

Managerial Ownership and Employee Risk Bearing

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Abstract

If executives own a stake in the firm they manage, whether for historical or incentive based reasons, they are inherently under-diversified. Management is therefore not the risk neutral actor many corporate finance texts assume and the results from the optimal risk-sharing literature apply: management should be expected to pass some share of firm risk to employees and this share should be increasing in managerial risk aversion. Managers who own more of the firm are more under-diversified and therefore likely to be more risk averse, implying that employee borne risk should be increasing in managerial ownership. We test this proposition and find that when management owns more of the firm employees have greater risk of being fired and greater variability in pay. A ten percent increase in executive ownership translates to a 14% increase in the variability of option grants per employee and a 3% increase in the variability in employment. Our results also suggest that the effect of financing constraints may be felt most by employees not through the mix of compensation elements, but through the risk of job loss.

1 Introduction

The first principal agent model most students learn in graduate school allows for both parties to be risk averse: first best risk sharing rules are derived and agency issues leading to second best contracts are developed.¹ In corporate finance applications, the principal is often either a public firm that must hire a worker or a corporate board that must hire a CEO. In either case, the principal is assumed to be risk neutral; after all, she is acting on behalf of shareholders who may diversify away idiosyncratic risk.² Optimal risk sharing then requires that employees bear no risk. Therefore, while the concept of both principal and agent preferring less risk to more appears early in a course on contracting, it also disappears early and the implications of risk aversion on the part of management are not typically addressed.

If executives own a large share of a firm, either through stock or option grants aimed at proper incentive design or through a historic relationship with the company (e.g. founder), they are inherently under-diversified. They are typically too cash constrained to diversify through purchases of stock in other firms and attempts to diversify by selling their stakes, trading derivatives etc. will be seen as, at least, a negative signal regarding the prospects of the firm and, at most, a criminal act. Firm management is therefore not the risk neutral actor many corporate finance texts assume, and the degree of manager risk aversion varies systematically according to the level of managerial ownership of the firm.

Once we acknowledge that management is risk averse it is clear that man-

¹Most introductory principal agent courses begin with a derivation of the *Borch rule*. For example, the following definition of the Borch rule and its derivation appear on pages 9-13 of *Contract Theory*, a 2005 textbook authored by Patrick Bolton and Mathias Dewatripont: "optimal coinsurance requires the equalization of the ratio of marginal utilities of money across states of nature".

²Market risk of projects is typically ignored in corporate finance models.

agement will take actions in a manner suboptimal for shareholders. There is evidence that managers take such actions. They make use of looseness in accounting rules to reduce idiosyncratic risk: Teoh, Welch and Wong (1998a,b), Sloan (1996) and Nelson et al. (2002) provide examples. Healy and Wahlen (1999), Dechow and Skinner (2000), Beneish (2001), and Fields et al. (2001) offer surveys. In line with our paper, managers also make real choices to manage earnings. Dechow and Sloan (1991), Bartov (1993), Bushee (1998) and Gunny (2008) show that firms use real choices like price discounts (to inflate sales), overproduction (to lower cost of goods sold), reductions in advertising and research and development (which are accounted for as a cost rather than as a capital expenditure) and asset disposals to smooth cash flows and reported earnings. Each of these actions reduces the idiosyncratic risk of the firm to the detriment of long run profit, but each is a predictable consequence of managerial ownership.

We argue that management should also be expected to shift risk to employees: when employees bear no risk they are risk neutral on the margin – the marginal benefit of pushing risk to employees is first order for management while the marginal cost for employees is second order. We set out a simple principal agent model with a board, manager and employee and show that greater managerial ownership of the firm should be associated with greater risk borne by employees. Not surprisingly, given the intuitiveness of this claim, such a model need not be particularly complex. To test the theory empirically, we identify two ways in which employees bear risk:

1. Employment risk – firms may establish reputations for laying off or not laying off workers in tough times.³

³Japanese firms are famous for not laying off workers during periods of weak demand. Even when layoffs occur, companies may accompany layoffs with severance pay, offers to work at other locations, etc. to soften the blow.

2. Compensation risk – firms may use variable compensation components like cash or stock bonuses or options in an employee’s pay package.

While precise contracting terms are not typically disclosed by public firms, we can observe proxies for these two measures of employee borne risk in the data: volatility in reported employment is a proxy for employment risk and volatility in option pay per employee is a measure of compensation risk. Total variability in pay is of course greater than variability in option pay alone, but as we cannot observe the former we rely on the latter and assume that the two are not negatively correlated; indeed, it would be odd if they were.

To study the relationship of managerial risk aversion and employee risk bearing, we measure how the fraction of firm risk borne by employees depends on the fraction of the firm’s diluted equity owned by the top five managers. Firm risk is measured as the volatility in revenue normalized by lagged assets and employee borne risk is measured alternately as volatility in employment normalized by lagged assets or volatility in option pay per employee.⁴ We find that when management owns more of the firm, employees bear both more employment risk and more compensation risk. This finding is robust to whether we measure managerial ownership as a continuous variable or as a dummy; whether controls are included for whether the firm is financially constrained; whether financials and utilities are included or excluded; and whether we control for industry mean alone or industry variation as well. It is also worth noting that management attempts to reduce firm risk succeed: the raw correlation of managerial ownership and free cash flow volatility for S&P 1500 firms since 1992 is -0.06 which, while small, is statistically significant.

From our analyses it appears that greater executive ownership does drive managers to push greater risk onto employees, and the effect is primarily felt

⁴As option pay is already normalized by employment level, it does not need normalization by lagged assets as the other two variables do.

through variable pay rather than employment risk. An increase in executive ownership at a firm from zero to ten percent increases variability in employee option grants by 24.6-24.9%. The increased risk to employment is 2.7-3.7% and the increased risk in option pay for an employee is 13.3-14.6%.

We also find that the relationship of measures of financing constraints and employee risk bearing can be negative or positive depending on the measure used. In line with previous work (Core and Guay (2001) and Bergman and Jenter (2007), for example), compensation risk may be larger or smaller for more constrained firms depending on the measure of financing constraints used. Employment risk, however, is greater for more constrained firms regardless of the financing constraint measure used. These results suggest that the effect of financing constraints may be felt most by employees not through the mix of compensation elements, but as a risk of job loss. This should not surprise us. Management has significant discretion over compensation techniques regardless of the firm's performance, but it has much less discretion when it comes to employment: if a firm is running out of money it simply must fire employees.

The paper is organized as follows. Section 2 reviews the literature on variable compensation and its determinants. Section 3 lays out a formal model of the board's problem: it must offer a share of the firm to management in order to induce optimal behavior, but management has the ability to set employee pay. Any positive level of incentives will induce the manager to impose risk on employees to the detriment of shareholders. This increases the necessary incentives that must be given to the manager and decreases firm value. The model should not be thought of as a structural model for the empirical work, but a simple exposition of the risk sharing problem at the heart of this paper. Section 4 describes the data and our methods for estimating managerial risk aversion and employee borne risk while section 5 describes the primary results of the paper.

Section 5.1 in particular discusses the ability of a variety of financing constraints measures to predict employment risk and compensation risk while section 5.3 addresses potential alternative stories that could produce our results; we believe that our results rule out other potential links between managerial ownership and employee risk bearing including incentive and financing constraints stories. Section 6 concludes. Tables are displayed at the end of the paper and proofs appear in the appendix.

2 Literature Review

There are two strands of literature related to our paper, the first attempting to provide justification for the use of broad-based employee stock option plans and the second concerning earnings or cash flow smoothing. We will discuss each in turn as well as the relationship of our paper to the literature.

The use of broad based employee stock option plans is perplexing when viewed through the lens of traditional principal-agent theory: if management represents risk neutral shareholders, employees are risk averse, and the relationship of employee effort to firm value is minimal then it seems sub-optimal to shift risk to employees through stock options. It has therefore been a goal of the theoretical and empirical literature surrounding compensation design to search outside the traditional models for new explanations. There are three primary outstanding explanations, here referred to as the "financing constraints", "behavioral" and "accounting" stories.

The first of the three explanations argues that it may be costly for some firms to raise external capital, even when high NPV projects are available. This may be due to agency concerns (as in Myers and Majluf (1984)) or other factors, but it is certainly the case that firms facing financing constraints may wish to use less

cash compensation and more equity compensation (Yermack (1995), Core and Guay (2001)). Babenko, Lemmon and Tserlukevich (2008) argue that beyond the current cash savings from issuing equity to employees, options are especially attractive because they yield additional cash in the future when the firm has the greatest investment opportunities: options are more likely to be exercised when firm value is high, and if high firm value implies high investment opportunities then cash arrives just when it should. These arguments rely on employees having better information than the market regarding firm opportunities; otherwise why not sell options on the open market and pay employees with cash? It is unclear whether the theory holds empirically: Core and Guay (2001) find support for the financing constraints theory while Bergman and Jenter (2007) do not.

The second of the three explanations is that there may be behavioral reasons for broad based employee option pay. Bergman and Jenter (2007) propose a model possessing two channels through which employees will be willing to overpay for equity compensation. The first is that employees might pay more than fair value for equity compensation because they have a preference for the compensation instruments offered by their firms over the equity claims traded in the market. The second is that they may be willing to pay more than fair value since the market overvalues their firm's equity and equity can be sold on that market (this is essentially a back door seasoned equity offering). Under both conditions, firms can use equity compensation to reduce their total compensation costs. They present evidence for this hypothesis by showing that past stock price performance, a proxy for investor optimism and sentiment, is positively related to employee stock option grants. In addition, they document that variables which are positively related to employee sentiment – cash balances, Q, cash flow and investment – are associated with greater use of option grants while variables negatively related to sentiment – leverage and interest burden –

are associated with lesser use of option grants. Their empirical support relies on the reader finding plausible their assumptions regarding what variables imply greater or lesser sentiment. It is unclear, for example, why higher leverage should imply lower employee sentiment.

An alternative behavioral story is due to Spalt (2008): employees with cumulative prospect theory preferences find options attractive due to the tendency to overweight small probabilities of large gains. Options offer low downside risk but the small potential for large gain. Consistent with this view, firms with greater stock price volatility grant more options to lower level employees. Unfortunately for this theory, options are typically issued at the money, which is inconsistent with optimal compensation under cumulative prospect theory preferences. Furthermore, Oyer and Schaefer (2005) find that firm volatility is not a good predictor of option grants once industry volatility is controlled for.

A final behavioral story is that options compensate employees well when demand for labor is high. So long as vesting schedules are long and demand for employees tends to be high when firm value is high, employee retention can be improved by using option compensation. Because there are more effective ways of retaining employees some executive myopia is necessary to declare option compensation ideal. Each behavioral story has significant shortcomings theoretically though each provides an interesting potential justification for broad based option pay.

The third of the three explanations for the use of broad based employee option plans is due to Hall and Murphy (2003), who argue that prior to rule changes regarding option expensing, options were viewed by executives as a cheap way to pay employees. Oyer and Schaefer (2006) investigate this claim and find that accounting considerations are not the main driver of broad based option schemes. While the use of such schemes has declined since 2002, they

are still common today.

We describe a rationale for using variable pay as a way to smooth cash flows, thereby making a risk averse executive who holds an equity stake in the firm better off. As discussed in the introduction, it is well established that managers make both accounting and real choices to smooth cash flows or earnings. Amihud and Lev (1981) argue that managers have an incentive to engage in conglomerate mergers to decrease their largely un-diversifiable "employment risk". They show that manager-controlled firms engage in more conglomerate acquisitions and more diversifying acquisitions than owner-controlled firms. Dechow and Sloan (1991), Bartov (1993), Bushee (1998) and Gunny (2008) show that firms use real choices like price discounts, overproduction, reductions in advertising and research and development and asset disposals to smooth cash flows and reported earnings. Our story is one in a long list of methods discussed in the literature for using real decisions to smooth cash flows or earnings.

There is some literature that low volatility in cash flow or earnings may be good for shareholders: Rountree, Weston and Allayannis (2008) document that cash flow volatility (not earnings volatility) is negatively related to firm value measured by Tobin's Q , suggesting that investors prefer smooth cash flows. This result holds even for firms with lower financing needs. There is also evidence that low earnings volatility is associated with greater analyst following (Lang, Lins and Miller 2003), a greater number of institutional investors (Badrinath, Gay, and Kale 1989), and lower borrowing costs (Trueman and Titman 1988). Using surveys of top executives, Graham, Harvey and Rajgopal (2005) find that a large sample of CFOs display a strong preference on earnings, and may even give up positive NPV projects in order to generate smooth earnings.

The theoretical basis for these results is not well established. Froot, Scharfstein and Stein (1993) show that smooth cash flows can increase firm value by

reducing the firm's reliance on costly external capital markets. Consistent with this theory, Minton and Schrand (1999) find evidence that cash flow volatility can affect investment policy through the cost of capital. We argue for another mechanism that predicts at least some of these results. It isn't low cash flow volatility driving higher value or lower borrowing costs. Instead, higher managerial ownership both decreases cash flow and earnings volatility and improves value and borrowing costs. The confounding variable of managerial ownership may have driven some of the previous results.

The basis for broad based option plans remains an open question, and we argue that risk sharing may play a role. On the one hand, managers can move some risk they bear through equity ownership onto the backs of employees. This reduces their risk, but because employees are risk averse it also decreases firm value. On the other hand, higher managerial ownership can increase firm value due to proper incentivisation of executives. Holding managerial ownership fixed, the relationship between cash flow volatility and firm value would be negative, but if managers are more effective as they own more of the firm then we might find a positive relationship.

3 Model

It should not be difficult to see that risk averse managers have an incentive to shift risk to employees even if those employees are considerably more risk averse. Nonetheless it is worth having a formal model to show this explicitly. While the model below is not particularly general, it should be clear that the intuition extends naturally to more complex settings – the simplicity of the model is designed to make the intuition clear but is not necessary.

Suppose a board must hire a CEO who in turn must hire an employee. The

board, as a representative of shareholders, is risk neutral, but the CEO and employee are risk averse. The board faces a hidden action problem vis a vis the CEO and may therefore wish to incentivize her to exert effort. The CEO faces no such problem with the employee: her effort is observable and contractible. We can model this as follows. The firm has gross revenue of $R = e + x$ where e is the CEO's effort and x is a random variable with mean 0 and variance σ^2 . The CEO must offer a pay package to the worker $w(R)$. Net revenue is revenue net of the employee's wage: $NR = R - w = e + x - w$. The board can only observe net revenue and sets CEO pay $p(NR)$ to maximize expected profit $E(\pi) = E(NR - p) = E(e + x - w - p)$.

The CEO and employee each have CARA utility in the neighborhood of expected pay,⁵ so their certainty equivalents of pay are:

$$\begin{aligned} CE_C &= E(p) - \frac{1}{2}\gamma_C Var(p) - \frac{1}{2}\delta e^2 \\ CE_w &= E(w) - \frac{1}{2}\gamma_w Var(w) \end{aligned}$$

respectively, where γ_c and γ_w are the CEO's and worker's coefficients of absolute risk aversion. δ is a parameter describing the CEO's cost of effort. The employee must be paid at least \bar{u}_w while the CEO has reservation utility of \bar{u}_C . For simplicity we restrict attention to linear contracts for both CEO and employee so

$$\begin{aligned} w(R) &= A_w + B_w R \\ p(NR) &= A_C + B_C NR \end{aligned}$$

The game is as follows. First, the board sets A_C and B_C , high enough so

⁵It is easy to show that any twice differentiable utility function is equivalent to CARA utility in the neighborhood of expected pay by taking a second order Taylor expansion around said expectation.

that the CEO is willing to work for the firm. Second, the CEO chooses effort e . Finally the CEO sets A_w and B_w , high enough so that the employee is willing to work for the firm. The value of x is then realized and payouts occur.⁶ The board recognizes that the CEO's effort choice depends on contracting terms and acts accordingly. We solve the game through backwards induction using the equilibrium concept of subgame perfection.

Proposition 1 *The quantity of risk borne by the employee is increasing in management's equity ownership stake*

Corollary 1 *The quantity of risk borne by the employee is decreasing in her risk aversion relative to the CEO*

The relationship of worker equity in the firm to CEO equity is given by

$$B_w = \frac{B_C}{B_C + \gamma_w/\gamma_C}$$

Risk borne by workers is $var(w) = var(A_w + B_w R) = B_w^2 \sigma^2 = \left(\frac{B_C}{B_C + \gamma_w/\gamma_C} \right)^2 \sigma^2$.

This is increasing in managerial ownership and decreasing in relative risk aversion of employees to CEOs. In the extreme case where CEOs are risk neutral, $\gamma_C = 0$ so $B_w = 0$ and employees do not bear risk. This case is optimal for shareholders. We can now solve the CEO's effort problem, and we arrive at the following result.

Proposition 2 *The effort of the CEO is increasing in her equity ownership stake and decreasing in her cost of effort*

⁶In practice the game would be more dynamic. The CEO chooses effort and worker pay jointly over time, and the choice of each affects the other. The modeling decision of whether the choice of effort should precede the choice of pay or the other way around is for simplicity. If effort responds to pay, then there is a first order effect of pay on effort. That is, in setting pay the CEO thinks: by shifting risk to employees I am disincenting myself. This is bad for firm profits and consequently bad for my payoff. If only I could commit..." By allowing effort to be chosen before pay, the CEO can commit to herself, which seems more natural and realistic while simplifying the mathematics.

The relationship between optimal effort e^* , equity ownership and cost of effort is given by

$$e^* = \frac{BC}{\delta}$$

Effort increases with managerial ownership and decreases with cost of effort. This result is in line with standard results in the incentive design literature. Our final result establishes that there are varying levels of management ownership in our economy. The parameter we will use to drive that variation is the cost of effort.

Proposition 3 *The level of optimal managerial ownership for the board to assign is greater when the cost of managerial effort is lower*

The mixed partial derivative of firm profit, net of pay for the CEO and employee, with respect to equity ownership and cost of effort is given by

$$-\frac{1}{\delta^2} < 0$$

The marginal return to increasing the ownership stake is decreasing in cost of effort. Because this ownership level is the only choice parameter for the board, we can apply Topkis' theorem and know that the level of ownership ceded to management is decreasing in cost of effort.

Pulling these threads together, we intended to show the following: there are different levels of optimal managerial ownership in the firm and the ratio of variability in employee pay to variability in revenue is increasing in this level. Increases in the cost of effort δ reduce the optimal equity stake in the firm assigned to the manager, so there is variability in that equity stake. The fraction

of firm risk borne by employees is

$$\frac{\left(\frac{B_C}{B_C + \gamma_w / \gamma_C}\right)^2 \sigma^2}{\sigma^2} = \left(\frac{B_C}{B_C + \gamma_w / \gamma_C}\right)^2$$

and this fraction is clearly increasing in the manager's equity stake.

4 Data and Variable Construction

Showing that firms where management retains a greater fraction of marginal revenue pass a greater fraction of risk to shareholders is not a simple matter. Ideally we would observe contracts given to each employee of each firm and show that employees with similar job descriptions bear differing risk depending on managerial risk aversion. As a measure of managerial risk aversion we could ideally use the total wealth of the manager and fraction of total wealth tied to the firm. Unfortunately, these data do not presently exist for large public firms, let alone smaller or private firms. We therefore must create proxies for each variable using the data we do have.

Our sample consists of all firms in the ExecuComp database from 1992 to 2006. ExecuComp provides detailed compensation information for the five highest paid executives at each firm in the S&P 1500, and because we need this information in our analysis we are limited to this sample. We exclude utilities (SIC 4900-4999).⁷ All financial information is taken from the Compustat database. Our initial sample consists of 25,652 firm-year observations from 2,649 firms, though we exclude 1,285 observations due to measurement error in calculating employee option compensation described below.

⁷It is standard to exclude utilities because their regulated nature makes their behavior significantly different from other large firms. We also perform the same analyses in this paper both including utilities and excluding financials and find little difference in the results. In order to align our methods with those standard in the literature, we choose the specification excluding utilities here.

While we are interested in pay variability for each employee, we do not have access to such data. We can, however, calculate a measure of the variability in option pay per employee and so long as we assume that option and other variable pay are not negatively associated, we can use this measure as a proxy for total pay variability. Firms report each option grant to their top five executives, but need not report the size, timing or distribution of option grants to other employees. Following Desai (2003) and Bergman and Jenter (2007), we use the ExecuComp variable "pcttotopt" to estimate the number of non-executive option grants. This variable describes, for each executive option grant reported in ExecuComp, the fraction of total employee option grants that year comprised by the executive grant in question. By dividing the size of each executive option grant by the associated value of pcttotopt we get an estimate of total employee option grants for the year. Unfortunately, these estimates do not always align for a given firm-year. We use the mean of these estimates as our estimate of total employee option grants for the firm-year and eliminate all firm-year observations in which the sample standard deviation of our estimates for the firm-year exceed 10% of the mean. We estimate the number of options granted to non-executive employees by subtracting the number of options granted to the top five executives from the number of options granted to all employees (following Core and Guay (2001) and Bergman and Jenter (2007)).

To estimate the value of these option grants from the number, we need measures of other parameters that enter into the Black-Scholes (1973) formula for option pricing. Since we know neither the stock price nor exercise price for the options when issued, we use the midpoint of the fiscal year high and low stock prices as the stock price and assume that all options are granted at the money. The estimates of dividend yield and stock price volatility are taken from ExecuComp. If dividend yield data are unavailable from ExecuComp, we

calculate the average dividend yield over the two preceding years using data from the Compustat database. If stock price volatility data are unavailable, we calculate it from the daily stock return data over the preceding two years taken from CRSP. We assume the risk free rate to be 6% and the maturity is uniformly set to 10 years. Finally, we calculate the per-employee value of option grants by dividing the total value granted to non-executive employees by the number of non-executive employees during the relevant fiscal year. Firm revenue and head count are taken from Compustat.

Our analysis evaluates the relationship of firm risk, employee borne risk and managerial risk aversion, and these measures require calculating standard deviations of relevant variables within a firm. For each firm we have up to 15 years of data, but we face a trade-off. We could simply use all 15 years to calculate standard deviations for each firm; in this case, each observation in our analysis would be associated with a single firm. The problem is that managerial ownership and employee risk bearing may change significantly over such a long sample period, causing significant measurement error. To lessen the problem we could use shorter time periods for each firm and have firm-period level (rather than firm level) observations, but this increases the measurement error of our estimates of firm and employee borne risk. We chose five years as the best length trading off these two concerns, so for each firm there are as many as three firm-period observations in the data.⁸ We also present results using the entire 15 years as a robustness check, and the conclusions are similar. Analyses with other period lengths are not reported but yield similar results as well.

We proxy for the level of management under-diversification using the fraction of the firm owned by the top five executives. We add the number of shares,

⁸There are often fewer than three since there was considerable movement in and out of the S&P 1500 over our sample period, and we do not have data on firms during years in which they were out. Firms are also sometimes out of sample if no options were granted to executives. This is because we can only calculate employee option grants through disclosed executive option grants.

restricted shares and exercisable options for the top five executives and divide by the number of shares outstanding for that firm-year to get the fraction of diluted equity controlled by top management. Mean executive ownership in our sample is 7.1% while the median is 3.7%.

We measure firm risk as the standard deviation of firm revenue divided by lagged assets.⁹ Profit is revenue less cost, so if managers wish to decrease profit volatility via employment contracts, they must pass a greater share of revenue volatility to employees. We measure the fraction of firm risk borne by employees the ratio of the variability in option pay to the variability in firm revenue, each normalized by firm assets. To reduce the impact of outliers we take a log of this ratio. Our measure of employee risk bearing is therefore

$$ERB_{BSV} = \log \left(\frac{\sigma(\text{Option Pay/Lagged Assets})}{\sigma(\text{Revenue/Lagged Assets})} \right)$$

In order to determine the degree to which employees bear risk through variable pay versus employment uncertainty, we construct two other variables. Employee risk bearing through employment risk is measured as

$$ERB_{Emp} = \log \left(\frac{\sigma(\text{Total Employment/Lagged Assets})}{\sigma(\text{Revenue/Lagged Assets})} \right)$$

⁹Normalizing volatility by lagged assets serves two purposes. First, larger firms would mechanically have higher revenue volatility than smaller firms: $\sigma(Cx) = C\sigma(x)$ for a constant C and random variable x . Dividing by lagged assets puts all firms on an equal footing, though we still need to control for industry differences. Second, firms with greater growth also mechanically have higher variation in revenue. Revenue variability in this case would not measure risk, but growth. Dividing by lagged assets solves this problem, though if different firms have different acceleration in size the normalization will not completely solve this problem. Over a five year observation window this sort of second order effect is probably not relevant except in the case of mergers and acquisitions. To eliminate apparent "risk" which actually derives from mergers or divestitures we repeat these analyses while excluding firm-year observations where revenue increases or decreases more than 30% and more than 100%. Results are similar and available from the authors by request.

while employee risk bearing via variable pay is measured as

$$ERB_{BSV/Emp} = \log \left(\frac{\sigma(\text{Option Pay/Total Employment})}{\sigma(\text{Revenue/Lagged Assets})} \right)$$

We also investigate the impact of financing constraints on pay and employment variability. Previous work has analyzed the impact of financing constraints on the level of option pay, but no papers have studied the impact on pay or employment variability. It seems natural that firms facing financing constraints should be more inclined to pass risk to employees so we include five measures of financing constraints in various analyses.

There is no consensus on the best measure of financial flexibility, and the proxies used often generate different results. By using five common measures we can both assure that our results on employee risk bearing are robust and determine the (potentially different) relationship of such measures to pay variability.

Our baseline measures of financing constraints are from Fee, Hadlock and Thomas (2006) and Ouimet (2007): Free cash flow 1 and 2 (FCF1 and FCF2). FCF1 is calculated as the firm's income before extraordinary items plus depreciation and amortization minus capital expenditures. FCF2 is operating income before depreciation minus interest expense, taxes, preferred dividends and common dividends. Both measures are normalized by total assets.

A third measure is "interest burden", first proposed by Core and Guay (2001). This is the three year average of interest expense divided by operating income before depreciation. Following convention, we censor the variable at one.

A fourth measure is the Kaplan-Zingales index, developed by Kaplan and Zingales (1997) and adopted to empirical work by Lamont, Polk and Saa-

Requejo (2001). The index has the following definition:

$$\begin{aligned} KZ = & -1.002 \times \text{Cash flow} + 0.283 \times Q + 3.139 \times \text{Leverage} \\ & -39.368 \times \text{Dividends} - 1.315 \times \text{Cash holdings} \end{aligned}$$

All elements of the KZ index are windsorized at the 1% level before constructing the measure.¹⁰ A problem with the index is that it contains measures both of fund availability and investment opportunities in Q. We therefore follow Baker, Stein and Wurgler (2003) and Bergman and Jenter (2007) and construct a cropped KZ index, called KZ4, which excludes Q.

5 Results and Discussion

We find that a larger fraction of firm risk is passed on to employees, both through risk of unemployment and the use of variable pay, when the manager owns a greater share of the firm. Table 1 provides some descriptive statistics for our sample. The median firm grants options equal to 1.8% of common shares outstanding every year. 74.6% of options granted each year are awarded to non-executive employees and the median grant is \$1,741 per employee. Median equity value in our sample is \$1.035 billion, median asset value is \$1.052 billion and median revenue is \$896 million. These values are consistent with Bergman and Jenter (2007) and Babenko, Lemmon and Tserlukevich (2008).

A univariate look at the data is provided in table 2. We segment the firms into four quartiles by executive ownership and calculate the fraction of revenue volatility passed on to employees for each quartile. Mean (median) risk borne by employees increases from 2.4% (2.2%) of firm risk to 5.6% (4.9%) as executive ownership rises from the lowest to highest quartile: the fraction of firm risk

¹⁰The weights of each term in the KZ index result from an ordered logit regression of Kaplan and Zingales' description of firm financing constraints on standard accounting measures.

passed to employees more than doubles as managerial ownership increases. Both the t-test and Wilcoxon rank-sum test for equality with the previous quartile are positive and significant. The results in this table are consistent with the hypothesis that as managers become less diversified they shift greater risk to employees.

We now make use of regression analysis to more precisely control for potential confounders and generate estimates of marginal effects. Our baseline specification is

$$\widehat{ERB}_{BSV\,it} = \beta_0 + \beta_1 ExecutiveOwnership_{it} + \beta_2 X_{it} + \varepsilon_{it} \quad (1)$$

where \widehat{ERB}_{BSV} equals ERB_{BSV} net of industry mean.¹¹ *ExecutiveOwnership* is the percentage of equity controlled by the top five highest paid managers at the firm and X_{it} controls for other firm characteristics, such as financing constraints. All regressions use heteroskedasticity-robust standard errors that allow for clustering at the firm level.

Table 3 presents our baseline results. Regression 1 uses the level of executive ownership as a right hand side variable. The coefficient on executive ownership is positive and significant at the 1% level. When executive ownership enters as a dummy, taking a value of 1 if the top five executives own more than 10% of the firm and a value of 0 otherwise (regression 4), the effect is again positive and significant at the 1% level. We also decompose total option pay into two variables that drive it: the value of options per employee and the number of employees. Table 4 reports results where the left hand side risk variable from equation 1 is replaced with our measure of employment risk, ERB_{Emp} . Whether the executive ownership measure is continuous or a dummy, the coefficient is

¹¹It is clearly important to control for industry: standard contract features and industry risk characteristics (such as option pay and cyclicalities, respectively) differ substantially from one industry to the next. We also attempt in section 5.2 to control for both industry mean and industry variance and find similar (stronger) results.

positive, though not statistically significant at the 10% level. Table 5 reports results using option pay per employee on the left hand side and coefficients are positive and significant at the 1% level.

From these base analyses it appears that greater executive ownership does drive employee risk bearing, and the effect is primarily felt through variable pay rather than employment risk. Interpreting these numbers, an increase in executive ownership at a firm from zero to ten percent increases variability in employee option grants by 25%. The increased risk to employment is 3% and the increased risk in option pay for an employee is 14%.

Variable pay is usually a small component of total compensation, and because people are approximately risk neutral for small gambles it is not surprising that the primary way for executives to pass on risk is through variable pay. After all, employment risk is zero-one: employment or unemployment. Unemployment is a major life event for many people and workers are therefore unlikely to be risk neutral regarding employment risk. Nonetheless, as we will see when we control for financing constraints, the effect of managerial ownership on employment risk is positive and statistically significant. We turn now to analyses concerning financing constraints and employee risk bearing before providing further robustness checks concerning model specification in section 5.2.

5.1 Financing constraints

It is not established in the literature the extent to which financially constrained firms use option or other variable pay to partly relieve the constraint. As shown below, in line with previous work we find that evidence for the claim that financing constraints drive increased use of variable pay is mixed. On the other hand, financing constraints uniformly drive employment risk: firms facing financing constraints are more likely to fire workers when the market environment turns

south.

We use five measures of financing constraints: FCF1 and FCF2 are measures of free cash flow, interest burden measures the load of interest expenses relative to operating earnings and KZ and KZ4 are indices for financing constraints taking into account cash flow, dividends, cash holdings, leverage and, for KZ, Tobin's Q. We have used negative values of FCF1 and FCF2 in our regressions so that higher values of all five measures indicate greater financing constraints. We therefore expect positive coefficients for each measure.

Tables 6, 7 and 8 report results including each of the financing constraints measures on the right hand side for each of our measures of employee risk bearing. The effect of ownership on employee risk bearing is largely unchanged across specifications with the exception that the effect on employment risk is more significant once controls for financing constraints are added. When executive ownership is measured as a continuous variable, its associated coefficient is positive and statistically significant at the 5% level when KZ and FCF2 are on the RHS and at the 10% level when interest burden or FCF1 are used. Its coefficient is least significant when KZ4 is used, with a p-value of 0.1243. When executive ownership enters as a 10% dummy, its coefficient is significant at the 10% level when KZ or FCF1 are used but is otherwise insignificant (the highest associated p-value is 0.1679, arising when FCF2 is used). Taken together, these results suggest the higher ownership probably does drive employment risk, but the association is statistically weak.

The results regarding financing constraints are interesting and somewhat surprising. The effect of financing constraints on the variability in option pay is reported in table 6. When FCF1 or FCF2 are used, more constrained firms do indeed use more variable pay, and the effect is significant at the 1% level. This follows when executive ownership is measured as a continuous variable

or as a dummy. Our other three measures have the wrong sign and when executive ownership is measured as a continuous variable the three coefficients are even significant at the 5% level or better. If the theory that more constrained firms should employ greater pay variability is sound, then KZ, KZ4 and interest burden are not properly measuring financing constraints. If not then there is something driving the sharply different results that we are not considering.

Turning to the effect of financing constraints in our decomposed employment risk (table 7) and pay risk (table 8) variables, the signs of our coefficient estimates for option pay per employee are similar to total option pay, but the estimates for employment risk are in line with the theory. For all five measures greater financing constraints drive higher employment risk, and the effect is significant at the 1% or 5% level for FCF1, FCF2, KZ and KZ4 and at the 10% level for interest burden.

The results using free cash flow as a measure of financing constraints are all significant at the 1% or 5% level and support the theory for both the overall employee risk measure and the decomposed employment risk and pay risk measures. Using KZ, KZ4 or interest burden as our measures, however, we see that more constrained firms do push more employment risk on workers but vary option pay less. Whether this due to the inappropriateness of the measure or a potential confounder demanding further investigation is unclear, and the reader is free to hypothesize. Regardless, it appears that all measures of financing constraints are appropriate in the sense that they pick up a condition under which the firm will be forced to fire employees in a downturn.

5.2 Specification robustness checks

Our specification controlled for industry differences in firm risk and pay practices by subtracting industry mean from each left hand side variable. This particular

technique controls for differences in industry averages but does not control for dispersion within the industry. This means that industries with highly variable firm risk or pay practices drive coefficient estimates. To reduce the impact of outliers we took the log of our risk ratio, but this choice, while popular in the finance literature, was not the only one possible.

An alternative method to control for both industry mean and industry variance (see Leuz, Nanda and Wysocki (2003) or Tucker and Zarowin (2006), for example) is the following: after constructing the risk ratio for each firm, rank all firms in an industry from highest to lowest. Then, uniformly normalize these ratios: if there are N firms in an industry, the one with the lowest ratio is assigned value $1/N$, the second lowest $2/N$ etc. Now perform all analyses using this value for each firm rather than the actual or log standard deviation ratio. This procedure is similar to a standard normalization where the mean is subtracted and the difference is divided by the standard deviation, except that rather than normalizing to a normal distribution, the ratios are normalized to a uniform distribution.

Tables 9, 10 and 11 report results similar to tables 6, 7 and 8 but with this measure of employee borne risk. We use either 2 digit SIC code or Fama-French 48 (Fama and French (1992)) to define industries. The results are actually stronger than in our baseline: the effect of executive ownership on total employee risk bearing is positive and significant at the 1% level whether ownership is continuous or a dummy. The effect on pay risk (per employee) is also positive and significant at the 1% level except when FCF1 is used to proxy for financing constraints, in which case it is significant at the 5% level. The effect on employment is significant at the 1% or 5% level across the board.

The effect of financing constraints is consistently in line with theory, where more constrained firms push more pay and employment risk to workers. The

coefficients are significant at the 1% to 10% level for total pay per employee risk, but only marginally significant for employment risk. This is the reverse from our baseline specification in terms of statistical significance but the signs are consistently correct. Note that we only consider measures FCF1 and FCF2 here to conserve space.

We also test the robustness regarding our decision to break down our 15 year sample into as many as three five year samples for each firm. This was done in an attempt to trade off accuracy in measuring firm or employee borne risk for accuracy in measuring executive ownership. Other choices may have yielded different results so we provide results using the entire 15 year sample to estimate risk for each firm; rather than firm-period level observations we only have firm level observations. These checks support our main findings, though when we lose sample size our results are statistically weakened.

Tables 12, 13 and 14 repeat the analyses of tables 6, 7 and 8 using the entire 15 year period to estimate risk variables for each firm. When managerial ownership is measured as a continuous variable, its effect on employment risk, pay risk and total risk are all positive and significant at the 1% level. When managerial ownership is measured as a dummy, coefficients are positive and significant at the 5% level for total pay variability, significant at the 10% level for employment risk, and insignificant for pay risk. Taken together, these results confirm our baseline results, though the decreased sample size reduced significance levels across the board when managerial ownership was measured as a dummy. The effect of financing constraints in each case was unchanged. We do not report analyses using other cuts of the 15 year sample than five years, but we tried other period lengths and results were similar.

5.3 Other Stories

We have established a positive relationship between employee risk bearing and managerial ownership of the firm, but in order to show that this relationship results from a risk sharing motive we must rule out other stories that could be supported by the data. Higher managerial ownership is related to, and has a large impact on, a variety of other attributes of a firm and the potential for false correlations seems high. There are three major alternative stories to risk sharing that must be addressed.

First, higher ownership implies better incentives. Could better incentives cause managers to push risk onto employees? To answer this question we appeal to both theory and evidence; we begin with theory. Better incentives should induce managers to take actions that they find costly but are in the interest of shareholders, but it isn't the case that "better incentives will lead to better management" unless there is some reason for managers not to manage well in the first place. To address this story we should consider the effect of managerial ownership on employment risk and pay risk separately. Giving employees greater variability in their pay is not costly for a manager, and if it improves shareholder value then the manager is likely to do it regardless of her ownership stake. Giving employees greater employment risk may be costly for a manager – layoffs bring negative press and potentially personal attacks upon a manager – so there is some reason to believe that greater managerial ownership would drive employees to bear greater employment risk. Since only the latter avenue is consistent with the incentive story and the stronger results pertain to the former, the theoretical argument that our results are driven by greater managerial incentives is weak.

Turning to evidence, there is an established literature showing that lower volatility in cash flow or earnings leads to higher stock valuation (see Rountree, Weston and Allayannis (2008)), but it is a mystery why. Survey evidence pro-

vided by Graham, Harvey and Rajgopal suggests that managers place significant value on smooth earnings, but they understand that there is a trade-off between long run firm value and meeting short-run targets. Roychowdhury (2006) finds that real earnings management (EM) is less prevalent in the presence of sophisticated investors, suggesting that it results in long run value destruction. Gunny (2008) finds a significant negative impact of real EM on long run performance, and Wang and D'Souza (2008) find that firms are more likely to cut R&D to meet targets when accounting flexibility is low, suggesting a preference for accounting EM than real EM and therefore a negative impact of the latter relative to the former. Finally, Graham, Harvey and Rajgopal (2005) survey executives with questions specifically describing a choice to initiate a positive NPV project that will cause the firm to miss a quarterly earnings target. Most respondents would not initiate the project. A manager with a greater ownership stake in the firm would be more inclined to favor long run to short run concerns, and this will cause her to smooth earnings *less*, not more. The incentive story actually runs against our findings. Moreover, our findings suggest a reason why lower cash flow volatility is associated with higher valuation: each is associated with greater managerial ownership of the firm.

Second, higher ownership may be associated with firms facing financing constraints or particular industries in which pay variability is more popular. We address these alternatives through five different measures of financing constraints and three different specifications for industry controls. The coefficient estimates of the effect of ownership on employee borne risk are little changed when we use alternative measures of firm financing constraints, even as these measures produce conflicting results regarding the relationship of financing constraints and variably pay. Alternative controls for industry differences in mean and variability of variable pay usage consistently produce coefficients of the proper sign and

similar statistical significance. The findings in our baseline analysis are actually weaker than those found during many of the robustness checks.

Third, convex pay packages or tournament style compensation can make managers risk seeking (Smith and Stulz (1985)): if greater managerial ownership is driven primarily by at-the-money option pay then higher ownership should cause managers to increase volatility and shift less risk to employees. We observe the opposite in the data. Furthermore, if greater managerial ownership leads to greater firm valuation, as theory suggests, then high volatility in free cash flow should be associated with high valuation. This prediction also runs contrary to evidence.

It therefore seems unlikely that our results are driven by alternative stories connecting managerial ownership and employee risk bearing.

6 Conclusion

Executives must be given some share of marginal profit in order to be properly incentivised. While this claim is largely uncontested, the clear implication that most managers will be risk averse regarding shares of the firm they manage, and take action accordingly, is surprisingly uncommon in the literature. While there are some papers showing the primary effect of managerial risk aversion on optimal compensation (e.g. DeFusco, Johnson and Zorn (1990) argue that concave utility functions demand convex compensation functions to induce risk neutral decision making), none have argued that this risk aversion will drive managers to share risk with employees. We make this claim here and present a theoretical model establishing that:

1. There will be variation in managerial ownership of firms in the economy
2. Greater managerial ownership implies more risk will be passed to employ-

ees

3. Firm valuation will be negatively related to cash flow volatility

These facts should not surprise the reader, but were stated to provide a clear basis for our empirical work. We found that greater managerial ownership of the firm is associated with employees bearing greater risk. Variability in option pay is higher when management owns more of the firm, and when this is decomposed to variability in option pay per employee and variability in employment we find that both are driven by managerial ownership. An increase in managerial ownership from 0% to 10% of the firm implies 3% higher variability in employment and 14% higher variability in option pay per employee. Taken together, variability in total option pay is higher by 25%.

It is not surprising that the larger effect is on option pay per employee; after all, when employees face no risk they are risk neutral regarding small gambles implying that while the marginal benefit for top executives of passing some risk to employees is first order, the marginal cost (in terms of additional compensation employees demand) is second order. Some risk will certainly be passed on. An increase in employee borne risk via employment risk is not second order: getting fired is a major life event, and it is not obvious that managers would shift risk in this way even if they were very risk averse. In fact, they appear to, but the size of the effect is smaller than that involving variable pay and is less statistically supported.

Theory also suggests that firms facing financing constraints should employ greater variability in pay. Similar to previous work, we find that results are mixed depending on the measure of financing constraints used. It is possible that financing constraints are only important in extreme situations, that academics have not so far determined appropriate measures of such constraints, or that the theory is incorrect. Our results are most consistent with the first

possibility. While the effect of financing constraints on variable pay depends on the measure used, the effect on employment risk is uniformly positive: firms facing greater constraints have more variable employment levels. Perhaps the best interpretation of this result is that financing constraints come into play mostly when it comes to necessary layoffs: firms with the ability to weather downturns without layoffs find it worthwhile to do so while those more constrained must fire.

7 References

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8 Appendix

Proof of proposition 1. Linear contracts for the employee and CEO respectively are

$$\begin{aligned}
 w(R) &= A_w + B_w R \\
 p(NR) &= A_C + B_C NR \\
 &= A_C + B_C(R - A_w - B_w R) \\
 &= A_C + B_C((1 - B_w)R - A_w)
 \end{aligned}$$

Given a pair of wage packages, the CEO will choose employee pay in order to maximize her certainty equivalent pay, given a choice of effort:

$$\begin{aligned}
 &\max_{A_w, B_w} E(p) - \frac{1}{2}\gamma_C \text{Var}(p) - \frac{1}{2}\delta e^2 \\
 &= A_C + B_C((1 - B_w)e - A_w) - \frac{1}{2}\gamma_C B_C^2 (1 - B_w)^2 \sigma^2 - \frac{1}{2}\delta e^2
 \end{aligned}$$

$$\text{such that } A_w + B_w e - \frac{1}{2}\gamma_w B_w^2 \sigma^2 \geq \bar{u}_w$$

Letting the worker IR bind and plugging in to the CEO's objective yields the following problem

$$\begin{aligned} \max_{B_w} & A_C + B_C(1 - B_w)e - B_C(\bar{u}_w - B_w e + \frac{1}{2}\gamma_w B_w^2 \sigma^2) \\ & - \frac{1}{2}\gamma_C B_C^2 (1 - B_w)^2 \sigma^2 - \frac{1}{2}\delta e^2 \end{aligned}$$

Taking a derivative and setting to zero, the first order condition can be simplified to

$$B_w = \frac{B_C}{B_C + \gamma_w/\gamma_C}$$

The variance in employee pay is $var(w) = var(A_w + B_w R) = B_w^2 var(R) = \left(\frac{B_C}{B_C + \gamma_w/\gamma_C}\right)^2 \sigma^2$. The level of risk the employee bears is increasing in B_C and decreasing in the relative risk aversion of employee and CEO. This establishes corollary 1 as well. ■

Proof of proposition 2. After substituting our formulae for B_w and A_w into the manager's objective, the manager's problem can be written

$$\begin{aligned} \max_e & A_C + B_C \left(1 - \frac{B_C}{B_C + \gamma_w/\gamma_C}\right) e \\ & - B_C \left(\bar{u}_w - \frac{B_C}{B_C + \gamma_w/\gamma_C} e + \frac{1}{2}\gamma_w \left[\frac{B_C}{B_C + \gamma_w/\gamma_C}\right]^2 \sigma^2\right) \\ & - \frac{1}{2}\gamma_C B_C^2 \left(1 - \frac{B_C}{B_C + \gamma_w/\gamma_C}\right)^2 \sigma^2 - \frac{1}{2}\delta e^2 \end{aligned}$$

The first order condition with respect to effort is

$$B_C \left(1 - \frac{B_C}{B_C + \gamma_w/\gamma_C}\right) + B_C \frac{B_C}{B_C + \gamma_w/\gamma_C} = \delta e^*$$

which simplifies to

$$e^* = \frac{B_C}{\delta}$$

■

Proof of proposition 3. Plugging e^* , A_w and B_w into the board's problem, the objective can be written

$$\begin{aligned}
& \max_{A_C, B_C} e^* - w - p \\
&= e^* - A_w - B_w e^* - A_C - B_C((1 - B_w)e^* - A_w) \\
&= e^*(1 - B_w)(1 - B_C) - A_w(1 - B_C) - A_C \\
&= \left(\frac{B_C}{\delta} - \bar{u}_w - \frac{1}{2}\gamma_w \left[\frac{B_C}{B_C + \gamma_w/\gamma_C} \right]^2 \sigma^2 \right) (1 - B_C) - A_C
\end{aligned}$$

such that

$$\begin{aligned}
& A_C + B_C \left[\frac{B_C}{\delta} - \bar{u}_w - \frac{1}{2}\gamma_w \left[\frac{B_C}{B_C + \gamma_w/\gamma_C} \right]^2 \sigma^2 \right] \\
& - \frac{1}{2}\gamma_C B_C^2 \left(1 - \frac{B_C}{B_C + \gamma_w/\gamma_C}\right)^2 \sigma^2 \geq \bar{u}_C
\end{aligned}$$

Again following the usual procedure and allowing the CEO's individual rationality constraint to bind we get

$$\begin{aligned}
A_C &= \bar{u}_C - B_C \left[\frac{B_C}{\delta} - \bar{u}_w - \frac{1}{2}\gamma_w \left[\frac{B_C}{B_C + \gamma_w/\gamma_C} \right]^2 \sigma^2 \right] \\
& + \frac{1}{2}\gamma_C B_C^2 \left(1 - \frac{B_C}{B_C + \gamma_w/\gamma_C}\right)^2 \sigma^2
\end{aligned}$$

and the board's optimization problem becomes

$$\begin{aligned}
& \max_{B_C} \left(\frac{B_C}{\delta} - \bar{u}_w - \frac{1}{2}\gamma_w \left[\frac{B_C}{B_C + \gamma_w/\gamma_C} \right]^2 \sigma^2 \right) (1 - B_C) - \bar{u}_C \\
& + B_C \left[\frac{B_C}{\delta} - \bar{u}_w - \frac{1}{2}\gamma_w \left[\frac{B_C}{B_C + \gamma_w/\gamma_C} \right]^2 \sigma^2 \right] - \frac{1}{2}\gamma_C B_C^2 \left(1 - \frac{B_C}{B_C + \gamma_w/\gamma_C}\right)^2 \sigma^2
\end{aligned}$$

$$\begin{aligned}
&= \frac{B_C}{\delta} - \bar{u}_w - \frac{1}{2}\gamma_w \left[\frac{B_C}{B_C + \gamma_w/\gamma_C} \right]^2 \sigma^2 \\
&\quad - \bar{u}_C - \frac{1}{2}\gamma_C B_C^2 \left(1 - \frac{B_C}{B_C + \gamma_w/\gamma_C} \right)^2 \sigma^2
\end{aligned}$$

The derivative with respect to δ is

$$-\frac{B_C}{\delta^2}$$

The mixed partial with respect to δ and B_C is therefore

$$-\frac{1}{\delta^2} < 0$$

Higher cost of effort therefore reduces the marginal return to increasing incentives. Because B_C is the only choice variable for the board, we can apply Topkis' theorem: the optimal level of executive equity ownership is decreasing in the cost of effort. ■

Summary Statistics

Time period	1992-2006	
Number of firms	2,649	
Number of firm-year observations	24,367	
	Mean	Median
<i>Firm characteristics</i>		
Number of employees	15,613	4,622
Market value of equity (millions)	\$4,722	\$1,035
Book assets (millions)	\$7,406	\$1,052
Sales (millions)	\$3,434	\$896
Tobin's Q	2.12	1.59
<i>Stock option plan characteristics</i>		
Total option grants relative to common shares outstanding	26.5%	1.8%
Employee option grants relative to total grants	70.5%	74.6%
Black-Scholes value of employee option grants (thousands)	\$47,156	\$9,577
Per-employee option grants	\$10,766	\$1,741

Table 1: Observations include all non-utility firm-years in the ExecuComp database from 1992 to 2006. Firm characteristics are taken from Compustat and stock option plan characteristics are from ExecuComp.

Employee risk bearing - Total				
Executive ownership quartile	Mean [S.E]	T-test [P-value]	Median	Wilcoxon rank-sum test [P-value]
1	2.4% [1.546]		2.2%	
2	3.4% [1.564]	4.270 [0.000]	3.0%	3.962 [0.000]
3	4.5% [1.671]	2.900 [0.004]	4.5%	2.975 [0.003]
4	5.6% [1.551]	2.490 [0.013]	4.9%	2.177 [0.030]

Table 2: Univariate comparison of mean and median employee borne risk segmented by executive owned equity in the firm. T-tests and Wilcoxon rank-sum tests for equality with the previous quartile are reported. All differences are significant at the one or five percent level. Levels shown are de-logged

Baseline Analysis – Five year non-overlapping sample						
Dependent variable = Industry adjusted risk sharing measure on employee option grant value						
	(1)	(2)	(3)	(4)	(5)	(6)
Executive ownership (%)	2.2218*** (0.0000)	2.2010*** (0.0000)	2.2237*** (0.0000)			
Executive ownership (>10% dummy)				0.5340*** (0.0000)	0.5199*** (0.0000)	0.5435*** (0.0000)
Free cash flow 1		0.6990*** (0.0068)			0.6807*** (0.0075)	
Free cash flow 2			0.7435*** (0.0019)			0.7215*** (0.0023)
Constant	-0.1347*** (0.0061)	-0.1197** (0.0243)	-0.1897*** (0.0004)	-0.1065** (0.0126)	-0.0847* (0.0665)	-0.1607*** (0.0005)
Observations	2517	2285	2201	2631	2384	2297
Adj. R-squared	0.0160	0.0204	0.0199	0.0159	0.0192	0.0202

Table 3: The dependent variable is log ratio of the standard deviation of option pay and the standard deviation of revenue, both normalized by lagged assets. Higher executive ownership, measured as a continuous variable or a dummy, is strongly associated with higher variability in employee pay.

Baseline Analysis – Five year non-overlapping sample						
Dependent variable = Industry adjusted risk sharing measure on number of employees						
	(1)	(2)	(3)	(4)	(5)	(6)
Executive ownership (%)	0.2655 (0.1176)	0.3100* (0.0721)	0.3623** (0.0396)			
Executive ownership (>10% dummy)				0.0576 (0.1660)	0.0714* (0.0922)	0.0618 (0.1679)
Free cash flow 1		0.1675*** (0.0069)			0.1491** (0.0122)	
Free cash flow 2			0.0692** (0.0252)			0.0746** (0.0147)
Constant	0.1922*** (0.0000)	0.1925*** (0.0000)	0.1910*** (0.0000)	0.2070*** (0.0000)	0.2076*** (0.0000)	0.2134*** (0.0000)
Observations	3671	3375	3258	3909	3586	3467
Adj. R-squared	0.0006	0.0021	0.0013	0.0004	0.0016	0.0006

Table 4: The dependent variable is log ratio of the standard deviation of total employment and the standard deviation of revenue, both normalized by lagged assets. Higher executive ownership, measured as a continuous variable or a dummy, is weakly associated with higher variability in employment.

Baseline Analysis – Five year non-overlapping sample						
Dependent variable = Industry adjusted risk sharing measure on option grant value per employee						
	(1)	(2)	(3)	(4)	(5)	(6)
Executive ownership (%)	1.2465*** (0.0049)	1.3095*** (0.0039)	1.3649*** (0.0041)			
Executive ownership (>10% dummy)				0.2650*** (0.0059)	0.2703*** (0.0073)	0.2879*** (0.0057)
Free cash flow 1		1.2025*** (0.0000)			1.1998*** (0.0000)	
Free cash flow 2			0.7535*** (0.0089)			0.7420*** (0.0074)
Constant	-0.3751*** (0.0000)	-0.3845*** (0.0000)	-0.4528*** (0.0000)	-0.3658*** (0.0000)	-0.3684*** (0.0000)	-0.4385*** (0.0000)
Observations	2469	2259	2176	2575	2354	2268
Adj. R-squared	0.0039	0.0154	0.0080	0.0029	0.0136	0.0067

Table 5: The dependent variable is log ratio of the standard deviation of option pay per employee and the standard deviation of revenue normalized by lagged assets. Higher executive ownership, measured as a continuous variable or a dummy, is strongly associated with higher variability in option pay per employee.

Alternative Financing Constraint measures – Five year non-overlapping sample						
Dependent variable = Industry adjusted risk sharing measure on employee option grant value						
Panel A						
	(1)	(2)	(3)	(4)	(5)	(6)
Executive ownership (%)	2.2218*** (0.0000)	2.3067*** (0.0000)	2.3634*** (0.0000)	2.2166*** (0.0000)	2.2010*** (0.0000)	2.2237*** (0.0000)
Interest burden		-0.3070** (0.0127)				
KZ index			-0.0082** (0.0200)			
KZ4 index				-0.0087*** (0.0075)		
FCF1					0.6990*** (0.0068)	
FCF2						0.7435*** (0.0019)
Constant	-0.1347*** (0.0061)	-0.1342** (0.0129)	-0.2054*** (0.0003)	-0.2125*** (0.0001)	-0.1197** (0.0243)	-0.1897*** (0.0004)
Observations	2517	2240	2072	2413	2285	2201
Adj. R-squared	0.0160	0.0240	0.0284	0.0266	0.0204	0.0199
Panel B						
	(1)	(2)	(3)	(4)	(5)	(6)
Executive ownership (>10% dummy)	0.5340*** (0.0000)	0.5495*** (0.0000)	0.5791*** (0.0000)	0.5501*** (0.0000)	0.5199*** (0.0000)	0.5435*** (0.0000)
Interest burden		-0.2938** (0.0191)				
KZ index			-0.0028 (0.1906)			
KZ4 index				-0.0032 (0.1646)		
FCF1					0.6807*** (0.0075)	
FCF2						0.7215*** (0.0023)
Constant	-0.1065** (0.0126)	-0.1020** (0.0327)	-0.1422*** (0.0039)	-0.1495*** (0.0013)	-0.0847* (0.0665)	-0.1607*** (0.0005)
Observations	2631	2340	2162	2522	2384	2297
Adj. R-squared	0.0159	0.0236	0.0214	0.0201	0.0192	0.0202

Table 6: The dependent variable is log ratio of the standard deviation of option pay and the standard deviation of revenue, both normalized by lagged assets. Panel A features executive ownership as a continuous variable and Panel B as a dummy. The relationship between ownership and variability in pay does not much depend on which measure of financing constraint is used. When measured by free cash flow, more constrained firms have more variable pay but when measured by Kaplan-Zingales or interest burden this is not observed.

Alternative Financing Constraint measures – Five year non-overlapping sample						
Dependent variable = Industry adjusted risk sharing measure on number of employees						
Panel A						
	(1)	(2)	(3)	(4)	(5)	(6)
Executive ownership (%)	0.2655 (0.1176)	0.3265* (0.0658)	0.3518** (0.0444)	0.2597 (0.1243)	0.3100* (0.0721)	0.3623** (0.0396)
Interest burden		0.0067* (0.0577)				
KZ index			0.0019** (0.0213)			
KZ4 index				0.0019** (0.0149)		
FCF1					0.1675*** (0.0069)	
FCF2						0.0692** (0.0252)
Constant	0.1922*** (0.0000)	0.1944*** (0.0000)	0.2063*** (0.0000)	0.2225*** (0.0000)	0.1925*** (0.0000)	0.1910*** (0.0000)
Observations	3671	3306	3096	3523	3375	3258
Adj. R-squared	0.0006	0.0009	0.0056	0.0050	0.0021	0.0013
Panel B						
	(1)	(2)	(3)	(4)	(5)	(6)
Executive ownership (>10% dummy)	0.0576 (0.1660)	0.0644 (0.1413)	0.0768* (0.0772)	0.0569 (0.1696)	0.0714* (0.0922)	0.0618 (0.1679)
Interest burden		0.0067* (0.0622)				
KZ index			0.0019** (0.0174)			
KZ4 index				0.0020** (0.0105)		
FCF1					0.1491** (0.0122)	
FCF2						0.0746** (0.0147)
Constant	0.2070*** (0.0000)	0.2138*** (0.0000)	0.2257*** (0.0000)	0.2376*** (0.0000)	0.2076*** (0.0000)	0.2134*** (0.0000)
Observations	3909	3517	3285	3748	3586	3467
Adj. R-squared	0.0004	0.0004	0.0052	0.0049	0.0016	0.0006

Table 7: The dependent variable is log ratio of the standard deviation of employment and the standard deviation of revenue, both normalized by lagged assets. Panel A features executive ownership as a continuous variable and Panel B as a dummy. The relationship between ownership and variability in employment does not much depend on which measure of financing constraint is used. Regardless of the measure of free cash flow, more constrained firms have more variable employment.

Alternative Financing Constraint measures – Five year non-overlapping sample						
Dependent variable = Industry adjusted risk sharing measure on option grant value per employee						
Panel A						
	(1)	(2)	(3)	(4)	(5)	(6)
Executive ownership (%)	1.2465*** (0.0049)	1.4124*** (0.0020)	1.5343*** (0.0011)	1.2677*** (0.0053)	1.3095*** (0.0039)	1.3649*** (0.0041)
Interest burden		-0.2419*** (0.0003)				
KZ index			-0.0081** (0.0190)			
KZ4 index				-0.0096*** (0.0032)		
FCF1					1.2025*** (0.0000)	
FCF2						0.7535*** (0.0089)
Constant	-0.3751*** (0.0000)	-0.4147*** (0.0000)	-0.4845*** (0.0000)	-0.4773*** (0.0000)	-0.3845*** (0.0000)	-0.4528*** (0.0000)
Observations	2469	2216	2052	2371	2259	2176
Adj. R-squared	0.0039	0.0082	0.0140	0.0149	0.0154	0.0080
Panel B						
	(1)	(2)	(3)	(4)	(5)	(6)
Executive ownership (>10% dummy)	0.2650*** (0.0059)	0.2937*** (0.0041)	0.3231*** (0.0022)	0.2804*** (0.0043)	0.2703*** (0.0073)	0.2879*** (0.0057)
Interest burden		-0.2322*** (0.0006)				
KZ index			-0.0084** (0.0156)			
KZ4 index				-0.0097*** (0.0028)		
FCF1					1.1998*** (0.0000)	
FCF2						0.7420*** (0.0074)
Constant	-0.3658*** (0.0000)	-0.3998*** (0.0000)	-0.4640*** (0.0000)	-0.4682*** (0.0000)	-0.3684*** (0.0000)	-0.4385*** (0.0000)
Observations	2575	2312	2139	2474	2354	2268
Adj. R-squared	0.0029	0.0067	0.0124	0.0140	0.0136	0.0067

Table 8: The dependent variable is log ratio of the standard deviation of option pay per employee and the standard deviation of revenue normalized by lagged assets. Panel A features executive ownership as a continuous variable and Panel B as a dummy. The relationship between ownership and variability in pay per employee does not much depend on which measure of financing constraint is used. When measured by free cash flow, more constrained firms have more variable pay per employee but when measured by Kaplan-Zingales or interest burden the opposite is not observed.

Analysis using risk sharing rank – Five year non-overlapping sample						
Dependent variable = Risk sharing rank measure on employee option grant value						
Panel A – SIC 2						
	(1)	(2)	(3)	(4)	(5)	(6)
Executive ownership (%)	0.3915*** (0.0000)	0.3609*** (0.0000)	0.3879*** (0.0000)			
Executive ownership (>10% dummy)				0.0991*** (0.0000)	0.0906*** (0.0000)	0.0964*** (0.0000)
Free cash flow 1		0.1144*** (0.0044)			0.1090*** (0.0044)	
Free cash flow 2			0.0551* (0.0914)			0.0529* (0.0974)
Constant	0.5669*** (0.0000)	0.5733*** (0.0000)	0.5633*** (0.0000)	0.5725*** (0.0000)	0.5790*** (0.0000)	0.5699*** (0.0000)
Observations	2517	2285	2201	2631	2384	2297
Adj. R-squared	0.0161	0.0182	0.0159	0.0175	0.0186	0.0168
Panel B – Fama-French 48						
	(1)	(2)	(3)	(4)	(5)	(6)
Executive ownership (%)	0.3247*** (0.0000)	0.2933*** (0.0001)	0.3194*** (0.0000)			
Executive ownership (>10% dummy)				0.0744*** (0.0000)	0.0666*** (0.0000)	0.0688*** (0.0000)
Free cash flow 1		0.0603 (0.1951)			0.0544 (0.2291)	
Free cash flow 2			0.0425 (0.3238)			0.0387 (0.3631)
Constant	0.5521*** (0.0000)	0.5588*** (0.0000)	0.5467*** (0.0000)	0.5576*** (0.0000)	0.5645*** (0.0000)	0.5538*** (0.0000)
Observations	2517	2285	2201	2631	2384	2297
Adj. R-squared	0.0113	0.0105	0.0108	0.0101	0.0088	0.0084

Table 9: The dependent variable is "uniformly normalized within industry rank" of the ratio of the standard deviation of option pay and the standard deviation of revenue, both normalized by lagged assets. Panel A uses two digit SIC to define industry and Panel B uses Fama-French 48. Greater ownership is strongly associated with more variability in pay, regardless of whether ownership is continuous or a dummy and regardless of industry break-down.

Analysis using risk sharing rank – Five year non-overlapping sample						
Dependent variable = Risk sharing rank measure on number of employees						
Panel A – SIC 2						
	(1)	(2)	(3)	(4)	(5)	(6)
Executive ownership (%)	0.1187** (0.0251)	0.1211** (0.0249)	0.1342** (0.0164)			
Executive ownership (>10% dummy)				0.0312** (0.0150)	0.0350*** (0.0080)	0.0327** (0.0164)
Free cash flow 1		0.0362* (0.0682)			0.0319 (0.1187)	
Free cash flow 2			0.0181 (0.1702)			0.0217* (0.0642)
Constant	0.5553*** (0.0000)	0.5584*** (0.0000)	0.5577*** (0.0000)	0.5600*** (0.0000)	0.5622*** (0.0000)	0.5637*** (0.0000)
Observations	3672	3376	3259	3910	3587	3468
Adj. R-squared	0.0015	0.0019	0.0018	0.0016	0.0023	0.0018
Panel B – Fama-French 48						
	(1)	(2)	(3)	(4)	(5)	(6)
Executive ownership (%)	0.1227** (0.0144)	0.1298** (0.0106)	0.1377*** (0.0089)			
Executive ownership (>10% dummy)				0.0239* (0.0581)	0.0270** (0.0352)	0.0232* (0.0830)
Free cash flow 1		0.0347* (0.0865)			0.0297 (0.1579)	
Free cash flow 2			0.0242** (0.0376)			0.0274** (0.0155)
Constant	0.5398*** (0.0000)	0.5421*** (0.0000)	0.5411*** (0.0000)	0.5464*** (0.0000)	0.5483*** (0.0000)	0.5494*** (0.0000)
Observations	3672	3376	3259	3910	3587	3468
Adj. R-squared	0.0016	0.0022	0.0022	0.0009	0.0014	0.0010

Table 10: The dependent variable is "uniformly normalized within industry rank" of the ratio of the standard deviation of employment and the standard deviation of revenue, both normalized by lagged assets. Panel A uses two digit SIC to define industry and Panel B uses Fama-French 48. Greater ownership is strongly associated with more variability in employment, regardless of whether ownership is continuous or a dummy and regardless of industry break-down.

Analysis using risk sharing rank – Five year non-overlapping sample						
Dependent variable = Risk sharing rank measure on option grant value per employee						
Panel A – SIC 2						
	(1)	(2)	(3)	(4)	(5)	(6)
Executive ownership (%)	0.1984*** (0.0038)	0.1776** (0.0116)	0.1871*** (0.0062)			
Executive ownership (>10% dummy)				0.0555*** (0.0003)	0.0493*** (0.0021)	0.0519*** (0.0014)
Free cash flow 1		0.1523*** (0.0005)			0.1483*** (0.0004)	
Free cash flow 2			0.0699* (0.0648)			0.0691* (0.0564)
Constant	0.5827*** (0.0000)	0.5870*** (0.0000)	0.5808*** (0.0000)	0.5834*** (0.0000)	0.5881*** (0.0000)	0.5820*** (0.0000)
Observations	2470	2260	2176	2576	2355	2268
Adj. R-squared	0.0039	0.0101	0.0042	0.0052	0.0105	0.0053
Panel B – Fama-French 48						
	(1)	(2)	(3)	(4)	(5)	(6)
Executive ownership (%)	0.1415** (0.0303)	0.1223* (0.0688)	0.1223* (0.0608)			
Executive ownership (>10% dummy)				0.0316** (0.0363)	0.0274* (0.0800)	0.0266* (0.0962)
Free cash flow 1		0.1446*** (0.0001)			0.1374*** (0.0001)	
Free cash flow 2			0.0921*** (0.0064)			0.0882*** (0.0064)
Constant	0.5662*** (0.0000)	0.5704*** (0.0000)	0.5622*** (0.0000)	0.5675*** (0.0000)	0.5719*** (0.0000)	0.5639*** (0.0000)
Observations	2470	2260	2176	2576	2355	2268
Adj. R-squared	0.0018	0.0077	0.0032	0.0015	0.0066	0.0026

Table 11: The dependent variable is "uniformly normalized within industry rank" of the ratio of the standard deviation of option pay per employee and the standard deviation of revenue normalized by lagged assets. Panel A uses two digit SIC to define industry and Panel B uses Fama-French 48. Greater ownership is strongly associated with more variability in pay per employee regardless of whether ownership is continuous or a dummy when using SIC 2 and weakly associated with more variability in pay per employee regardless of whether ownership is continuous or a dummy when using Fama-French 48.

Baseline Analysis – Fifteen year sample for estimating risk measures						
Dependent variable = Risk sharing rank measure on employee option grant value5						
	(1)	(2)	(3)	(4)	(5)	(6)
Executive ownership (%)	0.0091*** (0.0000)	0.0089*** (0.0000)	0.0093*** (0.0000)			
Executive ownership (>10% dummy)				0.1836** (0.0131)	0.1840** (0.0144)	0.1946** (0.0107)
Free cash flow 1		1.0978*** (0.0035)			1.0749*** (0.0042)	
Free cash flow 2			0.6138*** (0.0000)			0.6054*** (0.0000)
Constant	-0.0004 (0.9886)	0.0212 (0.5111)	-0.0183 (0.5747)	-0.0373 (0.2827)	-0.0179 (0.6263)	-0.0588 (0.1106)
Observations	1765	1634	1637	1773	1640	1643
Adj. R-squared	-0.0002	0.0152	0.0091	0.0027	0.0181	0.0124

Table 12: The dependent variable is log ratio of the standard deviation of option pay and the standard deviation of revenue, both normalized by lagged assets. The entire 15 year sample is used for each firm in estimating the dependant variable. Higher executive ownership, measured as a continuous variable or a dummy, is strongly associated with higher variability in employee pay.

Baseline Analysis – Fifteen year sample for estimating risk measures						
Dependent variable = Risk sharing rank measure on number of employees						
	(1)	(2)	(3)	(4)	(5)	(6)
Executive ownership (%)	0.0074*** (0.0000)	0.0074*** (0.0000)	0.0075*** (0.0000)			
Executive ownership (>10% dummy)				0.0892* (0.0572)	0.0934* (0.0517)	0.0852* (0.0749)
Free cash flow 1		0.1382 (0.2648)			0.1356 (0.2595)	
Free cash flow 2			0.1416* (0.0838)			0.1418* (0.0676)
Constant	-0.0017 (0.9215)	0.0016 (0.9318)	-0.0091 (0.6222)	-0.0189 (0.3231)	-0.0172 (0.3898)	-0.0258 (0.2005)
Observations	2125	1957	1969	2131	1962	1974
Adj. R-squared	0.0004	0.0005	0.0009	0.0015	0.0019	0.0018

Table 13: The dependent variable is log ratio of the standard deviation of employment and the standard deviation of revenue, both normalized by lagged assets. The entire 15 year sample is used for each firm in estimating the dependant variable. Higher executive ownership measured as a continuous variable is strongly associated with higher variability in employment but when measured as a dummy the association is weak. Smaller sample size weakens results from the baseline case.

Baseline Analysis – Fifteen year sample for estimating risk measures						
Dependent variable = Risk sharing rank measure on option grant value per employee						
	(1)	(2)	(3)	(4)	(5)	(6)
Executive ownership (%)	0.0126*** (0.0000)	0.0126*** (0.0000)	0.0128*** (0.0000)			
Executive ownership (>10% dummy)				0.0131 (0.8815)	0.0070 (0.9379)	0.0253 (0.7784)
Free cash flow 1		1.1218*** (0.0018)			1.1223*** (0.0019)	
Free cash flow 2			0.5226*** (0.0000)			0.5209*** (0.0000)
Constant	0.0008 (0.9824)	0.0023 (0.9513)	-0.0204 (0.5885)	-0.0026 (0.9473)	0.0008 (0.9855)	-0.0255 (0.5447)
Observations	1734	1613	1615	1741	1619	1621
Adj. R-squared	-0.0001	0.0122	0.0049	-0.0006	0.0117	0.0044

Table 14: The dependent variable is log ratio of the standard deviation of option pay per employee and the standard deviation of revenue normalized by lagged assets. The entire 15 year sample is used for each firm in estimating the dependant variable. Higher executive ownership measured as a continuous variable is strongly associated with higher variability in employment but when measured as a dummy the association disappears. Smaller sample size weakens results from the baseline case.