Labor unemployment risk and CEO incentive compensation

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Abstract

In this paper, we investigate the impact of workers' unemployment risk, a salient attribute of labor market frictions, on the design of CEO incentive compensation. 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 adjust the compensation structure and provide managers with more stock option grants that result in more convexity payoffs. Such a change is consistent with the view that CEO's risk-taking incentives are amplified to take advantage of lower unemployment costs. The increase in convexity payoff structures is more pronounced in labor-intensive industries and industries that have higher layoff propensity, but is significantly attenuated when strong labor unions are present. The results are also stronger when the human capital of the CEO is more closely tied to the firm or when the CEO is older. Finally, we show that the increase in convexity payoff from option-based compensation induces firms to undertake more risky investments that deliver improved operating performance after the increase in unemployment insurance benefits. 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.

JEL classification: G32, G34
Keywords: Unemployment risk, Human capital, Executive compensation, Risk taking

I. Introduction

Stock options promise executives all of the benefits of share price increases with none of the risk of share price declines. In other words, stock options provide executives with asymmetric incentives to shoot for the moon. …… 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

Existing literature (Titman (1984), Berk, Stanton, and Zechner (2010), and Agrawal and Matsa (2013)) shows, both theoretically and empirically, that unemployment risk faced by workers is one of the drivers of firms' financial policies. For example, firms' leverage decision is one lever that is used to mitigate workers' exposure to unemployment risk (Agrawal and Matsa (2013)). Firms could also reduce the probability of distress, thus mitigating workers exposure to risk, by choosing less risky projects (Hennessy and Whited, 2005). The question that arises is about the channel through which the firm's investment policy can be changed to respond to workers' unemployment risk. The literature on managerial compensation shows evidence consistent with a strong (and causal) relationship between executive compensation and investment policy, debt policy and risk taking (Coles et al. (2006)). In this paper we investigate the impact of workers' unemployment risk, a salient attribute of labor market frictions, on the design of executive compensation which is a mechanism that can be used to alter the firm's risk taking activities.

[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'.

Furthermore, the recent financial crisis has renewed public interest in the risk-taking incentives embedded in CEO compensation packages.[2] Accordingly, the Securities and Exchange Commission (the SEC) has approved new rules that will "require disclosure of a company's compensation policies and practices as they relate to company's risk management".[3] The option-based incentive compensation has long been suggested as a solution to the risk-related agency problem that undiversified and risk-averse managers tend to pass up risky but positive net present value projects that are desired by diversified shareholders (Jensen and Meckling, 1976; Amihud and Lev, 1981; Smith and Stulz, 1985; Guay, 1999; Heron and Lie, 2013).

Consistent with this conjecture, most of the extant literature 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 for 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).[4]

However, few studies investigate the ex-ante factors that enter into directors' consideration when designing the optimal incentive pay (Guay, 1999; Hayes, Lemmon, and Qiu, 2012; Gormley, Matsa, and Milbourn, 2013) and even less is known on how the level of risk-taking incentives in managerial compensation packages is affected by the interests of other non-financial stakeholders, such as rank and file employees. In this paper, we aim to contribute to this

[2] Cari Tuna and Joann S. Lublin, "Risk vs. Executive Reward", the Wall Street Journal (June 15, 2009).
[3] See the SEC's press release on approval of enhanced disclosure about risk, compensation, and corporate governance at "http://www.sec.gov/news/press/2009/2009-268.htm".
[4] 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).

debate by shedding light on how these non-financial stakeholders can influence CEO incentive compensation.

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 a firm's rank and file employees who invest most of their human capital in the underlying firm (Titman, 1984). Workers bear substantial costs in the process of involuntary unemployment. Those who get laid-off experience reductions in personal consumption (Gruber, 1997), go through delays and costly searching before finding another job (Katz and Meyer, 1990), and fail to maintain previous wage level even after reemployment (Farber, 2005). Besides the monetary losses, unemployed workers also endure psychological and social costs (Kalil and Ziol-Guest, 2008).[5]

Anticipating the significant costs during unemployment, employees care about unemployment risk and ex ante require a premium in the setting of wages or other benefits to compensate for the level of unemployment risk they take, i.e. the "compensating wage differentials" (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 a firm's 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 losses increase with the risk environments of a firm's operations. The

[5] 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'.

additional costs associated with the heightened labor unemployment risk are especially important for firms operating in industries characterized with higher degree of labor intensity in their production inputs. For example, Agrawal and Matsa (2013) and Chemmanur, Cheng, and Zhang (2013) empirically document that the substantial labor costs limit the use of debt and firms adopt conservative financial policies to mitigate workers' concern for unemployment risk, which are consistent with the theoretic predictions of Titman (1984) and Berk, Stanton, and Zechner (2010). 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). Acharya, Baghai, and Subramanian (2014) find that wrongful discharge laws in the US encourage employee efforts and spur innovative activities by protecting workers against unjust dismissal. 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.[6]

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. The maintained hypothesis predicts that the boards will adjust the risk-taking incentives in CEO compensation when employees' unemployment risk changes. To address these concerns, we exploit the state-level changes in unemployment insurance benefits used by Agrawal and Matsa (2013) as a source of variation in the costs borne by employees during unemployment spells. We

[6] 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.

investigate whether, and in what way, the board of directors redesigns the structure of CEO compensation and adjusts the level of risk-taking incentives provided 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 state UI benefits have been documented in the literature to have a significant impact on workers' economic behaviors and the aggregate labor supply (Topel, 1984; Meyer, 1990, 1995; Hsu, Matsa and Melzer, 2014).

Importantly, more generous state unemployment benefits reduce workers' ex-post costs during unemployment and can partially mitigate their ex-ante concern and compensation for unemployment risk. Since the firm becomes less concerned over the workers' exposure to unemployment risk, the board of directors can reshape the risk environment of the firm by providing the managers with more risk-taking incentives in their compensation packages in a way to address the risk-related agency conflicts and better align the interests of executives with those of shareholders (Jensen and Meckling, 1976; Smith and Stulz, 1985).

We empirically test the hypothesis using a comprehensive sample of 33,850 firm-year observations between 1992 and 2013. Following the compensation literature (Guay, 1999), we measure the risk-taking incentives provided in the compensation packages by the sensitivity of 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).

We start the empirical tests with a simple univariate analysis designed on a treatment-control framework. Specifically, we construct the treatment firms as those headquartered in state-years that experience a large increase in the maximum amount of UI benefits. We accompany the treatment sample with a control group of firms headquartered in the neighboring state that does not change the unemployment insurance policy. A comparative analysis suggests that the board of directors raises the level of risk-taking incentives (Vega) provided in CEO compensation packages following the increase in the maximum amount of state-level UI benefits. A break-down analysis of the compensation structure indicates that the increase in the convexity of CEO's wealth-performance relation is due to a firm's increasing reliance on the option-based compensation and a decline in the usage of cash-component pay, such as salary. On the contrary, we observe no changes in both the level of risk-taking incentives provided and the composition of the overall pay packages for firms in the control group, which lend support to the conjecture that it is the reduced exposure to unemployment risk for workers in the treatment sample that leads to the change in compensation policy rather than the local economy conditions which are similar for geographically-proximate firms.

To further account for the effect of omitted variables, we conduct a multivariate regression analysis on the relationship between the levels of risk-taking incentives provided in the compensation packages on the lagged maximum UI benefits while controlling for a wide array of firm-specific characteristics and regional economic conditions. An additional inclusion

of both the firm fixed effects and year fixed effects warrants that the results capture the within-firm adjustments in CEO compensation policy in response to the shock to labor's unemployment risk rather than some cross-sectional correlations or time-series trend due to economy conditions. Consistent with the results in the univariate analysis, we find that increases in maximum UI benefits are significantly associated with increases in the risk-taking incentives provided in the compensation packages. The positive impact of UI benefit generosity on the compensation risk-taking incentives is also significant economically. A one-standard-deviation increases in the logarithms of maximum UI benefits lead to a 19.3% (14.4%) increase in the risk-taking incentives provided in the annual (aggregate) compensation packages. A further examination on the channels of the increase in the risk-taking incentives granted to the CEO indicates that the boards rely more on stock options (relative to restricted shares) in designing the incentive compensation following the increase in state-level maximum UI benefits. The results lend strong support to the conjecture that more generous unemployment policy reduces workers' concern for potential job losses and mitigate their demands for compensation premiums, which enable the directors to provide their executives with greater incentives for risk taking.

In ensuing analysis, we conduct a comprehensive array of tests for robustness checks and to speak to a causal interpretation of the results we document. First, we find that the significant relationship between the maximum amount of UI benefits and the compensation 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 (Agrawal and Matsa, 2013). The results also survive a battery

of tests using alternative measures for risk-taking incentives, such as logarithmic transformation of the compensation Vega (Low, 2009), compensation Vega scaled by the sensitivities of CEO's pay to changes in stock price (Delta) in the spirit of Dittmann and Yu (2010), and risk-taking incentives of the top management team (Armstrong, Larcker, Ormazabal, and Taylor, 2013).

Second, we address the endogeneity concerns that may affect the causal interpretation of the findings. Although we control for state-level GDP growth rate and unemployment conditions in the empirical design, some omitted and unobservable factors we fail to account for in the regressions, such as local investment opportunities, may drive both CEO compensation policy and the provisions of UI benefits and thus cloud the inference of our results. To alleviate the concerns, we conduct two falsification tests regarding the timing and location of the UI policy. An examination on the timing of the relationship between UI benefit changes and compensation 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 in timing are revealed in the data, which indicates that the significant relationship we document is not due to some omitted economic conditions or local investment opportunities that tend to be persistent and sticky over time. The omitted variable problem is further mitigated when we examine and find that the UI benefit provisions of a firm's bordering states, which are supposed to be affected by similar macroeconomic conditions and investment prospectus, do not have any significant impact on the design of CEO's incentive compensation. In all, the falsification tests we conduct mitigate the endogeneity concern and reinforce our ability to speak to a causal nature of the findings.

We next examine whether the positive relation between the generosity of state UI policy and compensation Vega exhibits any cross-sectional variations in terms of labor market

characteristics as the hypothesis would predict. If more generous UI benefit provisions lead to an increase in the risk-taking incentives provided in CEO compensation through their impact on workers' unemployment risk, the effect should be more pronounced for firms that rely more on labor as an element of inputs in their productions and firms whose workers face greater expected unemployment risk. Consistent with the conjecture, we find that the positive effect is especially pronounced for firms operating in labor-intensive industries and in sectors that experience frequent layoffs. In additional analysis, we find that high union coverage with strong collective bargaining significantly attenuates the board's ability to reshape the risk environment of the firm through the provision of risk-taking incentives following the increase in maximum UI benefits, which is consistent with the divergence of interests between rank and file employees and shareholders (Agrawal, 2011).

The benefits of providing risk-averse CEOs with convex pay structures might also differ across firms since managers have different level of risk aversions. Knopf, Nam, and Thornton (2002) document that the manager's appetite for risk is significantly weaker if her compensation package is more sensitive to stock prices (Delta). The CEO's incentive to take risk also decreases with age as theoretically predicted by Prendergast and Stole (1996) and empirically verified in Serfling (2014). Consistent with the notion that option-based compensation is used to overcome managerial risk aversion, we find that the adjustment in CEO incentive compensation after the UI benefit increase is more pronounced when the human capital of the CEO is more closely tied to the firm or when the CEO is relatively older.

Lastly, 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. Consistent with the positive effect of compensation Vega on corporate risk taking, we find that firms spend

more money on R&D, invest less in capital expenditures and liquid assets, are less likely to conduct diversifying acquisitions, and thus increase 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 result in higher leverage ratios. Interestingly, the engagement in these risk-taking behaviors is only observed in firms that have provided the CEO with relatively more risk-taking incentives after the policy change, suggesting that the provision of incentive compensation is an important mechanism for firms to adjust to their optimal risk environment after the shock to the labor unemployment risk. Our dynamic evidence complements prior studies on this issue (Rajgopal, and Shevlin, 2002; Coles et al., 2006) by bridging together the design of optimal incentive compensation and their impact on firm risk.

Our study makes three distinct contributions to the literature. First, we contribute to a growing literature on labor and finance. So far the labor and finance literature (Titman (1984), Berk, Stanton, and Zechner (2010), and Agrawal and Matsa (2013)) has shown that unemployment risk faced by workers is one of the drivers of firms' financial policies. We show, for the first time as far as we are aware, that one important determinant of executive compensation is the unemployment risk faced by workers.

Second, we make a contribution to the literature that investigates optimal design of executive incentive contracts. Prior research uses market-to-book ratio to measure growth opportunities and document that the option-based compensation is used to provide managers with more incentives to take risk (Smith and Watts, 1992; Guay, 1999). Recent works 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) to study how boards readjust CEO incentives accordingly. We contribute to a more

complete understanding of the issue by incorporating the role of non-shareholder stakeholders, namely rank and file employees, in the provision of risk-taking incentives. Our findings suggest that workers' exposures to unemployment risk are important considerations for board of directors when designing the optimal incentive contract.

Third, we contribute to the extant literature that highlights the positive impact of risk-taking incentives on firm risk (Coles et al., 2006; Armstrong and Vashishtha, 2012). We document the adverse effect of risk-taking activities on workers' exposure to unemployment risk and how that affects the design of managerial incentive compensation. Toward that end, we are able to bridge two important and connected questions together, namely the optimal design of incentive contracts and the economic consequences of managerial risk-taking incentives on corporate investment and financial policies.

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 1992. We obtain firm financial information from Compustat and stock return data from CRSP. We also exclude firm-year observations with missing or non-positive book value of total assets. Our final sample consists of 3,188 unique firms and 33,850 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 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.

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 grants through annual compensation packages are under more direct control of the board, we focus on the newly

[7] The information is available on the following website: http://workforcesecurity.doleta.gov/unemploy/statelaws.asp.

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 firm 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]

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

[8] In unreported results, we find that the results are robust to risk-taking incentive measures based on a CEO's complete equity portfolios (current + prior grants) although the statistical significance level drops. The findings are consistent with the conjecture that the existing portion of CEO's outstanding incentive compensation is costly and thus slow to be modified by the board.

(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. 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.

[Insert Figures 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 provide more dynamic 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]

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.

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 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 *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 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-specific attributes ($X_{i,s,t}$) and state-level characteristics ($Y_{s,t}$) that may affect CEO *vega*. 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 macroeconomy.

[Insert Table 3]

Table 3 reports the results from the baseline regressions. The coefficient estimates of *Log max total benefit* are positive and statistically significant in both columns, suggesting that CEO *flow vega* increases flowing an increase in the generosity of state UI benefits. Furthermore, the effect of increase in state UI benefits on CEO *flow vega* is also 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 19.3% increase in CEO *flow vega*. These results eco the findings from the event study and support the hypothesis that boards of directors increase managerial risk-taking incentive when states increase UI benefits and thus workers are less exposed to unemployment risk.

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 nonviability risk. 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 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.

[Insert Table 4]

Table 4 presents the regression results. 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 in both columns, suggesting that boards use more options as the CEO equity-based pay following an increase in the state unemployment insurance benefits.

D. Robustness checks

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 headquartering state, 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.

[Insert Table 5]

The regression results presented in Panel A of Table 5 show that our findings continue to hold in these different samples and 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 try 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 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.

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.

[Insert Table 6]

The regression results from these falsification tests are shown in Table 6. 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 concern 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 add create an indicator variable, *high layoff propensity*, that is equal to one if the industry's layoff propensity is above sample median, and zero otherwise. We then interact this indicator variable with *Log max total benefit* and add the interaction term in the baseline regression.

[Insert Table 7]

The regression results are shown in column (1) of Table 7. Since the layoff propensity measure is calculated for each industry over the whole sample period, including firm fixed effects in the regression subsume the indicator of *high layoff propensity*. We find that the coefficient estimate of the interaction term between *Log max total benefit* and *high layoff propensity* is positive and significant while the coefficient estimate of *Log max total benefit* continues to be positive and significant. These results 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 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 add create an indicator variable, *high labor intensity*, that is equal to one if the industry's layoff propensity is above sample median, and zero otherwise. We then add the interaction term between *high labor intensity* and *Log max total benefit* in the regression model and present the results in column (2) of Table 7. The positive and significant coefficient estimate of *Log max total benefit* high labor intensity* suggests that CEO *vega* increases more with UI generosity in industries where labor is more important in the production process.

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 create a dummy variable, *high unionization rate,* that is equal to one if an industry's unionization rate is above sample median and zero otherwise. 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. We then interact *Log max total benefit* with *high unionization rate* and this interaction term in the regression model. The results presented in column (3) of Table 7 indicate that strong labor unions can attenuate the positive relationship between *CEO Vega* and UI benefits, as evidenced by the significantly negative coefficient estimate of the interaction term. 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.

Third, 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*). CEOs are also more risk averse when they become older as theoretically predicted by Prendergast and Stole (1996) and empirically verified in Serfling (2014). Therefore, we expect that the adjustment in CEO incentive compensation after the increase in UI benefits be more pronounced when CEO *delta* is higher and when the CEO is relatively older.

To test our prediction, we construct two indicators for CEOs who are more risk-averse. The first indicator, *high delta*, is equal to one if CEO *delta* is above the sample median and zero otherwise, where CEO *delta* is the dollar change in CEO wealth for a 0.01 increase in the firm's stock price based on the complete equity portfolios held by the CEO. The second indicator, *Old CEO*, is equal to one if the CEO age is above the sample median and zero otherwise. We then create interaction terms between these two indicators and the UI generosity measure and add interaction terms in the *vega* regression. The regression results are reported in Table 8.

[Insert Table 8]

Consistent with our conjecture, the positive effect of UI benefits on CEO *vega* is more pronounced when a CEO is more risk-averse, as evidenced by the positive and significant coefficient estimates of *Log max total benefit* high delta* in column (1) and *Log max total benefit* Old CEO* in column (2). 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. 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 COMPUSTA 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.

[Insert Table 9]

The regression results are presented in Table 9, 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.

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 the CEO having a *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 *Log (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. Consequently, the increase in *vega* encourages managers to take more risk.

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 10.

[Insert Table 10]

Columns (1) and (2) of Table 10 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. 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 older CEOs and CEOs who are less diversified. 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 the importance of workers' exposure to unemployment risk in in the design of optimal managerial compensation.

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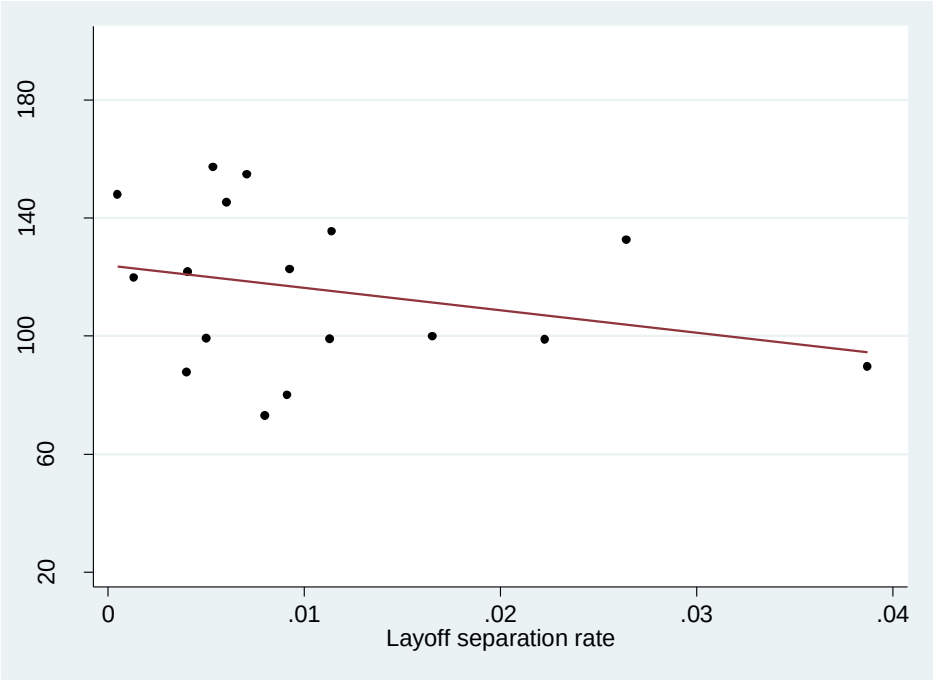

Figure 1. Industry average CEO *vega* and layoff separation rate

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).

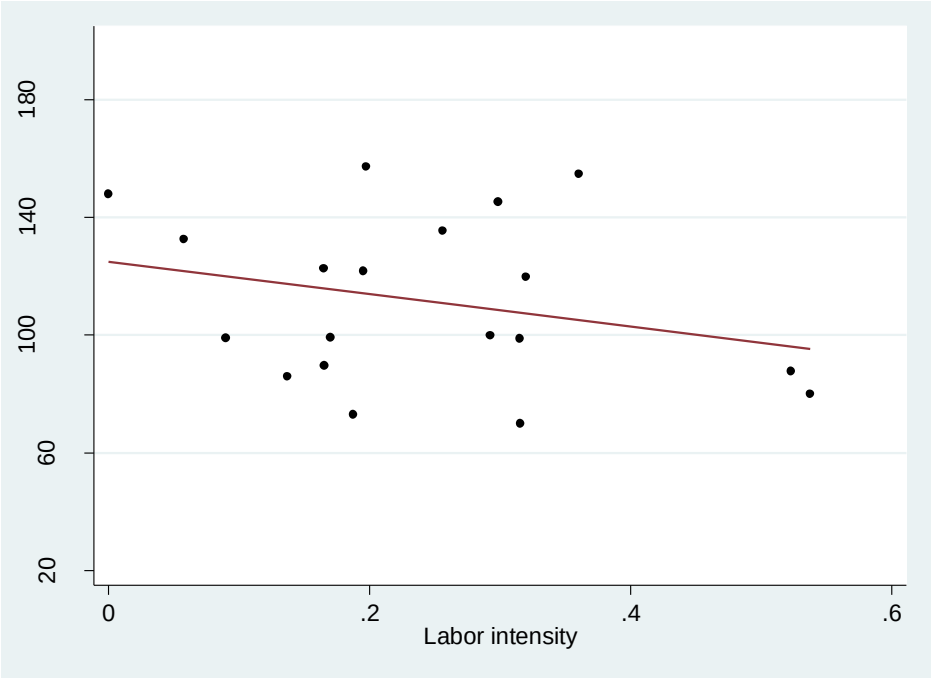

Figure 2. Industry average CEO *vega* and labor intensity

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.

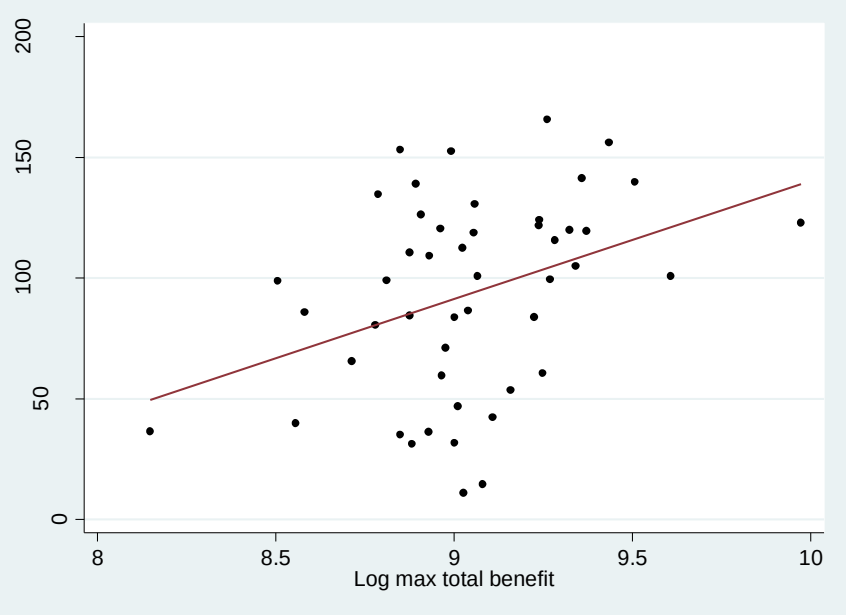

Figure 3A. State average CEO *vega* and maximum UI benefits

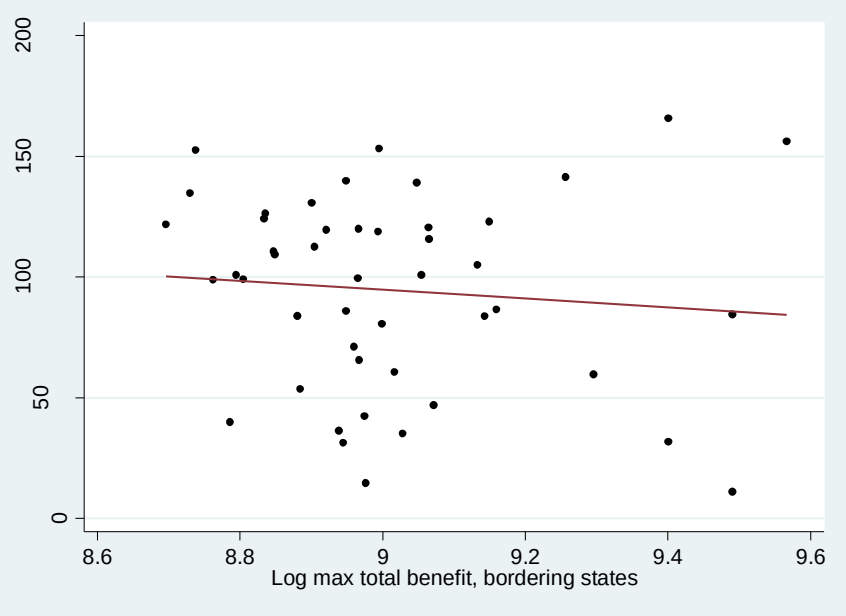

Figure 3B. State average CEO *vega* and maximum UI benefits: placebo

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 33,850 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	33850	26.710	52.149	0.000	6.672	27.399
Options/Equity (value)	27068	0.700	0.391	0.399	1.000	1.000
Options/Equity (number)	27068	0.753	0.370	0.645	1.000	1.000
Cash compensation	33850	0.444	0.297	0.192	0.377	0.661

Panel B: Firm-level characteristics

	N	Mean	Std	Q1	Median	Q3
Size (in $mil)	33850	11697	65780	459	1438	5191
Log(Size)	33850	7.416	1.783	6.131	7.271	8.555
Leverage	33850	0.224	0.201	0.057	0.202	0.338
MB ratio	33850	1.989	1.919	1.135	1.478	2.174
ROA	33850	0.032	0.157	0.012	0.043	0.082
Tangibility	33850	0.272	0.239	0.077	0.202	0.415
Tenure	33850	7.500	7.280	2.000	5.000	10.000
CEO chairman	33850	0.562	0.496	0.000	1.000	1.000
R&D	31093	0.028	0.053	0.000	0.000	0.030
CAPEX	29783	0.054	0.053	0.019	0.039	0.071
Cash	31079	0.142	0.167	0.022	0.071	0.202
Stock return volatility	33468	0.426	0.208	0.278	0.377	0.521
Diversifying acquisitions	10338	0.741	0.438	0.000	1.000	1.000

Panel C: State-level characteristics

	N	Mean	Std	Q1	Median	Q3
Max weekly benefit (in $)	33850	366.928	127.952	275	347	438
Max duration (in weeks)	33850	26.207	0.955	26	26	26
Max total benefit (in $)	33850	9679.641	3749.975	7150	9022	11388
Log max total benefit	33850	9.117	0.339	8.875	9.107	9.340
GDP growth rate	33850	4.808	2.850	3.441	4.922	6.631
Unemployment rate	33850	6.019	2.005	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. We control for firm and year fixed effects in all regressions, whose coefficient estimates are suppressed.

	(1)	(2)
Dependent variables	Flow Vega	Flow Vega
Log max total benefit$_{t-1}$	14.124***	15.212***
	(0.009)	(0.005)
Log(Size)	10.865***	10.851***
	(0.000)	(0.000)
Leverage	-6.910**	-6.823**
	(0.031)	(0.033)
MB ratio	2.369***	2.346***
	(0.000)	(0.000)
ROA	3.118**	3.098**
	(0.032)	(0.029)
Tangibility	-14.640**	-14.428**
	(0.013)	(0.016)
Tenure	0.066	0.067
	(0.208)	(0.209)
CEO chairman	0.026	0.052
	(0.972)	(0.943)
Cash compensation	-59.491***	-59.682***
	(0.000)	(0.000)
GDP growth rate		0.349*
		(0.063)
Unemployment rate		0.165
		(0.654)
Intercept	-154.645***	-167.319***
	(0.001)	(0.001)
Firm fixed effects	Yes	Yes
Year fixed effects	Yes	Yes
Observations	34,057	33,850
Adjusted R-squared	0.484	0.484

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$_{t-1}$	0.110***	0.098***
	(0.000)	(0.000)
Log(Size)	-0.001	0.004
	(0.853)	(0.277)
Leverage	0.029*	0.035**
	(0.072)	(0.024)
MB ratio	0.005***	0.002
	(0.001)	(0.246)
ROA	0.013	0.013
	(0.402)	(0.376)
Tangibility	-0.000	-0.042
	(0.987)	(0.132)
Tenure	0.001	-0.000
	(0.161)	(0.631)
CEO chairman	-0.000	0.001
	(0.933)	(0.796)
Cash compensation	-0.014	-0.065***
	(0.210)	(0.000)
GDP growth rate	0.001	0.001
	(0.248)	(0.290)
Unemployment rate	-0.002	-0.002
	(0.314)	(0.496)
Intercept	-0.079	0.053
	(0.691)	(0.784)
Firm fixed effects	Yes	Yes
Year fixed effects	Yes	Yes
Observations	27,068	27,068
Adjusted R-squared	0.539	0.514

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 dispersed industries
Dependent variables	Flow Vega	Flow Vega	Flow Vega
Log max total benefit$_{t-1}$	15.507***	15.154***	15.288***
	(0.000)	(0.008)	(0.006)
Log(Size)	11.665***	11.151***	10.920***
	(0.000)	(0.000)	(0.000)
Leverage	-5.446*	-8.104***	-7.033**
	(0.095)	(0.003)	(0.023)
MB ratio	3.170***	2.414***	2.316***
	(0.000)	(0.000)	(0.000)
ROA	3.178	1.763	3.191**
	(0.109)	(0.262)	(0.030)
Tangibility	-12.224	-16.398***	-16.043**
	(0.121)	(0.009)	(0.020)
Tenure	0.138**	0.014	0.050
	(0.030)	(0.872)	(0.390)
CEO chairman	1.671*	-0.043	0.320
	(0.073)	(0.963)	(0.646)
Cash compensation	-60.995***	-58.893***	-59.502***
	(0.000)	(0.000)	(0.000)
GDP growth rate	0.212	0.296**	0.488**
	(0.152)	(0.028)	(0.016)
Unemployment rate	0.229	-0.046	0.457
	(0.590)	(0.924)	(0.421)
Intercept	-200.815***	-163.095***	-171.498***
	(0.000)	(0.002)	(0.001)
Firm fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
Observations	27,119	27,229	29,711
Adjusted R-squared	0.512	0.488	0.485

Panel B: alternative incentive measures

	(1)	(2)	(3)
Dependent variables	LN(1+Flow Vega)	Flow Vega/Flow Delta	Flow Vega Team
Log max total benefit$_{t-1}$	0.479***	0.171***	9.230**
	(0.000)	(0.001)	(0.025)
Log(Size)	0.284***	0.088***	7.163***
	(0.000)	(0.000)	(0.000)
Leverage	-0.085	0.179**	-4.022**
	(0.348)	(0.049)	(0.027)
MB ratio	0.021***	-0.014**	1.458***
	(0.000)	(0.017)	(0.000)
ROA	0.134**	0.032	1.453
	(0.017)	(0.615)	(0.124)
Tangibility	-0.351	0.014	-7.757**
	(0.125)	(0.884)	(0.017)
Tenure	-0.004*	-0.002*	0.135**
	(0.061)	(0.070)	(0.037)
CEO chairman	-0.001	0.007	-1.456*
	(0.981)	(0.590)	(0.091)
Cash compensation	-3.428***	0.598***	-22.493***
	(0.000)	(0.000)	(0.000)
GDP growth rate	0.005	-0.003	0.263***
	(0.279)	(0.184)	(0.005)
Unemployment rate	0.000	-0.006	0.430
	(0.980)	(0.315)	(0.216)
Intercept	-2.652***	-1.596***	-116.847***
	(0.003)	(0.001)	(0.004)
Firm fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
Observations	33,850	27,068	33,850
Adjusted R-squared	0.643	0.327	0.372

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$_{t-1}$	13.598***	15.153***	
	(0.007)	(0.006)	
Log max total benefit$_{t}$	-7.046		
	(0.291)		
Log max total benefit$_{t+1}$	10.780		
	(0.236)		
Log max total benefit$_{t-1}$, bordering states average		-11.702	-12.106
		(0.318)	(0.342)
Log(Size)	11.171***	10.846***	10.867***
	(0.000)	(0.000)	(0.000)
Leverage	-7.928**	-6.813**	-6.616**
	(0.015)	(0.034)	(0.040)
MB ratio	2.331***	2.347***	2.291***
	(0.000)	(0.000)	(0.000)
ROA	3.051**	3.131**	3.319**
	(0.021)	(0.025)	(0.018)
Tangibility	-13.818**	-14.399**	-14.422**
	(0.015)	(0.016)	(0.017)
Tenure	0.060	0.066	0.062
	(0.294)	(0.214)	(0.246)
CEO chairman	-0.083	0.042	0.045
	(0.906)	(0.954)	(0.951)
Cash compensation	-60.316***	-59.672***	-59.568***
	(0.000)	(0.000)	(0.000)
GDP growth rate	0.334*	0.342*	0.290
	(0.076)	(0.070)	(0.131)
Unemployment rate	0.102	0.099	0.059
	(0.775)	(0.791)	(0.887)
Intercept	-187.246***	-64.379	72.739
	(0.002)	(0.533)	(0.508)
Firm fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
Observations	32,724	33,850	33,850
Adjusted R-squared	0.487	0.484	0.483

Table 7. Labor unemployment risk and CEO vega: labor market characteristics

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. 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 intensity is measured as the median ratio of total labor expenses (XLR) to sales (SALE) for COMPUSTAT firms based on three-digit NAICS industries. 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. 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$_{t-1}$	7.991**	11.962***	17.107***
	(0.041)	(0.000)	(0.000)
Log max total benefit$_{t-1}$*High layoff propensity	10.448***		
	(0.000)		
Log max total benefit$_{t-1}$*High labor intensity		8.272***	
		(0.002)	
Log max total benefitt-1*High labor union			-5.674**
			(0.045)
Log(Size)	11.005***	10.813***	10.730***
	(0.000)	(0.000)	(0.000)
Leverage	-6.867***	-6.579***	-7.789***
	(0.000)	(0.000)	(0.000)
MB ratio	2.369***	2.306***	2.325***
	(0.000)	(0.000)	(0.000)
ROA	3.235**	3.133**	3.277**
	(0.038)	(0.039)	(0.030)
Tangibility	-14.004***	-15.085***	-14.491***
	(0.000)	(0.000)	(0.000)
Tenure	0.024	0.061	0.054
	(0.644)	(0.216)	(0.284)
CEO chairman	0.272	0.143	0.010
	(0.668)	(0.815)	(0.988)
Cash compensation	-59.883***	-59.528***	-58.986***
	(0.000)	(0.000)	(0.000)
GDP growth rate	0.371***	0.363***	0.327***
	(0.002)	(0.002)	(0.007)
Unemployment rate	0.334	0.219	0.304
	(0.265)	(0.456)	(0.319)
Intercept	-164.277***	-176.682***	-158.535***
	(0.000)	(0.000)	(0.000)
Firm fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
Observations	32,174	33,631	31,703
Adjusted R-squared	0.483	0.485	0.484

Table 8. Labor unemployment risk and CEO vega: CEO risk aversion

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. High Delta is a dummy variable, which equals 1 if the compensation Delta based on the CEO's complete equity portfolios is above the sample median and 0 otherwise. Old CEO is a dummy variable, which equals 1 if the CEO age is above the sample median and 0 otherwise. 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	Flow Vega	Flow Vega
Log max total benefit$_{t-1}$	14.165***	12.954**
	(0.008)	(0.035)
Log max total benefit$_{t-1}$*High Delta	6.158*	
	(0.074)	
High Delta	-50.292	
	(0.109)	
Log max total benefit$_{t-1}$*Old CEO		5.576*
		(0.076)
Old CEO		-52.035*
		(0.072)
Log(Size)	10.876***	11.605***
	(0.000)	(0.000)
Leverage	-5.032	-6.147*
	(0.108)	(0.064)
MB ratio	3.334***	2.325***
	(0.000)	(0.000)
ROA	2.069*	2.253
	(0.097)	(0.115)
Tangibility	-12.992*	-12.594**
	(0.065)	(0.045)
Tenure	-0.021	0.093*
	(0.709)	(0.099)
CEO chairman	0.466	1.725**
	(0.600)	(0.045)
Cash compensation	-61.920***	-62.187***
	(0.000)	(0.000)
GDP growth rate	0.365*	0.336*
	(0.060)	(0.081)
Unemployment rate	0.611	0.171
	(0.209)	(0.660)
Intercept	-186.097***	-137.522**
	(0.001)	(0.013)
Firm fixed effects	Yes	Yes
Year fixed effects	Yes	Yes
Observations	30,012	30,754
Adjusted R-squared	0.502	0.495

Table 9. 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 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$_{t-1}$	0.011**	-0.010***	-0.036**	-0.194**	0.151***	0.021**
	(0.049)	(0.004)	(0.012)	(0.023)	(0.000)	(0.011)
Log(Size)	-0.003***	-0.002***	-0.035***	0.093***	-0.054***	0.006***
	(0.000)	(0.005)	(0.000)	(0.000)	(0.000)	(0.005)
Leverage	-0.025***	-0.033***	-0.057***	-0.110	0.144**	0.543***
	(0.000)	(0.000)	(0.000)	(0.373)	(0.017)	(0.000)
MB ratio	0.002**	0.001**	0.003**	-0.001	0.005	-0.003**
	(0.045)	(0.040)	(0.034)	(0.904)	(0.236)	(0.047)
ROA	-0.059***	0.026***	-0.058***	0.133	-0.138***	-0.046***
	(0.000)	(0.000)	(0.000)	(0.508)	(0.000)	(0.002)
Tangibility	-0.016***	0.035***	-0.165***	-0.638**	-0.195**	0.007
	(0.001)	(0.000)	(0.000)	(0.014)	(0.015)	(0.561)
Tenure	0.000	0.000	-0.000	-0.011**	-0.002**	-0.000
	(0.422)	(0.283)	(0.165)	(0.012)	(0.039)	(0.974)
CEO chairman	-0.003**	0.000	0.001	0.105	0.016	0.005***
	(0.038)	(0.757)	(0.786)	(0.162)	(0.141)	(0.002)
Cash compensation	-0.015***	-0.011***	-0.018**	0.154	-0.001	0.004
	(0.000)	(0.000)	(0.026)	(0.290)	(0.955)	(0.378)
GDP growth rate	0.000*	0.000**	0.000	-0.014*	-0.003***	-0.000
	(0.053)	(0.041)	(0.137)	(0.093)	(0.002)	(0.268)
Unemployment rate	0.003***	-0.001*	-0.002	-0.023	0.017***	0.001
	(0.009)	(0.057)	(0.164)	(0.180)	(0.000)	(0.312)
Intercept	-0.048	0.174***	0.777***	7.382***	-1.957***	-0.137*
	(0.288)	(0.000)	(0.000)	(0.000)	(0.000)	(0.059)
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	15,542	14,884	15,534	5,124	16,737	16,304
Adjusted (Pseudo) R-squared	0.586	0.740	0.808	0.615	0.716	0.817

Panel B: Low CEO 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	-0.078	0.013	0.005
	(0.334)	(0.464)	(0.712)	(0.354)	(0.719)	(0.647)
Log(Size)	-0.004***	-0.004**	-0.024***	0.056***	-0.066***	0.013***
	(0.000)	(0.013)	(0.000)	(0.000)	(0.000)	(0.000)
Leverage	-0.012***	-0.027***	-0.077***	0.081	0.146***	0.513***
	(0.000)	(0.000)	(0.000)	(0.576)	(0.001)	(0.000)
MB ratio	0.002***	0.002*	0.001	-0.000	0.009***	-0.002
	(0.004)	(0.086)	(0.397)	(0.950)	(0.000)	(0.143)
ROA	-0.063***	0.009	-0.016**	0.349**	-0.249***	-0.047**
	(0.000)	(0.103)	(0.040)	(0.042)	(0.000)	(0.014)
Tangibility	-0.018***	0.013	-0.216***	-0.438**	-0.340***	0.072***
	(0.007)	(0.172)	(0.000)	(0.020)	(0.000)	(0.000)
Tenure	-0.000	0.000	0.000	-0.001	-0.002***	-0.000**
	(0.552)	(0.190)	(0.866)	(0.732)	(0.009)	(0.048)
CEO chairman	-0.002	0.001	-0.003	0.086*	0.016	0.004
	(0.236)	(0.347)	(0.243)	(0.059)	(0.104)	(0.144)
Cash compensation	-0.009***	-0.007***	-0.005	0.132**	-0.261***	-0.001
	(0.000)	(0.007)	(0.148)	(0.039)	(0.000)	(0.850)
GDP growth rate	0.001***	0.000	0.000	0.009	-0.005***	0.001*
	(0.000)	(0.532)	(0.428)	(0.335)	(0.000)	(0.071)
Unemployment rate	0.003**	-0.001*	0.000	-0.010	0.011***	0.002
	(0.026)	(0.080)	(0.974)	(0.442)	(0.000)	(0.127)
Intercept	-0.006	0.149**	0.345***	6.400***	-0.533*	-0.068
	(0.881)	(0.013)	(0.002)	(0.000)	(0.072)	(0.525)
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	15,551	14,899	15,545	5,119	16,731	16,315
Adjusted (Pseudo) R-squared	0.568	0.681	0.789	0.529	0.684	0.835

Table 10. 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 $benefit_{t-1}$	0.025***	0.024***	0.008	0.009
	(0.007)	(0.009)	(0.482)	(0.448)
Log(Size)	-0.015***	-0.015***	-0.020***	-0.019***
	(0.000)	(0.000)	(0.000)	(0.000)
Leverage	-0.002	-0.002	0.014	0.013
	(0.809)	(0.800)	(0.172)	(0.210)
MB ratio	0.014***	0.014***	0.014***	0.015***
	(0.000)	(0.000)	(0.000)	(0.000)
ROA	0.252***	0.251***	0.310***	0.310***
	(0.000)	(0.000)	(0.000)	(0.000)
Tangibility	0.006	0.006	-0.009	-0.009
	(0.668)	(0.666)	(0.528)	(0.528)
Tenure	0.000	0.000	0.000	0.000*
	(0.452)	(0.470)	(0.103)	(0.080)
CEO chairman	-0.002	-0.002	-0.004*	-0.004*
	(0.268)	(0.264)	(0.051)	(0.057)
Cash compensation	-0.011**	-0.013**	-0.010**	-0.010***
	(0.031)	(0.016)	(0.011)	(0.009)
GDP growth rate	-0.000	0.000	0.000	-0.000
	(0.797)	(0.697)	(0.861)	(0.867)
Unemployment rate	0.000	0.001	0.000	0.001
	(0.630)	(0.257)	(0.924)	(0.364)
Intercept	-0.111	-0.138*	0.057	0.015
	(0.183)	(0.094)	(0.566)	(0.878)
Firm fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Observations	16,302	16,302	16,316	16,316
Adjusted (Pseudo) R-squared	0.485	0.490	0.519	0.513

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 0.01 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).
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.
Stock return volatility	Annualized standard deviation of firm's daily stock returns.
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.