.136
		(0.952)	(0.403)	(0.536)
Tangibility		-13.917***	-5.071	-3.647
		(0.009)	(0.392)	(0.564)
Stock return volatility		-3.540**	0.033	0.189
		(0.025)	(0.980)	(0.886)
Tenure		0.068	0.485*	1.072**
		(0.285)	(0.062)	(0.014)
CEO chairman		-0.050	-1.559	-1.763
		(0.946)	(0.168)	(0.201)
Cash compensation		-58.333***	-60.921***	-60.934***
		(0.000)	(0.000)	(0.000)
GDP growth rate		0.435***	0.423***	0.366***
		(0.007)	(0.002)	(0.006)
Unemployment rate		0.632	0.122	0.325
		(0.195)	(0.818)	(0.577)
Firm fixed effects	Yes	Yes	No	No
CEO fixed effects	No	No	Yes	No
CEO-firm fixed effects	No	No	No	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Observations	32,561	32,561	32,561	32,561
Adjusted R-squared	0.398	0.486	0.551	0.563

Table 4. Labor unemployment risk and CEO compensation structure

The table presents the results from regressions of CEO equity-based compensation structure on the natural log of the maximum UI benefits in the previous year. The dependent variable in column (1) is the value of stock options granted to the CEO scaled by the total value of equity grants in the current fiscal year. The dependent variable in column (2) is the number of stock options granted to the CEO scaled by the total number of equity grants in the current fiscal year. Other variable definitions are in Appendix A. In parentheses are p-values based on standard errors adjusted for heteroskedasticity (White, 1980) and clustering at the state level (Petersen, 2009). ***, **, and * stand for statistical significance based on two-sided tests at the 1%, 5%, and 10% level, respectively. We control for firm and year fixed effects in all regressions, whose coefficient estimates are suppressed.

	(1)	(2)
Dependent variables	Options/Equity (value)	Options/Equity (number)
Log max total benefit$_{t-1}$	0.082***	0.064***
	(0.001)	(0.004)
Firm size	0.006	0.007
	(0.392)	(0.334)
Leverage	0.026	0.039
	(0.324)	(0.156)
MB ratio	0.014***	0.006
	(0.002)	(0.130)
ROA	0.001	0.012
	(0.988)	(0.723)
Tangibility	0.008	-0.038
	(0.878)	(0.530)
Stock return volatility	0.028**	0.008
	(0.012)	(0.526)
Tenure	0.000	-0.000
	(0.597)	(0.756)
CEO chairman	-0.001	-0.000
	(0.852)	(0.995)
Cash compensation	-0.005	-0.060***
	(0.789)	(0.000)
GDP growth rate	0.001	0.001
	(0.321)	(0.437)
Unemployment rate	-0.001	0.000
	(0.819)	(0.977)
Firm fixed effects	Yes	Yes
Year fixed effects	Yes	Yes
Observations	26,049	26,049
Adjusted R-squared	0.537	0.513

Table 5. Labor unemployment risk and CEO vega: Robustness checks

The table presents the results from robustness checks. Panel A and B present the results from robustness checks using alternative sampling methods and alternative risk-taking measures, respectively. CEO turnover years are defined as firm-years when a CEO turnover is observed. Dispersed industries are defined as those industries in which the workforce is likely to be geographically dispersed, namely retail, wholesale, and transport. Flow Vega Team is the flow-based risk-taking incentive measures for the top management team. Other variable definitions are in Appendix A. In parentheses are p-values based on standard errors adjusted for heteroskedasticity (White, 1980) and clustering at the state level (Petersen, 2009). ***, **, and * stand for statistical significance based on two-sided tests at the 1%, 5%, and 10% level, respectively. We control for firm and year fixed effects in all regressions, whose coefficient estimates are suppressed.

Panel A: Alternative sampling methods

	(1)	(2)	(3)
Sample	Exclude CEO turnover years	Exclude financial and utility	Exclude geographically dispersed industries
Dependent variables	Flow Vega	Flow Vega	Flow Vega
Log max total benefit$_{t-1}$	8.926***	11.431***	10.838***
	(0.008)	(0.003)	(0.009)
Firm size	11.523***	11.640***	11.224***
	(0.000)	(0.000)	(0.000)
Leverage	-6.345*	-8.741**	-7.429**
	(0.064)	(0.011)	(0.024)
MB ratio	5.307***	5.074***	5.146***
	(0.000)	(0.000)	(0.000)
ROA	-0.399	-1.224	0.324
	(0.914)	(0.655)	(0.918)
Tangibility	-11.314*	-15.129***	-15.615***
	(0.095)	(0.003)	(0.010)
Stock return volatility	-5.057***	-2.382	-4.907***
	(0.002)	(0.210)	(0.008)
Tenure	0.151**	0.005	0.052
	(0.029)	(0.939)	(0.518)
CEO chairman	1.729**	-0.046	0.342
	(0.027)	(0.953)	(0.669)
Cash compensation	-59.799***	-57.755***	-58.119***
	(0.000)	(0.000)	(0.000)
GDP growth rate	0.343**	0.403**	0.474***
	(0.025)	(0.021)	(0.009)
Unemployment rate	0.600	0.363	0.775
	(0.301)	(0.558)	(0.174)
Firm fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
Observations	26,149	26,275	28,567
Adjusted R-squared	0.514	0.490	0.488

Panel B: Alternative incentive measures

	(1)	(2)	(3)
Dependent variables	LN(1+Flow Vega)	Flow Vega/Flow Delta	Flow Vega of Entire Management Team
Log max total benefit$_{t-1}$	0.302***	0.115***	4.414**
	(0.000)	(0.003)	(0.040)
Firm size	0.260***	0.074***	5.714***
	(0.000)	(0.000)	(0.000)
Leverage	-0.053	0.110***	-4.005***
	(0.633)	(0.001)	(0.009)
MB ratio	0.034***	-0.035***	2.705***
	(0.006)	(0.000)	(0.000)
ROA	0.275**	0.015	0.158
	(0.026)	(0.817)	(0.906)
Tangibility	-0.349	-0.010	-4.583*
	(0.107)	(0.912)	(0.056)
Stock return volatility	-0.244***	-0.065***	-0.985
	(0.000)	(0.002)	(0.203)
Tenure	-0.004	-0.002**	0.085***
	(0.110)	(0.047)	(0.001)
CEO chairman	-0.010	0.008	-0.258
	(0.684)	(0.492)	(0.284)
Cash compensation	-3.418***	0.595***	-18.333***
	(0.000)	(0.000)	(0.000)
GDP growth rate	0.006	-0.001	0.151**
	(0.142)	(0.737)	(0.037)
Unemployment rate	0.001	-0.002	0.356
	(0.940)	(0.775)	(0.144)
Firm fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
Observations	32,561	26,049	32,561
Adjusted R-squared	0.646	0.331	0.539

Table 6. Labor unemployment risk and CEO vega: Falsification tests

The table presents the results from falsification tests. Column (1) presents the results from regressions of CEO's risk-taking incentives on the 1-year lagged, contemporaneous, and 1-year forward values of the natural log of the maximum UI benefits. Columns (2) and (3) present results from regressions of CEO's risk-taking incentives on the natural log of the maximum UI benefits in the previous year and/or the average of the natural log of the maximum UI benefits in the bordering states. Other variable definitions are in Appendix A. In parentheses are p-values based on standard errors adjusted for heteroskedasticity (White, 1980) and clustering at the state level (Petersen, 2009). ***, **, and * stand for statistical significance based on two-sided tests at the 1%, 5%, and 10% level, respectively. We control for firm and year fixed effects in all regressions, whose coefficient estimates are suppressed.

	(1)	(2)	(3)
Dependent variables	Flow Vega	Flow Vega	Flow Vega
Log max total benefit$_{t-1}$	11.896**	11.967***	
	(0.017)	(0.002)	
Log max total benefit$_{t}$	-6.643		
	(0.371)		
Log max total benefit$_{t+1}$	6.763		
	(0.340)		
Log max total benefit$_{t-1}$, bordering states average		-5.933	-2.681
		(0.396)	(0.705)
Firm size	11.583***	11.222***	11.169***
	(0.000)	(0.000)	(0.000)
Leverage	-8.382**	-7.263**	-6.865**
	(0.021)	(0.033)	(0.041)
MB ratio	4.908***	4.930***	4.862***
	(0.000)	(0.000)	(0.000)
ROA	-0.208	-0.202	-0.171
	(0.943)	(0.947)	(0.954)
Tangibility	-12.824**	-13.839***	-14.036***
	(0.012)	(0.010)	(0.008)
Stock return volatility	-3.445**	-3.532**	-3.949***
	(0.028)	(0.025)	(0.009)
Tenure	0.059	0.068	0.064
	(0.393)	(0.287)	(0.318)
CEO chairman	-0.217	-0.057	-0.024
	(0.763)	(0.939)	(0.974)
Cash compensation	-58.939***	-58.308***	-58.226***
	(0.000)	(0.000)	(0.000)
GDP growth rate	0.404**	0.430***	0.376**
	(0.011)	(0.008)	(0.019)
Unemployment rate	0.520	0.579	0.542
	(0.269)	(0.223)	(0.292)
Firm fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
Observations	31,441	32,561	32,561
Adjusted R-squared	0.490	0.486	0.486

Table 7. Labor unemployment risk and CEO vega: Cross-sectional variation

The table presents the cross-sectional variation in the effect of labor unemployment risk on CEO vega. Each panel presents an excerpt of the results from subsample regressions of CEO risk-taking incentives on the natural log of the maximum UI benefits in the previous year based on whether the split variable is above or below the sample median. Labor intensity is measured as the median ratio of total labor expenses (XLR) to sales (SALE) for COMPUSTAT firms based on three-digit NAICS industries. Layoff propensity is the ratio of workers affected by a mass layoff to total industry employment based on three-digit NAICS industries following Agrawal and Matsa (2013). Labor union is calculated as the percentage of total workers in a 3-digit Census Industry Classification (CIC) industry that are represented by unions in collective bargaining agreements. CEO portfolio delta is measured as the dollar change in CEO wealth for a 1% increase in the firm's stock price following Core and Guay (2002) based on the CEO's complete equity portfolios. Other variable definitions are in Appendix A. In parentheses are p-values based on standard errors adjusted for heteroskedasticity (White, 1980) and clustering at the state level (Petersen, 2009). ***, **, and * stand for statistical significance based on two-sided tests at the 1%, 5%, and 10% level, respectively. We control for the same set of control variables as in column (3) of Table (3), firm and year fixed effects in all regressions, whose coefficient estimates are suppressed.

Panel A: Partition based on industry layoff propensity

	(1)	(2)
Sample	High layoff propensity	Low layoff propensity
Dependent variables	Flow Vega	Flow Vega
Log max total benefit$_{t-1}$	13.040**	7.949
	(0.027)	(0.264)
Control variables	Yes	Yes
Firm fixed effects	Yes	Yes
Year fixed effects	Yes	Yes

Panel B: Partition based on industry labor intensity

	(1)	(2)
Sample	High labor intensity	Low labor intensity
Dependent variables	Flow Vega	Flow Vega
Log max total benefit$_{t-1}$	18.613***	2.682
	(0.007)	(0.623)
Control variables	Yes	Yes
Firm fixed effects	Yes	Yes
Year fixed effects	Yes	Yes

Panel C: Partition based on industry unionization

	(1)	(2)
Sample	Low union representation	High union representation
Dependent variables	Flow Vega	Flow Vega
Log max total benefit$_{t-1}$	15.925**	8.259
	(0.012)	(0.168)
Control variables	Yes	Yes
Firm fixed effects	Yes	Yes
Year fixed effects	Yes	Yes

Panel D: Partition based on CEO portfolio delta

	(1)	(2)
Sample	High portfolio delta	Low portfolio delta
Dependent variables	Flow vega	Flow vega
Log max total benefit$_{t-1}$	21.860**	2.313
	(0.023)	(0.338)
Control variables	Yes	Yes
Firm fixed effects	Yes	Yes
Year fixed effects	Yes	Yes

Table 8. Labor unemployment risk, CEO vega and firms' risk taking

The table presents results from regressions of several risk-taking measures on the natural log of the maximum UI benefits in the previous year. The dependent variables in columns (1) to (6) are R&D to assets ratio, capital expenditures to assets ratio, cash holdings to assets ratio, an indicator for diversifying acquisitions, the natural log of annualized stock return volatility, and leverage ratio, respectively. Panel A and B present regression results for subsamples based on whether the flow vega is above or below the sample median for each year, respectively. Other variable definitions are in Appendix A. In parentheses are p-values based on standard errors adjusted for heteroskedasticity (White, 1980) and clustering at the state level (Petersen, 2009). ***, **, and * stand for statistical significance based on two-sided tests at the 1%, 5%, and 10% level, respectively. We control for firm and year fixed effects in all regressions, whose coefficient estimates are suppressed.

Panel A: High CEO flow vega

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variables	$R\&D_{t+1}$	$CAPEX_{t+1}$	$Cash_{t+1}$	Diversifying acquisitions indicator	Log(Stock return volatility)$_{t+1}$	$Leverage_{t+1}$
Log max total benefit$_{t-1}$	0.010**	-0.012***	-0.031***	-0.813**	0.016**	0.014***
	(0.037)	(0.000)	(0.001)	(0.042)	(0.038)	(0.008)
Firm size	-0.002***	-0.001	-0.031***	0.172***	-0.025***	0.022***
	(0.007)	(0.325)	(0.000)	(0.001)	(0.000)	(0.000)
Leverage	-0.036***	-0.030***	-0.053***	-0.540**	0.075***	0.379***
	(0.000)	(0.000)	(0.000)	(0.043)	(0.000)	(0.000)
MB ratio	0.005***	0.004***	0.005***	0.040*	0.015***	-0.010***
	(0.000)	(0.000)	(0.000)	(0.055)	(0.000)	(0.001)
ROA	-0.102***	0.042***	-0.065***	-0.288	-0.312***	-0.046***
	(0.000)	(0.000)	(0.002)	(0.367)	(0.000)	(0.000)
Tangibility	-0.012**	0.036***	-0.165***	1.006**	-0.046**	-0.011
	(0.011)	(0.000)	(0.000)	(0.029)	(0.025)	(0.522)
Stock return volatility	0.013***	0.002	0.011**	0.270**	0.634***	0.019***
	(0.000)	(0.407)	(0.045)	(0.043)	(0.000)	(0.000)
Tenure	0.000	0.000	-0.000	-0.008	0.000	-0.000
	(0.456)	(0.586)	(0.196)	(0.157)	(0.163)	(0.775)
CEO chairman	-0.002*	0.000	0.001	-0.109*	-0.007	0.003
	(0.057)	(0.967)	(0.804)	(0.097)	(0.126)	(0.101)
Cash compensation	-0.006**	-0.008***	-0.013*	0.195	-0.061***	0.018**
	(0.022)	(0.000)	(0.062)	(0.553)	(0.000)	(0.028)
GDP growth rate	0.001**	0.000	0.001*	-0.028	0.008***	-0.000
	(0.013)	(0.113)	(0.052)	(0.358)	(0.000)	(0.676)
Unemployment rate	0.003***	-0.001	-0.002	-0.036	-0.036***	0.001
	(0.003)	(0.217)	(0.154)	(0.369)	(0.000)	(0.310)
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	14,962	14,337	14,956	5,122	14,974	14,960
Adjusted (Pseudo) R-squared	0.883	0.741	0.808	0.534	0.793	0.824

Panel B: Low CEO flow vega

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variables	$R\&D_{t+1}$	$CAPEX_{t+1}$	$Cash_{t+1}$	Diversifying acquisitions indicator	Log(Stock return volatility)$_{t+1}$	$Leverage_{t+1}$
Log max total benefit$_{t-1}$	0.005	-0.005	0.004	0.116	-0.000	0.008
	(0.353)	(0.361)	(0.695)	(0.734)	(0.984)	(0.400)
Firm size	-0.002***	-0.002	-0.018***	0.011	-0.027***	0.027***
	(0.000)	(0.141)	(0.000)	(0.924)	(0.000)	(0.000)
Leverage	-0.018***	-0.029***	-0.095***	-0.577	0.092***	0.404***
	(0.000)	(0.000)	(0.000)	(0.177)	(0.000)	(0.000)
MB ratio	0.007***	0.006***	0.009***	-0.072	0.012***	-0.007***
	(0.000)	(0.000)	(0.000)	(0.134)	(0.000)	(0.000)
ROA	-0.119***	0.030***	-0.042**	0.870*	-0.302***	-0.060***
	(0.000)	(0.000)	(0.034)	(0.050)	(0.000)	(0.000)
Tangibility	-0.015***	0.019**	-0.217***	-1.045*	-0.066***	0.022
	(0.005)	(0.040)	(0.000)	(0.067)	(0.002)	(0.187)
Stock return volatility	0.006**	-0.002	0.008**	-0.033	0.635***	0.012***
	(0.025)	(0.353)	(0.045)	(0.841)	(0.000)	(0.010)
Tenure	-0.000	0.000	0.000	0.003	0.001	-0.000
	(0.750)	(0.434)	(0.995)	(0.792)	(0.138)	(0.368)
CEO chairman	-0.002	0.001	-0.004	0.157**	-0.012**	0.001
	(0.255)	(0.325)	(0.145)	(0.033)	(0.021)	(0.690)
Cash compensation	-0.008***	-0.005**	-0.004	-0.130	-0.182***	0.003
	(0.000)	(0.014)	(0.225)	(0.307)	(0.000)	(0.328)
GDP growth rate	0.001***	-0.000	0.000	0.037**	0.009***	-0.001
	(0.006)	(0.858)	(0.362)	(0.048)	(0.000)	(0.183)
Unemployment rate	0.003**	-0.001*	0.000	0.059	-0.035***	0.000
	(0.028)	(0.094)	(0.718)	(0.317)	(0.000)	(0.970)
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	14,975	14,348	14,968	5,123	14,966	14,973
Adjusted (Pseudo) R-squared	0.892	0.691	0.790	0.578	0.792	0.810

Table 9. Labor unemployment risk, CEO vega and operating performance

The table presents results from regressions of operating performance measures on the natural log of the maximum UI benefits in the previous year. The dependent variable in columns (1) and (3) is the raw Return on Assets (ROA) in T+1. The dependent variable in columns (2) and (4) is the industry-adjusted Return on Assets (Ind-adj ROA) in T+1. High (Low) incentive compensation is the subsample where the Flow Vega is above (below) the sample median in a given year. Other variable definitions are in Appendix A. In parentheses are p-values based on standard errors adjusted for heteroskedasticity (White, 1980) and clustering at the state level (Petersen, 2009). ***, **, and * stand for statistical significance based on two-sided tests at the 1%, 5%, and 10% level, respectively. We control for firm and year fixed effects in all regressions, whose coefficient estimates are suppressed.

	(1)	(2)	(3)	(4)
	High CEO vega		Low CEO vega	
Dependent variables	ROA_{t+1}	Ind-adj ROA_{t+1}	ROA_{t+1}	Ind-adj ROA_{t+1}
Log max total $benefit_{t-1}$	0.014*	0.013*	0.005	0.006
	(0.062)	(0.074)	(0.609)	(0.551)
Firm size	-0.018***	-0.018***	-0.022***	-0.022***
	(0.000)	(0.000)	(0.000)	(0.000)
Leverage	0.002	0.001	0.025**	0.024**
	(0.848)	(0.868)	(0.013)	(0.016)
MB ratio	0.014***	0.014***	0.015***	0.015***
	(0.000)	(0.000)	(0.000)	(0.000)
ROA	0.228***	0.226***	0.295***	0.294***
	(0.000)	(0.000)	(0.000)	(0.000)
Tangibility	0.010	0.009	-0.016	-0.015
	(0.423)	(0.462)	(0.288)	(0.326)
Stock return volatility	-0.033***	-0.033***	-0.027***	-0.026***
	(0.000)	(0.000)	(0.000)	(0.000)
Tenure	0.000	0.000	0.000*	0.000*
	(0.515)	(0.583)	(0.089)	(0.081)
CEO chairman	-0.001	-0.001	-0.005***	-0.005**
	(0.616)	(0.705)	(0.008)	(0.010)
Cash compensation	-0.015***	-0.015***	-0.009**	-0.009**
	(0.003)	(0.003)	(0.023)	(0.024)
GDP growth rate	-0.000	-0.000	-0.000	-0.000
	(0.631)	(0.658)	(0.665)	(0.645)
Unemployment rate	0.001	0.001	0.001	0.001
	(0.263)	(0.250)	(0.438)	(0.436)
Firm fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Observations	14,959	14,959	14,973	14,973
Adjusted (Pseudo) R-squared	0.490	0.526	0.524	0.515

Appendix A. Variable definitions

Variable	Definitions
CEO compensation	
Flow vega	CEO's dollar change in wealth for a 0.01 increase in the annualized standard deviation of firm's stock returns following Core and Guay (2002). Calculated using only CEO's equity grants in the current fiscal year.
Flow delta	CEO's dollar change in wealth for a 1% increase in the firm's stock price following Core and Guay (2002). Calculated using only CEO's equity grants in the current fiscal year.
Options/Equity (value)	The value of stock options granted to the CEO scaled by the total value of equity grants in the current fiscal year.
Options/Equity (number)	The number of stock options granted to the CEO scaled by the total number of equity grants in the current fiscal year.
Cash compensation	The sum of salary and bonus scaled by CEO's total compensation.
Firm-level characteristics	
Log(Size)	Natural logarithm of firm's total assets (at).
Leverage	The sum of long-term debt (dltt) and current liability (dlc) scaled by firm's total assets (at).
MB ratio	Market value of firm's assets (at – ceq + csho*prcc_f) scaled by book value of total assets (at).
ROA	Income before extraordinary items (ib) scaled by firm's total assets (at).
Tangibility	Net PPE (property, plant and equipment) (ppent) scaled by firm's total assets (at).
Stock return volatility	The log of the annualized standard deviation of firm's daily stock returns.
Tenure	Number of years a manager has been CEO of the firm.
CEO chairman	A dummy variable: 1 if the CEO of the firm is also the board chairman, 0 otherwise.
R&D	Research and development expense (xrd) scaled by firm's total assets (at).
CAPEX	Capital expenditures (capx) scaled by firm's total assets (at).
Cash	Cash and short-term investments (che) scaled by firm's total assets (at).

Diversifying acquisitions	Dummy variable: 1 if the acquirer and target do not share a four-digit SIC industry, 0 otherwise.
State-level characteristics	
Log max total benefit	Natural logarithm of the maximum total unemployment insurance benefit under the state's unemployment insurance system.
GDP growth rate	State-level growth rate of GDP.
Unemployment rate	State-level unemployment rate.