Managerial Risk-Taking Behavior and Equity-Based Compensation

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Abstract

I study managers' risk-taking behavior and how it is affected by equity-based compensation. I find that in response to an exogenous increase in takeover protection in Delaware during the mid-1990s, managers lower firm risk by 5%. I also find that the decrease in firm risk is concentrated among firms with low managerial equity-based incentives. In particular, firms with low CEO portfolio sensitivity to stock return volatility experience more than 10% reduction in risk. Further, firms respond to the increased protection accorded by the regime shift with greater incentives for risk-taking.

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1. Introduction

The finance literature has argued that equity-based compensation is awarded to managers to overcome managerial risk aversion and induce optimal risk-taking behavior (e.g., Smith and Stulz, 1985; Guay 1999). However, endogeneity issues often cloud the interpretation of the relation between equity-based incentives and firm risk. Moreover, conclusions regarding the risk-taking incentives of equity-based compensation are often inferred through financial and investment policies, rather than firm risk itself, therefore, complicating the interpretation even further. In this paper, I examine firm risk directly to see how equity-based compensation affects managers' risk-taking behavior. I try to overcome the endogeneity problem by examining whether managers change firm risk in response to exogenous shocks. To perform my study, I use the changes in the Delaware takeover regime of the mid-1990s and look at whether managers with different equity-based incentives react differently to this regime shift. I also investigate whether equity-based compensation itself changes subsequently in response to changes in managers' risk-taking behavior.

The change in the Delaware takeover environment in the mid-1990s greatly altered the legal protection of firms against takeovers. A series of takeover contests during this period legitimized the use of the poison pill in conjunction with a staggered board, giving Delaware firms with staggered boards an extremely potent takeover defense and making them virtually immune to hostile takeovers (Subramanian, 2004; Bebchuk and Cohen, 2005; Rauh, 2006). Unlike the earlier second generation anti-takeover laws, the change in the Delaware takeover environment happened during a period when the use of options in executive compensation was more prevalent. Thus, the mid-1990s change in Delaware takeover regime provides an ideal setting in which to study the role of stock and stock-derived compensation in overcoming managerial risk aversion.

I use a differences-in-differences method used by Bertrand and Mullainathan (2003), among others, to examine the impact of the regime shift on firm risk. I compare the firm risk changes between Delaware firms and non-Delaware firms before and after the regime shift. By having firm and year fixed effects, this method allows me to control for fixed unobservable firm characteristics and to eliminate any

common shocks contemporaneous with the regime shift. To ensure that what I have identified is due to the impact of the regime shift, I exploit the fact that the regime shift affects only the Delaware firms with staggered boards. Therefore, I also contrast my findings for the staggered-board firms by examining whether similar effects can be found for the non-staggered-board firms.

I first establish that managerial risk-aversion leads managers to reduce firm risk. After controlling for aggregate movements in risk, I find that the average Delaware firm decreases total risk, which I measure with stock return volatility, by about 5% in response to the change in takeover regime. This decrease is both statistically and economically significant. In my sample, it takes a doubling of firm size to get the same reduction in risk. Furthermore, the decrease in risk is driven by the firms with staggered boards, which are the firms most protected by the changes. There is no similar decrease among the non-staggered-board firms. In addition, I also find that the decrease in risk is mainly among firms with low CEO pay-performance sensitivity (delta) or low sensitivity of CEO wealth to stock return volatility (vega). This supports the view that equity-based compensation encourages managerial risk-taking. There is also evidence that firms respond to the greater protection accorded by the regime shift in ways that increase the vega of their CEO's portfolio. This effect is slightly more pronounced among firms with blockholders, where blockholders are expected to proactively correct the reduced risk-taking effects of the greater protection. I conclude that managerial risk-aversion can lead managers to reduce firm risk, and that firms use equity-based incentives to overcome managerial risk-aversion.

The paper is organized as follows. I provide an overview of the change in the Delaware takeover regime in Section 2. In Section 3, I develop the hypotheses. I discuss the data and methodology in Section 4, and my results on risk changes in Section 5. The effects of equity-based compensation on risk changes and changes in incentives are examined in Section 6. Section 7 concludes.

2. The "just say no" defense for Delaware firms with staggered boards

To understand the change in legal protection against hostile takeovers in Delaware, I examine the series of court rulings that shaped Delaware's takeover environment before 1995.

In the landmark ruling of *Unocal Corp. v. Mesa Petroleum Co. (1985)*, the Delaware Supreme Court announced a two-pronged proportionality test for legal takeover defense. Under this test, when a target is defending against a hostile bid, the target must demonstrate that the takeover bid presents a threat, and if so, that its defense is proportional to the threat. In applying the proportionality test in *Moran v. Household International Inc. (1985)*, the Delaware Supreme Court was careful to point out that a target's right to use a poison pill to defend against a hostile bid was not absolute, and that management decisions to use the pill would be subjected to judicial scrutiny.

Subsequent chancery court rulings further emphasized that managers could not arbitrarily use the poison pill to defend against a hostile takeover bid. For example, in *City Capital Associates v. Interco Inc. (1988),* the chancery court ordered for the withdrawal of the target's poison pill, thus allowing shareholders to decide for themselves whether to accept the hostile bid. Delaware's relatively friendly takeover law led Daines (2001) to conclude that one of the reasons Delaware firms had higher market valuation from 1981 to 1996 was due primarily to the ease with which targets could be taken over.

This friendly takeover landscape changed markedly with the Delaware Supreme Court's ruling in *Unitrin Inc. v. American General Corp. (1995)*. The *Unitrin* ruling expanded the circumstances under which a hostile bid was considered a threat and it also relaxed the judicial scrutiny in the proportionality review. After *Unitrin*, it was widely believed that targets could indefinitely hold off a hostile takeover with a poison pill, unless the bidder won control of the target board through a proxy contest and then cancelled the pill. The *Unitrin* ruling not only reflected the increasingly manager-oriented stance of the Delaware Supreme Court, but also substantially solidified the power of managers to "just say no" to hostile bidders indefinitely (Gordon, 1997; Bebchuk and Cohen, 2005). Gilson (2001) argues that the Supreme Court's decision in Unitrin reduced the proportionality test to one of whether a proxy contest was available to the hostile bidder in the face of the target's refusal to redeem its poison pill. Since a poison pill is available to every company whenever a hostile bid is made, the Delaware Supreme Court's analysis in Unitrin "… reduces functionally to a preference that control contests be resolved through an election, rather than a market…" Gilson (pp. 501, 2001). Gilson also points out that there remains an

issue of staggered boards, since the election route for staggered-board companies entails a minimum of two years to change control of the boards, and this delay can prove to be very significant in today's fast changing markets. Thus, after Unitrin, the question to ask is, can a Delaware target with a staggered board maintain its poison pill defense in the face of a hostile takeover?

After *Unitrin,* the first case to directly confront this question under Delaware law was *Moore Corp. Ltd. v. Wallace Computer Services (1995)*. The *Wallace* case demonstrated how far the "just say no" defense could go under current Delaware law (Bebchuk, Coates, and Subramanian, 2002; Subramanian, 2004). Wallace Computer was able to successfully defend itself against the hostile bid by Moore, even though 75% of shareholders tendered into the offer and Moore had won a first round of a proxy contest to replace one third of the target's staggered board. In applying *Unitrin*, the Delaware federal district court left the target's poison pill intact, ruling that the pill would not impair the chances of success in a proxy contest. This case received a lot of attention among practitioners, as it had important implications for the use of staggered boards and poison pills together as takeover defenses. Subramanian (2004) notes that the Wallace takeover contest was closely watched by practitioners since it offered the cleanest example of a "just say no" defense. [1] Subsequently, Pennzoil Co and Circon Corp, both Delaware companies, also successfully made use of the combination of poison pill and staggered board to defend against their respective hostile bidders. And when reporting on the Pennzoil case, the Wall Street Journal claimed that targets were "… emboldened by the recent success of a Just Say No defense by Wallace…".[2]

The *Wallace* case legitimized the use of the poison pill in conjunction with a staggered board for Delaware firms, and may have given managers of Delaware firms with staggered boards an extremely effective defense against hostile bidders. Bebchuk, Coates and Subramanian (2002) find that not a single hostile bidder managed to win control against a target with an effective staggered board in the five-year period from 1996 to 2000. In addition, Rauh (2006) shows a decrease in the probability of takeover for Delaware firms after 1996. Subramanian (2004) argues that the series of takeover events have eliminated

[1] "Moore Drops Bid to Acquire Wallace Computer", *Wall Street Journal*, 7 Aug 1996.
[2] "Will Pennzoil 'Just Say No' to Union Pacific?" *Wall Street Journal,* 30 Jun 1997.

Delaware's distinctiveness as a takeover friendly jurisdiction. Consistent with the entrenchment effects of the regime shift, Bebchuk and Cohen (2005) find that staggered-board firms generally have lower valuations after 1995. In addition, Rauh (2006) finds that managers respond to this change in the Delaware takeover regime by decreasing managerial and pension-based employee ownership, both of which are often considered to be anti-takeover mechanisms. Importantly, he finds that the decrease is concentrated among Delaware firms with staggered boards, firms most affected by the regime shift.

3. Hypotheses development

Managers often have the discretion to change firm risk through the selection of investment projects. By selecting projects with lower cash flow volatility or investing in assets that stabilize the firm's income stream, such as diversification activities, managers can decrease firm risk. Many studies assume that when risk-averse managers are given the opportunity, they are likely to take on less than optimal firm risk. They will do so to protect their firm-specific human capital (Amihud and Lev, 1981; Smith and Stulz, 1985) and their perquisite consumption (Williams, 1987), both of which are jeopardized by firm risk.

Unlike well-diversified shareholders, who prefer to accept all positive NPV projects regardless of project risk, managers might turn down risk-increasing, positive NPV projects if the cost to them of the increased risk is greater than the benefit from the increase in firm value. The increased protection from takeovers due to the regime shift in 1995 allows managers to lower firm risk to their own advantage, and possibly to the detriment of shareholders. *My main hypothesis (H1) is that after 1995, when managers of Delaware staggered-board firms are more protected from takeovers, there is a decrease in firm risk among Delaware firms with staggered boards relative to other firms.*

Prior empirical evidence of the effects of managerial risk-aversion on firm risk is mixed due to endogeneity problems. Amihud and Lev (1981) find that value-destroying conglomerate mergers are more likely when firms have dispersed ownership, supporting the view that managerial risk-aversion causes managers to reduce firm risk through diversifying mergers. However, ownership structure is

arguably endogenous and is itself determined by firm risk (Demsetz and Lehn, 1985). Aggarwal and Samwick (2003) present a principal-agent model where diversification, incentives and performance are endogenously determined and they conclude that diversification is motivated by the private benefits associated with running a diversified firm and not by risk-reduction considerations. Thus, it is not clear whether managerial risk-aversion is necessarily a serious agency problem.

Papers that examine the second generation anti-takeover laws, which were passed in the 1980s and early 1990s, provide some initial evidence. Bertrand and Mullainathan (2003) find that plant births and deaths decrease when managers are protected from takeovers, suggesting that protected managers seek to lower firm risk. Garvey and Hanka (1999) find that leverage decreases upon passage of these anti-takeover laws, while Cheng, Nagar, and Rajan (2005) find decreases in management ownership, supporting the hypothesis that managers try to reduce their exposure to firm risk. However, these papers do not directly examine changes in firm risk. Bertrand and Mullainathan (2003) interpret their results as evidence of entrenched managers seeking the "quiet life".

3.1. Effects of equity-based compensation on managerial risk-taking behavior

Because managerial risk-aversion can lead managers to turn down risk-increasing, positive NPV projects, use of equity-based compensation has been suggested as a mechanism to align the interests of managers to that of shareholders (Jensen and Meckling, 1976). Executive stock options can encourage managerial risk-taking as increases in stock return volatility increase the value of the options (Haugen and Senbet, 1981; Smith and Stulz, 1985). However, equity-based compensation does not necessarily lead to increased risk-taking since it can increase the sensitivity of the manager's portfolio to firm stock price movements (Carpenter, 2000; Ross, 2004). Hirshleifer and Suh (1992) show that on the one hand, equity-based compensation can encourage managers to work hard, but on the other hand, it can affect their attitude towards project risk, and thus, lead to too little risk-taking. Thus, Guay (1999) highlights the need to differentiate between the slope of the relation between manager's wealth and stock price (delta) and the convexity of the relation, which is the sensitivity of the manager's wealth to stock return volatility (vega).

Increased delta exposes managers to more risk while increased vega helps offset the aversion to risky projects that arises due to the increased delta.

Empirical work, such as Guay (1999), generally finds a positive association between vega and stock return volatility, suggesting that vega encourages managerial risk-taking. Using a simultaneous equations approach, Coles, Daniel, and Naveen (2006) find that the direction of causality runs both ways. Riskier firms are more likely to increase CEO portfolio delta and vega, and increased delta and vega also lead to riskier firm policies and higher firm risk. However, Aggarwal and Samwick (1999) document that higher risk leads to lower delta, consistent with the principal-agent framework where increased risk increases the cost of providing equity-based incentives. Endogeneity issues make it difficult to interpret the results from a regression analysis, and even standard econometric solutions such as a simultaneous equations approach may fail to fully address the endogeneity issues (Coles, Lemmon, and Meschke, 2005). In this paper, I try to overcome the endogeneity problem by examining how equity-based incentives affect managers' decision to change firm risk in response to an exogenous shift in takeover environment. *I hypothesize (H2) that if equity-based incentives encourage managerial risk-taking, then firms with low managerial equity-based incentives should experience a relatively larger decrease in firm risk in response to the increased protection accorded to managers after 1995.*

Besides firm focus and risk, past research has also examined the relation between managerial equity-based incentives and other firm policies, such as leverage and hedging, but with mixed results on how equity-based compensation affects managerial risk-taking behavior (e.g., Tufano, 1996; Geczy, Minton, and Schrand, 1997; Berger, Ofek, and Yermack, 1997; Rajgopal and Shevlin, 2002). Changes in firm diversification, leverage, and hedging activities are just some of the ways by which managers can reduce firm risk. These activities are often observable to shareholders, making managers reluctant to reveal their preferences through such obvious activities. Furthermore, such activities affect managerial incentives in many complex ways, making it difficult to interpret them solely in terms of risk considerations. Therefore, a direct way to examine the effects of managerial risk-aversion is by measuring

firm risk itself, which summarizes the net effect of all managerial risk-taking activities, including those that are unobservable, such as the selection of less risky projects.

If equity-based incentives affect managerial risk-taking behavior, I should be able to observe changes in equity-based compensation as firms proactively change incentives to mitigate the adverse effects of the regime shift. *Therefore, I hypothesize (H3) that if equity-based compensation encourages managerial risk-taking, then incentives will increase after 1995 as firms counter the reduced risk-taking effects of the regime shift.*

Cheng, Nagar, and Rajan (2005) and Rauh (2006) show a decrease in managerial stock ownership in response to the second generation anti-takeover laws and the 1995 Delaware regime shift, respectively. These papers, however, do not examine changes in option holdings, delta or vega values, measures that are more likely to be associated with managerial risk-taking.

4. Data and method

My sample period is from 1990 to 2004. To be included in the sample, I require the firm to have accounting and stock data available on Compustat and Center for Research in Security Prices (CRSP) databases, respectively. I exclude financial firms (SIC 6000–6999) and utilities (4900-4999), since these firms are often subject to heavy federal regulations. I also require that information on the state of incorporation of the firm be available from the Investor Responsibility Research Center (IRRC) database.

My final sample consists of an unbalanced panel of 2,399 firms, with a total of 17,220 firm-years. I winsorize all control variables at the 1% level in both tails and for each year. I also match the main sample to the IRRC data for information on staggered boards, to Execucomp for information on CEO ownership and compensation structure, and to the Thomson Financial Ownership Database for data on institutional ownership.

4.1. Definition of variables

My main dependent variable is total firm risk, which I calculate using the variance of daily stock returns over the fiscal year. I annualize the variance before taking a natural logarithmic transformation. There are several reasons why I use equity risk as my proxy for firm risk. First, estimating firm risk is plagued with problems, since it entails calculating the risk of the firm's debt, and data on private and public debt is not readily available. Estimating firm risk using yearly cash flow volatility is also problematic (Shin and Stulz, 2000). Thus, it is no surprise that most prior studies use equity risk as their proxy for firm risk. Second, in the context of my study, using equity risk is consistent with the fact that executive stock options are written on the firm's equity. Third, I also control for the impact of leverage on equity risk in my regressions.

Managers can affect both the level of total risk and the composition of risk. Concentrating on total risk assumes that systematic risk and unsystematic risk are equally costly to the managers. However, it is likely that systematic risk and unsystematic risk affect managers differently. First, even absent equity-based compensation, executives have large undiversified positions in their firms in terms of their human capital investments. Thus, it would be difficult to diversify away the idiosyncratic risk. However, to the extent that they can trade the market portfolio, executives can optimally adjust their exposure to systematic risk (Jin, 2002). But if executives cannot trade the market portfolio, then systematic risk can also matter. Second, executives are compensated for the systematic risk they hold through their equity-based compensation, not for the idiosyncratic risk (Meulbroek, 2001; Duan and Wei, 2005). Thus, while stock and stock options might cause executives to increase systematic risk beyond the optimal level, they can also cause them to reduce idiosyncratic risk at the same time.

I decompose total risk into systematic risk and unsystematic risk by using the market model, and with CRSP value-weighted market portfolio as my proxy for the market portfolio. I adjust for nonsynchronous trading by adding five leads and five lags of market returns (Dimson, 1979). Systematic risk is measured with the variance of the product of the firm beta times the market daily returns. I use the predicted portion of the stock return regression, since I include leads and lags of market portfolio returns.

Similar to total risk, I annualize the variance before taking a natural logarithmic transformation. Idiosyncratic risk is measured with the natural logarithmic of the annualized variance of the residuals from the market model. All risk measures are calculated with at least 60 days of returns data.

My main independent variable is DELAFT, which takes the value of one for Delaware-incorporated firms for years 1996 to 2004. Since the regime change happened in 1995, using 1996 as the first year allows for lags in implementation of firm policies and also accounts for the fact that some variables may overlap with the previous calendar year. The results hold when I use 1995 as the first year in which the regime shift is in full effect. I use total book assets at the beginning of the year to control for firm size (SIZE). I also include lagged market-to-book ratio (MB) as my proxy for investment opportunities, and lagged return on assets (ROA) to control for profitability. Since the latter two variables and the firm policy variables that I discuss below are arguably endogenous to the regime shift, I present results both with and without them.

Managers can change firm risk through leverage, capital expenditures, research and development (R&D) expenditures, and firm focus (Coles, Daniel, and Naveen, 2006). Changes in firm risk due to these firm policies can also be attributed to reasons other than managerial risk-aversion. For example, increases in capital and R&D expenditures in response to the regime shift are consistent with Stein (1988) who argues that takeovers can cause myopic managerial behavior leading managers to forgo long-term projects for short-term profits. Changes in these firm policies can lead to changes in firm risk unrelated to managerial risk-aversion. Therefore, I also control for the contemporaneous values of the following policy variables: R&D expenditures (RD); net capital expenditures (NETCAPEX); leverage (BLEVTOT); number of business segments (SEGMENTS); and segment sales Herfindahl (SALEHERF) as a second measure of firm focus.

I also examine the effects of CEO portfolio delta and vega values on managers' incentives to change firm risk. Delta is defined as the dollar change in a CEO's stock and option portfolio for a 1% change in stock price, and vega as the dollar change in a CEO's option holdings for a 1% change in stock return volatility. I calculate both delta and vega values by using the "one-year approximation" method

outlined in Core and Guay (2002). I also use other measures of CEO incentives, such as percentage of common stock held by the CEO and the number of options held scaled by the stocks outstanding. However, these latter measures of incentives do not account for the structure of compensation, and are thus noisy. Appendix A describes the construction of the variables in more detail.

4.2. Summary statistics

Table 1 shows the means and medians for the 1994 variables. In the table, I separate the sample into Delaware and non-Delaware firms, with Delaware-incorporated firms accounting for over half of the sample. In 1994, the Delaware firms are riskier than the non-Delaware firms for both systematic risk and unsystematic risk. Delaware firms without a staggered board are the main drivers behind this difference in risk. When I group firms into Delaware firms with staggered boards versus all other firms, this difference in risk disappears. Further examination shows that the Delaware non-staggered-board firms have significantly higher R&D expenditures than do the other firms in 1994, and that they are slightly over-represented in the Computers and Electronic Equipment industries as defined by the Fama-French list of 48 industries. Since the IRRC firms are all typically large, there is little difference in the size of Delaware and non-Delaware firms. Consistent with Daines (2001), I find that Delaware firms are more leveraged than the non-Delaware firms. Delaware firms also have lower MB and ROA values.

I find little difference in the compensation structure of Delaware firms and non-Delaware firms, except that the Delaware CEOs have a higher number of option holdings. However, this difference does not translate into higher convexity in their compensation structure as measured by vega. In terms of board structure, there is an even spread of firms with staggered boards among both the non-Delaware and Delaware firms, with mean values of 0.59 and 0.57, respectively.

In untabulated summary statistics, I examine the industry composition and characteristics of firms based on whether they are incorporated in Delaware or not and whether they have a staggered board in 1994. There is little difference in terms of industry composition, except that the Delaware non-staggered-board firms have a higher representation in the Computers and Electronic Equipment industries, as noted

above, and that the Delaware staggered-board firms have a higher representation in the Petroleum and Natural Gas industry. The four groups of firms are similar in size and have roughly similar CEO compensation structure. The non-Delaware firms have higher profitability and MB ratios. In addition, the Delaware staggered-board firms are generally more leveraged, have lower R&D, and are more diversified than the other three groups of firms. My results are robust to controlling for these additional firm policies.

4.3. Method

To test for the effect of the regime shift on firm risk, I use the differences-in-differences method. This method has been used by Bertrand and Mullainathan (1999a, 1999b, 2003) in their analyses of the second generation anti-takeover laws. The basic regression that I estimate is:

$$y_{it} = \alpha_t + \beta_i + \gamma X_{it} + \varphi DELAFT_{it} + \varepsilon_{it} \quad (1)$$

where i indexes firm, t indexes time, y_{it} is the dependent variable of interest (i.e., firm risk), α_t and β_i are year and firm fixed effects, X_{it} is a vector of control variables, $DELAFT_{it}$ is a dummy variable that equals one if firm i is incorporated in Delaware and the observation is on or after 1996, and ε_{it} is an error term. My estimate of the effects of changes in Delaware takeover environment is φ. Since I am using the natural logarithmic transformation of firm risk, φ yields the percentage of risk differential that can be attributed to the regime change.

This method essentially compares the change in firm risk for a firm before and after the regime shift and compares this change to that for a control firm over the same period. A control firm is one that has not been exposed to the regime shift. I implement this method in a regression framework to allow for changing firm characteristics.

One advantage of this method is that the firm fixed effects take into account any unobserved cross-sectional heterogeneity across firms. The use of year fixed effects accounts for any market-wide fluctuations in volatility. Following Bertrand, Duflo, and Mullainathan (2004), I allow the standard errors to cluster by states of incorporation.

5. Analysis of risk changes

I first examine whether risk-averse managers who are protected from takeovers prefer to lower firm risk. Table 2 presents a univariate analysis of changes in firm risk. I calculate the average risk for each firm from 1990 to 1995, and subtract it from the average risk for that firm from 1996 to 2004. Separately for Delaware and non-Delaware firms, I take an average or median change over all the firms in each subsample. I require that firms have at least three years of risk data before and after the change.

I find that although both the Delaware and non-Delaware firms increase total risk, the Delaware firms have a smaller increase. The mid-1990s shift in the Delaware takeover regime seems to cause total risk to decrease by about 5% for the Delaware firms relative to the non-Delaware firms, although this difference is not statistically significant. Unsystematic risk shows a relative decrease of 6%, and is marginally significant at the 10% level. This relatively larger decrease in the risk of Delaware firms is consistent with managerial risk-aversion being a serious agency problem that leads managers to reduce risk.

Next, I use a more powerful econometric test to analyze the data, one that allows me to control for contemporaneous changes in firm characteristics. Table 3 presents results from the differences-in-differences analysis. All models include firm and year fixed effects. The coefficient on DELAFT measures the effect of the Delaware takeover regime shift on firm risk. For each risk measure, I present three models. Model 1 controls for firm size only; Model 2 controls for firm size, ROA, and MB; and Model 3 controls for the various contemporaneous firm policies that affect firm risk but might be unrelated to managerial risk-aversion. Consistent with the univariate analysis, total risk and unsystematic risk display a significant decrease of about 5% to 6% surrounding the shift in Delaware takeover regime. This decrease due to the regime shift is comparable to the effect of firm size on total risk: a doubling of firm size also decreases total risk by about 5% in my sample. There is also a significant decrease of about 5% in systematic risk. Since the economic significance does not differ much across the three models, the results are not driven by changes in firm policies. This decrease is also not driven by market-wide fluctuations, since I use year dummies to control for such fluctuations.

The estimated coefficients on the control variables indicate that smaller firms, high-growth firms, and less-profitable firms have higher equity volatility. In addition, firms with higher leverage and higher R&D expenditures are riskier. Estimated coefficients on the two measures for firm focus also indicate that increases in firm focus lead to higher unsystematic risk and lower systematic risk.

5.1. The impact of staggered board

The solidification of the "just say no" defense applies mainly to the Delaware firms with staggered boards. Here, I examine the impact of staggered boards on risk changes.

Table 4 presents my univariate analysis of firm risk changes by dividing the firms into two subsamples based on the presence of a staggered board in 1994. Delaware firms with staggered boards significantly decrease their total risk and unsystematic risk by about 8%, relative to non-Delaware firms with staggered boards. There is no similar decrease in risk for the Delaware firms among the non-staggered board firms.

In Table 5, I examine risk changes by using the differences-in-differences procedure. I examine the staggered board firms and the non-staggered board firms separately. This separation presents a more rigorous test of Hypothesis 1 and ensures that the risk decrease is due to the regime shift. Any risk decreases should be driven by the Delaware staggered-board firms, since they are the firms most affected by the regime shift. Furthermore, by dividing the firms into two groups, I can control for any differences between the staggered-board and non-staggered-board firms not captured by the control variables. I also report the *p*-value of the Wald statistic that tests whether the coefficients on DELAFT are the same across the two subsamples of firms for the same model. The Wald test does not take into account the clustering of the standard errors at the state level.

The shift in Delaware takeover regime causes the Delaware staggered-board firms to decrease their total risk and unsystematic risk by about 5% to 8%, relative to non-Delaware staggered-board firms. The magnitude of change is similar to that found in the univariate analysis and is also comparable to the effect of firm size on total risk. The coefficients on DELAFT for the Delaware staggered board subsample

in Table 5 are also generally bigger than those in Table 3. Using the additional control variables and firm policy variables in Models 2 and 3 does not qualitatively change the coefficients. I observe a similar decrease for the systematic risk, although the coefficient on DELAFT is not significant in Model 3 for the staggered-board subsample. There is no similar decrease in systematic risk for the non-staggered-board firms.

For all three risk measures and for all of the models, the coefficients on DELAFT for the non-staggered-board subsample are economically small and statistically insignificant. For example, in Model 2 of the total risk specification, the coefficient on DELAFT for the staggered-board subsample is about ten times bigger than the corresponding coefficient in the non-staggered-board subsample. The Wald tests generally show that the coefficients on DELAFT are significantly different across the two subsamples for both total risk and unsystematic risk, although the difference for systematic risk is not significant across the two subsamples.

The coefficients on the firm policy variables have somewhat different patterns across the two subsamples. In the total risk and unsystematic risk analyses, the coefficients on NETCAPEX are significantly negative for the staggered-board subsample, but the corresponding coefficients for the non-staggered board subsample are insignificant. This difference in coefficients across the subsamples highlights the importance of controlling for firm financing and investment policies.

Using DELAFT does not allow me to differentiate exactly when the risk changes take place. The regime shift happened in 1995 with the *Unitrin* ruling and the attempted takeover of Wallace Computer. If decreases in risk started in 1993 and continued, then I would still be able to find a significant negative coefficient on DELAFT. However, this would cast doubt on whether the Delaware takeover regime shift caused the pattern I find here. On the other hand, if I find decreases in risk for only one year, then one could argue that there was no permanent change, and the findings are therefore not economically interesting.

In Table 6, I use five dummy variables in place of DELAFT to examine the timing of the risk changes. DELAFT (-2), DELAFT (-1), DELAFT (0), and DELAFT (+1) are dummy variables that equal

one if the firm is incorporated in Delaware and the year is 1993, 1994, 1995, and 1996, respectively. DELAFT (+2) is a dummy variable that equals one if the firm is incorporated in Delaware and the year is 1997 or later. This series of DELAFTs is designed to analyze exactly when the changes take place. In the staggered-board subsample, total risk and unsystematic risk start decreasing only in 1995 and continue to do so even after 1997. The significance of the coefficient on DELAFT (+2) suggests that any risk changes implemented by the managers after 1995 are not for the short term. The results for the systematic risk are quite weak, though the coefficient on DELAFT (+2) in Model 2 is significant at the 10% level for the staggered-board firms and not for the non-staggered-board subsample. The results in Table 6 show that risk decreases take place only in 1995 and onwards, which is exactly when the regime shift took place. In addition, I find this effect only for the staggered-board firms, which are the firms primarily affected by the regime shift.

My results so far are consistent with Hypothesis 1, which states that managerial risk-aversion leads to a reduction in risk, thus posing a serious conflict between shareholders and managers. This decrease is not only statistically significant, it is also economically significant. My findings also show that separating total risk into systematic risk and idiosyncratic risk is important, and that managers are apparently also concerned with their exposure to systematic risk. This result for systematic risk is consistent with the view that managers may not necessarily have the ability to adjust their optimal exposure to systematic risk by trading the market portfolio (Jin, 2002).

5.2. Robustness checks

Although I include a comprehensive list of firm characteristics and policies in the regressions, one could argue that the decrease in risk might be caused by the Delaware staggered-board firms somehow changing over the same period in time, and that the decrease may have nothing to do with the regime shift. However, it is unlikely that this reason can fully explain the results in Tables 5 and 6. Not only must the changes be affecting only the Delaware staggered-board firms and not the rest of the firms, but the changes must also have happened precisely in 1995 and thereafter. Nevertheless, I empirically

address the possibility in various ways. First, I control for other variables that could conceivably affect either firm risk or a firm's decision to incorporate in Delaware. Second, I examine whether industry differences across the subsamples could be driving the results. Third, I examine whether the results are due to mean reversion. Fourth, I relate the magnitude of the change in risk to the probability that the firm is being disciplined by the hostile takeover market prior to the regime shift. Since the regime shift protects the managers from being taken over, the reduction in risk should be greatest among managers who previously faced the most takeover pressure. The results from the robustness checks are described below.

5.2.1. Omitted variables

To show that the results are not due to omitted control variables, I also control for variables that are known to influence a firm's decision of whether to incorporate in Delaware or not. Thus, I control for firm age and the number of acquisitions the firm makes over the fiscal year (Daines, 2002; Bebchuk and Cohen, 2003). I find that the results in Table 5 still hold. I also use the natural logarithm of beginning-of-year market capitalization to control for firm size instead of book assets. Again, my main conclusions hold. Finally, when I control for stock returns over the fiscal year, beginning-of-period cash holdings, and a dummy variable for missing R&D, the results do not change

5.2.2. Industry trends

My results are also robust to differences in industry trends. The Delaware staggered-board subsample is over-represented in the Petroleum and Natural Gas industry. I delete firms in this industry and find that the results remain the same. I also delete firms in the Computers and Electronic Equipment industries in which the Delaware non-staggered-board firms are over-represented, and the main conclusions continue to hold. Finally, I follow Loughran and Ritter's (2004) definition of technology stocks and delete those firms. My conclusions are unchanged.

This series of robustness checks also shows that the technology boom in the late 1990s and the subsequent bust are not driving the results. To further verify whether the results are driven by the

technology boom and bust during these years, I delete the years 1998, 1999, and 2000. The results remain the same. I also control for industry volatility in the regressions and again obtain the same results.[3]

5.2.3. Mean reversion

I next address the possibility that the results are due to mean reversion. As noted earlier, in 1994 the Delaware firms have higher volatility than do the non-Delaware firms. Following Cheng, Nagar, and Rajan (2005), to examine total risk changes I delete all firms with total risk that is non-decreasing in the years prior to the regime shift. The idea is that these firms are most likely to experience a reversal in trend. I obtain stronger results with greater economic significance, thereby reinforcing the previous findings. The results also hold if I repeat the analysis for the systematic risk and unsystematic risk. Thus, it is unlikely that patterns of mean reversion drive the results in Table 5.

5.2.4. Hostile takeover pressure

Another way to check whether my results are caused either by changing characteristics unrelated to the regime shift or by the increased takeover protection for Delaware managers in staggered-board firms is to relate the size of the risk decrease to the probability that the firm is being disciplined by the hostile takeover market prior to the regime shift. Firms faced with constant hostile takeover threats benefit most from the regime shift and thus should have the largest risk decrease. Schwert (2000) finds that bigger firms are more likely to be targets of hostile takeovers. Consistent with this, Bertrand and Mullainathan (1999a) show that bigger firms increase wages more in response to the takeover protection afforded by the second generation anti-takeovers laws. They argue that bigger firms have more agency problems, making takeovers an important disciplining device. In Table 7, I examine whether larger firms are likely to have a bigger reaction to the regime shift. I allow DELAFT to interact with firm size and also

[3] I would like to thank Ken French for making data on daily industry returns available on his website http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html. I calculate industry volatility by using the daily industry returns for the 48 industries.

allow the coefficients on size to vary by year and by Delaware and non-Delaware firms. To make the coefficients on DELAFT easier to interpret, I demean firm size.

Table 7 shows that in response to the regime shift, the bigger firms decrease their total risk more. Furthermore, the results show up only for the sample of staggered-board firms, further reinforcing the previous results. Thus, the decrease in risk is stronger among firms that are most subject to the disciplinary effects of hostile takeovers prior to the regime shift.

Taken together, both my main tests and my battery of robustness tests suggest that there is indeed a decrease in risk that is associated with increased protection from the regime shift.

6. Analysis of effect of equity-based compensation

Here, I investigate whether equity-based compensation can mitigate the risk-aversion conflicts between managers and shareholders. I address the issue in two ways. First, I examine how managers with high equity-based compensation react to the regime shift compared to managers with low equity-based compensation (H2). Second, I examine how firms react to the regime shift and whether they change their CEO compensation structure to mitigate the adverse effects of the regime shift (H3).

6.1. Equity-based compensation and changes in risk

To address the issue of whether CEOs with different incentives react to the regime shift differently, I divide the firms into those where the CEO has equity-based incentives greater (lower) than the median value in 1994. If equity-based compensation helps mitigate managerial risk-aversion, I should see a relatively larger decrease in risk among firms whose CEOs have low incentives compared to firms whose CEOs have high incentives. However, if equity-based compensation leads to managerial conservatism, then managers with more equity-based incentives will want to decrease their exposure to firm risk. Therefore, I should see a relatively larger decrease in risk among firms with high CEO incentives. Table 8 presents my results based on simpler measures of equity-based incentives.

The first compensation variable I examine is the percentage of stock ownership held by the CEO. My second variable attempts to capture the convexity of CEO payoff by using the number of options held by the CEO scaled by the number of stocks outstanding.

Since the regime shift affects primarily the Delaware staggered-board firms, and given the results in Tables 5 and 6, I replace DELAFT with DELAFTSB. DELAFTSB is an interaction term between DELAFT and a dummy variable that takes the value of one if the firm has a staggered board in 1994. Using DELAFTSB is equivalent to treating the changes in Delaware takeover environment as affecting only those Delaware firms that have staggered boards. Using the presence of a staggered board in 1994 restricts the sample to those firms that existed in 1994. Survivorship bias is unlikely to affect my results, since firms can still drop out of the sample if they went out of business in 1995.

Table 8, Panel A, gives the results of dividing firms based on the percentage of CEO stock ownership. Consistent with the alignment role of greater stock ownership, CEOs who hold a relatively lower proportion of their company stock decrease their firm's total risk by about 11% to 12% in response to the takeover regime shift. There is no similar decrease for firms with relatively high CEO stock ownership, either economically or statistically. In all three models for total risk, the coefficients on DELAFTSB for the low CEO ownership subsample are at least 15 times greater than the corresponding coefficients for the high CEO ownership subsample. Furthermore, all the coefficients on DELAFTSB in the low CEO ownership subsample are statistically significant at the 1% level, but the coefficients in the latter subsample are insignificant. Both systematic and unsystematic risk show similar patterns. Thus, there is no evidence that stock ownership induces managerial conservatism and discourages managerial risk-taking.

The subsample of firms with high CEO ownership shows a 5% increase in systematic risk in response to the regime shift, with the coefficients on DELAFTSB significant in Models 2 and 3. This result is in line with the argument that managers are compensated for the systematic risk they bear through their equity compensation, and might possibly increase systematic risk beyond what is optimal (Meulbroek, 2001; Duan and Wei, 2005).

Panel B gives the results of dividing the firms based on the CEO's holdings of stock options. Total and unsystematic risk decrease in both subsamples of firms in response to the regime shift. However, the firms with lower amounts of CEO option holdings have a larger decrease in total risk: the coefficient on DELAFTSB in Model 1 of the low CEO option holdings firms is almost twice as big as that of the other group of firms, although the difference in the coefficients across the two subsamples is not significant, as shown by the Wald test. There is a significant decrease in systematic risk among firms with low CEO stock option holdings, and an insignificant increase for firms with high CEO stock option holdings. The Wald test shows that this difference is significant. Stock and stock option holdings could be noisy measures, since they do not take into account the structure of the CEO's compensation. Therefore, in Table 9 I examine how the delta and vega values for the CEO's portfolio of stock and option holdings affect managerial risk-taking.

Table 9, Panel A, presents results based on the delta values of the CEO portfolio. Only in the subsample of firms with low CEO delta is the regime shift associated with a significant decrease in both total and systematic risk. Compared to the firms with high CEO delta values, the decrease in total risk for the low CEO delta firms is almost three times greater. The Wald tests also reinforce the conclusion that the Delaware staggered-board firms with low CEO delta values decrease firm risk more than do those with high CEO delta values. There is no evidence that increased delta leads to managerial conservatism.

The results in Panel B that use vega values to measure CEO risk-taking incentives show that increased vega values encourage managerial risk-taking. Firms with low CEO vega values decrease total risk, systematic risk, and unsystematic risk by a significant 10% to 11% in response to the Delaware takeover regime shift. There is no similar magnitude of decrease for the firms with high CEO vega values, either economically or statistically. Except for Model 1 of the unsystematic risk specification, the coefficients on DELAFTSB for the low CEO vega firms are always more than twice as much as those for the high vega firms, and the systematic risk specifications show even greater economic significance. Furthermore, the decrease in risk for the low vega firms is always significantly negative at the 1% level.

Except for Model 1 with unsystematic risk as the dependent variable, the decrease for the high vega firms are mostly insignificant.

The Wald tests also generally support my conclusion that the firms with low CEO vega values react to the regime shift by decreasing total risk more than do the firms with high CEO vega values. These results support the argument made by Guay (1999) that increased vega can encourage managerial risk-taking.

6.2. Changes in Equity-Based Incentives

Table 10 examines changes in CEO equity-based compensation due to shifts in the Delaware takeover regime. I do not find any change in managerial ownership. This finding contrasts with that of Rauh (2006) and Cheng, Nagar, and Rajan (2005), who document decreases in managerial ownership in response to the Delaware regime shift and the second generation anti-takeover laws, respectively. The difference in results might be explained by the use of firm fixed effects versus industry fixed effects. Cheng, Nagar, and Rajan (2005) make use of industry fixed effects, and Rauh (2006) finds significant results mainly for his industry fixed effects specification only. When I examine the managerial ownership specifications with industry fixed effects, I find a significant decline in managerial ownership for Models 1 and 2.

I find that Delaware staggered board firms increase CEO option holdings significantly in response to the regime shift, which is not consistent with the view that stock options encourage managerial conservatism. If executive stock options increase managerial exposure to firm risk, then managers would likely decrease their holdings of stock options whenever they have the discretion to do so. However, I find an increase in stock options in reaction to the regime shift.

In examining CEO delta and vega values, I use LN(1+delta) and LN(1+vega) to deal with outliers and firm-years with zero delta and vega values, where LN(.) is the natural logarithmic transformation. There is no significant change in CEO delta values, but there is an increase in CEO vega values in response to the regime shift. These results are consistent with results in Table 9, that delta and vega values

are set to align managerial interests, and that they do not magnify managers' exposure to firm risk. These results are not caused by aggregate fluctuations in compensation structure since all the other firms not affected by the regime shift act as controls in the differences-in-differences method. Interestingly, I find the increase in equity-based compensation mostly in measures most related to risk-taking, i.e., CEO stock option holdings and CEO vega.

It is possible that the increases in option holdings and vega values are the result of increases in total compensation as managers become more entrenched when they are better protected from takeovers. Under this argument, my results are not due to firms adjusting the CEO compensation structure to mitigate managerial risk-aversion, but due to entrenched managers paying themselves more. In untabulated regressions, I control for total compensation, which includes items such as salary, bonus, the value of option grants over the fiscal year, long term incentive payouts, etc. The results remain robust. I also control for total risk, systematic risk, and idiosyncratic risk in the respective regressions, and the results continue to hold. My results are also robust to the deletion of the technology firms or the deletion of the years 1998, 1999, and 2000.

Although the change in Delaware takeover environment entrenches CEOs of firms with staggered boards, these CEOs are still subject to monitoring by other mechanisms. For example, CEO contracts might be revised to take into account their incentives to reduce firm risk. In their analysis of the effects of the second generation anti-takeover laws on managerial compensation, Bertrand and Mullainathan (1999b) find that firms with a blockholder are more likely to adjust the compensation of their CEO to overcome the reduced incentives due to weaker takeover pressures.

In Table 11, I divide my sample of firms into those with and without institutional blockholder monitoring as of 1994. I find significant increases in vega values only in the sample of firms with blockholder monitoring. This finding is consistent with the hypothesis that high vega values align managerial risk-taking behavior, and that firms increase vega values to counteract the decreased incentives on account of the takeover market. The coefficient on DELAFTSB in the subsample with blockholder monitoring is about twice as large as that of the subsample without blockholder monitoring,

and always significant at the 1% level. The coefficients on DELAFTSB for the subsample without blockholder monitoring are always insignificant. However, the Wald test does not support the conjecture that firms with a blockholder increase their CEO vega values more than do those firms without a blockholder.

In unreported results, I find that most of the increase in vega values for the blockholder firms happens two years after the regime shift, i.e., in and after 1997. This delayed increase is consistent with the conjecture that the changes in takeover regime lead to a shock to the system, and that firms cannot re-contract immediately. This provides a window of opportunity for rent-seeking managers.

My findings are consistent with the view that higher vega values encourage managers to take on more risk, which explains the increase in CEO portfolio vega values to counteract the adverse effects of changes in Delaware takeover regime on firm risk. There is however little corresponding evidence that firms increase CEO delta values to mitigate effects of managerial risk-aversion.

7. Conclusion

Using exogenous changes in the Delaware takeover regime during the mid-1990s, I study the effect of equity-based compensation on managers' risk-taking behavior. I find that managerial risk-aversion is a serious agency problem, one which leads managers to reduce firm risk. Managers respond to the greater takeover protection accorded by the regime shift by decreasing firm risk. In particular, this decrease is concentrated among firms with low CEO pay-performance sensitivity (low delta firms) and low CEO sensitivity to stock return volatility (low vega firms). Firms with low CEO vega experience a reduction of over 10% in risk. I also find evidence that firms counter the reduced risk-taking incentives of managers by increasing CEO vega gradually after the regime shift. These results are consistent with the view that equity-based compensation is used to mitigate managerial risk aversion.

APPENDIX A: Definitions of variables used in study

This appendix defines the variables used in this study. State of incorporation data and staggered board data are from the Investor Responsibility Research Center (IRRC) database, accounting and segment data are from Compustat, stock return data from CRSP, and compensation data from Execucomp.

Variables	Definition
Main Dependent Variable	
DELAFT	Dummy variable that takes the value of one for firms incorporated in Delaware and for the years 1996-2004, and zero otherwise
Risk Measures	
Total Risk	Log(variance of daily stock returns over firm fiscal year, annualized)
Systematic Risk	Log(variance of the predicted portion of a market model, annualized). The market model takes into account nonsynchronous trading by adding five leads and lags of daily market returns (Dimson, 1979)
Unsystematic Risk	Log(variance of the residual from the market model, annualized).
Control Variables (Winsorized at 1% level in both tails)	
SIZE	Log($Data6_{t-1}$), in millions of 2004 dollars
ROA	$(Data18 / Data6)_{t-1}$
MB	$((Data6-Data60+Data199*Data25) / Data6)_{t-1}$
Firm Policies	
BLEVTOT	$((Data34+Data9)/ Data6)_t$
NETCAPEX	$((Data128-Data107)/ Data6)_t$. Missing values are coded zero
RD	$(Data46/ Data6)_t$. Missing values are coded zero
SEGMENTS	No. of business segments reported in Compustat Segment Database
SALEHERF	Sum of squared (segment sales/ total segment $sales)_t$
Incentives variables	
CEO Ownership	% of common stocks held by CEO
CEO Option Holdings	Total no. of options held by CEO scaled by shares outstanding (%)
CEO Delta	Dollar change in CEO stock and option portfolio for 1% change in stock price, in thousands of 2004 dollars
CEO Vega	Dollar change in CEO option holdings for a 1% change in stock return volatility, in thousands of 2004 dollars. In my calculation of delta and vega, I use the method described in Core and Guay (2002)

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Table 1. Summary statistics of sample firms in 1994

The table gives the means and medians of selected financial data for Delaware and non-Delaware firms in 1994. I obtain the states of incorporation from the IRRC database, risk measure data from CRSP, accounting and segment data from Compustat, CEO compensation data from Execucomp, and board structure data from the IRRC database. Total Risk is the natural logarithm of the annualized variance of daily returns over the fiscal year. Systematic Risk is the natural logarithm of the annualized variance of the product of the firm beta times the market daily returns. I calculate firm beta by using the market model adjusted for nonsynchronous trading. Unsystematic Risk is the natural logarithm of the annualized variance of the residuals from the market model. MB is the ratio of the market value to total assets. BLEVTOT is the ratio of long- and short-term debt to book assets. RD is the research and development expenditures scaled by book assets. NETCAPEX is the ratio of capital expenditures net of sales of property, plant, and equipment, scaled by book assets. SEGMENTS is the number of business segments as reported in the Compustat segment database. SALEHERF is the Herfindhal index of the segment sales. *CEO ownership* is the percentage of common stocks held by the CEO and *CEO option holdings* is the total number of options held by the CEO scaled by common stocks outstanding. *CEO Delta* is the dollar change in CEO stock and option portfolio for a 1% change in stock price. *CEO Vega* is the dollar change in CEO option holdings for a 1% change in stock return volatility. *Staggered board* is a dummy variable that takes the value of one if the firm has a staggered board, and zero otherwise. All dollar values are in 2004 dollars. I conduct t-tests to test for differences between the means for the Delaware and non-Delaware firms. The difference-in-means t-tests assume unequal variance across groups when a test of equal variance is rejected at the 10% level. I use the Wilcoxon Rank Sum Test to test for differences in the medians. *, **, and *** measure significance at the 10%, 5%, and 1% levels, respectively.

	Non-Delaware Firms			**Delaware Firms**		
Variable	N	Mean	Median	N	Mean	Median
Risk Measures						
Total Risk	436	6.836	6.742	562	6.979***	6.938***
Systematic Risk	436	4.624	4.589	562	4.787***	4.784***
Unsystematic Risk	436	6.697	6.637	562	6.838***	6.812***
Control Variables						
Market Cap ($ millions)	436	3656.4	1155.5	562	3539.0	957.2
Total Assets ($ millions)	436	3819.7	922.8	562	3871.4	1070.1
Sales ($ millions)	436	4105.0	1095.1	562	3876.2	1209.1
MB	436	1.844	1.562	562	1.762	1.487*
ROA	436	0.046	0.049	562	0.030***	0.040***
Firm Policies						
BLEVTOT	435	0.223	0.202	561	0.244*	0.230*
RD	436	0.027	0.002	562	0.028	0.002
NETCAPEX	436	0.061	0.052	562	0.064	0.053
SEGMENTS	436	1.968	1.000	562	2.062	1.000
SALEHERF	436	0.780	1.000	562	0.775	1.000
CEO Incentives						
CEO Ownership (%)	324	3.046	0.400	429	2.728	0.400
CEO Options Hldgs (%)	324	0.691	0.399	429	0.910**	0.474**
CEO Delta ($000s)	324	866.2	170.7	429	715.4	165.7
CEO Vega ($000s)	324	57.6	28.3	429	58.0	30.9
Board Structure						
Staggered Board	436	0.589	1.000	562	0.566	1.000

Table 2. Changes in firm risk - Univariate analysis

This table presents my univariate analysis of changes in firm risk in response to changes in the Delaware takeover regime in 1995. I calculate the average risk for each firm from 1990 to 1995 and subtract it from the average risk for each firm from 1996 to 2004. I then take an average or median change over all the firms, separately for those firms affected by the Delaware regime change (*DE firms*) and for those that are not (*Non-DE firms*). I require that firms have at least three years of risk data before and after the change. Total Risk is the natural logarithm of the annualized variance of daily returns over the fiscal year. Systematic Risk is the natural logarithm of the annualized variance of the product of the firm beta times the market daily returns. I calculate firm beta by using the market model adjusted for nonsynchronous trading. Unsystematic Risk is the natural logarithm of the annualized variance of the residuals from the market model. I conduct t-tests to test for differences between the means for the Delaware and non-Delaware firms. The difference-in-means t-tests assume unequal variance across groups when a test of equal variance is rejected at the 10% level. I use the Wilcoxon Rank Sum Test to test for differences in the medians. *, **, and *** measure significance at the 10%, 5%, and 1% levels, respectively.

	N	**Mean**	**Median**
Total Risk			
DE Firms	439	0.330***	0.360***
Non-DE Firms	338	0.377***	0.376***
Difference		-0.047	-0.015
Systematic Risk			
DE Firms	439	0.593***	0.601***
Non-DE Firms	338	0.600***	0.570***
Difference		-0.007	0.031
Unsystematic Risk			
DE Firms	439	0.262***	0.276***
Non-DE Firms	338	0.319***	0.299***
Difference		-0.057*	-0.022

Table 3. Changes in firm Risk - Differences-in-differences method

This table presents the results of regressions of firm risk for changes in the Delaware takeover regime in 1995. DELAFT measures the effect of the regime change and takes the value of one for Delaware-incorporated firms for the years 1996-2004, and zero otherwise. Total Risk is the natural logarithm of the annualized variance of daily returns over the fiscal year. Systematic Risk is the natural logarithm of the annualized variance of the product of the firm beta times the market daily returns. I calculate firm beta by using the market model adjusted for nonsynchronous trading. Unsystematic Risk is the natural logarithm of the annualized variance of the residuals from the market model. Control variables are as described in the Appendix. All regressions include firm and year fixed effects. Dollar values are in millions of year 2004 dollars. Intercepts are not reported. Standard errors are reported in *italics*. Standard errors are clustered by states of incorporation. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

	Total Risk			**Systematic Risk**			**Unsystematic Risk**		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
DELAFT	-0.054**	-0.056**	-0.049**	-0.049*	-0.052**	-0.047*	-0.057**	-0.059**	-0.051**
	0.021	*0.022*	*0.023*	*0.025*	*0.024*	*0.024*	*0.022*	*0.023*	*0.023*
SIZE	-0.054***	-0.048***	-0.050***	0.006	0.028***	0.015	-0.077***	-0.075***	-0.075***
	0.012	*0.014*	*0.015*	*0.009*	*0.009*	*0.010*	*0.016*	*0.018*	*0.018*
MB		0.033***	0.040***		0.103***	0.110***		0.016***	0.023***
		0.003	*0.003*		*0.011*	*0.012*		*0.003*	*0.003*
ROA		-0.847***	-0.751***		-0.514***	-0.473***		-0.912***	-0.805***
		0.072	*0.059*		*0.068*	*0.053*		*0.068*	*0.058*
BLEVTOT			0.517***			0.190**			0.584***
			0.033			*0.080*			*0.033*
RD			0.617***			-0.180			0.770***
			0.112			*0.161*			*0.115*
NETCAPEX			-0.241			0.142			-0.270
			0.198			*0.101*			*0.213*
LN(SEGMENTS)			0.008			0.054***			-0.003
			0.016			*0.020*			*0.015*
SALEHERF			0.016***			-0.005***			0.017***
			0.001			*0.002*			*0.002*
Adj R-Sq	0.7968	0.8030	0.8090	0.7344	0.7401	0.7483	0.7920	0.7988	0.8050
Firm-Years	17220	17220	16398	17220	17220	16398	17220	17220	16398
FirmYears (DELAFT=1)	6998	6998	6509	6998	6998	6509	6998	6998	6509
Firms	2399	2399	2350	2399	2399	2350	2399	2399	2350

Table 4. Firm risk changes and staggered boards - Univariate analysis

This table presents changes in firm risk in response to shifts in the Delaware takeover regime in 1995, separately for firms with and without staggered boards in 1994. I calculate the average risk for each firm from 1990 to 1995 and subtract it from the average risk for each firm from 1996 to 2004. I then take an average or median change over all the firms, separately for those firms affected by the Delaware regime change (*DE firms*) and for those that are not (*Non-DE firms*). I require that firms have at least three years of risk data before and after the change. Total Risk is the natural logarithm of the annualized variance of daily returns over the fiscal year. Systematic Risk is the natural logarithm of the annualized variance of the product of the firm beta times the market daily returns. I calculate firm beta by using the market model adjusted for nonsynchronous trading. Unsystematic Risk is the natural logarithm of the annualized variance of the residuals from the market model. I conduct t-tests to test for differences between the means for the Delaware and non-Delaware firms. The difference-in-means t-tests assume unequal variance across groups when a test of equal variance is rejected at the 10% level. I use the Wilcoxon Rank Sum Test to test for differences in the medians. *, **, and *** measure significance at the 10%, 5%, and 1% levels, respectively.

	Mean Change			Median Change		
	DE Firms	Non-DE Firms	Difference (DE - Non-DE)	DE Firms	Non-DE Firms	Difference (DE - Non-DE)
			Total Risk			
Non-Staggered board	0.377***	0.358***	0.019	0.408***	0.292***	0.116
Staggered Board	0.319***	0.396***	-0.077*	0.328***	0.426***	-0.097**
			Systematic Risk			
Non-Staggered board	0.627***	0.568***	0.059	0.633***	0.555***	0.079
Staggered Board	0.585***	0.626***	-0.041	0.580***	0.596***	-0.016
			Unsystematic Risk			
Non-Staggered board	0.312***	0.300***	0.012	0.301***	0.250***	0.051
Staggered Board	0.250***	0.337***	-0.087**	0.260***	0.365***	-0.105**

Table 5. Firm risk changes and staggered boards - Differences-in-differences method

This table presents the results of regressions of firm risk on changes in Delaware takeover regime by breaking down the sample of firms into those with staggered boards in 1994 and those with no staggered boards. I obtain data on staggered boards from the IRRC database. DELAFT measures the effect of the regime change and takes the value of one for Delaware-incorporated firms for the years 1996 and later, and zero otherwise. Total Risk is the natural logarithm of the annualized variance of daily returns over the fiscal year. Systematic Risk is the natural logarithm of the annualized variance of the product of the firm beta times the market daily returns. I calculate firm beta by using the market model adjusted for nonsynchronous trading. Unsystematic Risk is the natural logarithm of the annualized variance of the residuals from the market model. Control variables are as described in the Appendix. All regressions include firm and year fixed effects. The Wald Test tests whether the coefficients on DELAFT are the same across the two subsamples for the corresponding model. Dollar values are in millions of year 2004 dollars. Intercepts are not reported. Standard errors are reported in *italics*. Standard errors are clustered by states of incorporation. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

	Total Risk						**Systematic Risk**						**Unsystematic Risk**					
	Non-Staggered Board			Staggered Board			Non-Staggered Board			Staggered Board			Non-Staggered Board			Staggered Board		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
DELAFT	0.003	-0.007	-0.016	-0.069**	-0.068**	-0.052*	-0.007	-0.017	-0.030	-0.056*	-0.059**	-0.043	0.006	-0.005	-0.013	-0.075**	-0.073**	-0.057*
	0.032	*0.033*	*0.037*	*0.026*	*0.026*	*0.027*	*0.046*	*0.046*	*0.047*	*0.029*	*0.028*	*0.029*	*0.032*	*0.032*	*0.035*	*0.028*	*0.029*	*0.029*
SIZE	-0.063***	-0.074***	-0.059***	-0.058***	-0.052***	-0.064***	0.006	-0.000	0.003	0.004	0.014	-0.017	-0.093***	-0.104***	-0.086***	-0.074***	-0.069***	-0.077***
	0.018	*0.018*	*0.021*	*0.014*	*0.013*	*0.014*	*0.018*	*0.017*	*0.016*	*0.025*	*0.022*	*0.015*	*0.022*	*0.023*	*0.026*	*0.015*	*0.017*	*0.018*
MB		0.044***	0.043***		0.031***	0.044***		0.134***	0.134***		0.101***	0.122***		0.019***	0.017***		0.016***	0.027***
		0.006	*0.006*		*0.007*	*0.007*		*0.012*	*0.012*		*0.016*	*0.018*		*0.006*	*0.006*		*0.006*	*0.006*
ROA		-1.649***	-1.573***		-1.523***	-1.190***		-1.251***	-1.311***		-0.885***	-0.690***		-1.682***	-1.574***		-1.617***	-1.265***
		0.178	*0.219*		*0.178*	*0.180*		*0.160*	*0.175*		*0.101*	*0.142*		*0.186*	*0.225*		*0.189*	*0.178*
BLEVTOT			0.230***			0.744***			-0.116			0.352**			0.311***			0.828***
			0.082			*0.061*			*0.079*			*0.150*			*0.084*			*0.087*
RD			0.916**			0.271*			0.408			-0.888**			1.038***			0.461***
			0.344			*0.135*			*0.401*			*0.414*			*0.369*			*0.168*
NETCAPEX			0.202			-0.510***			0.744***			-0.284			0.115			-0.492***
			0.474			*0.116*			*0.241*			*0.227*			*0.487*			*0.106*
LN(SEGMENTS)			0.011			-0.052			-0.001			-0.028			0.006			-0.061
			0.052			*0.043*			*0.062*			*0.028*			*0.055*			*0.045*
SALEHERF			0.108			-0.075			-0.020			-0.266***			0.113			-0.047
			0.140			*0.113*			*0.173*			*0.078*			*0.146*			*0.121*
Adj R-Sq	0.7159	0.7786	0.7307	0.6953	0.7077	0.7187	0.6359	0.6467	0.6582	0.6158	0.6211	0.6265	0.7173	0.7299	0.7318	0.6925	0.7059	0.7181
Wald Test P-Val	0.03	0.06	0.28	-	-	-	0.29	0.37	0.78	-	-	-	0.02	0.04	0.19	-	-	-
Firm-Years	4844	4844	4606	6842	6842	6630	4844	4844	4606	6842	6842	6630	4844	4844	4606	6842	6842	6630
FirmYears (DELAFT=1)	1419	1420	1298	2010	2011	1895	1419	1420	1298	2010	2011	1895	1419	1420	1298	2010	2011	1895
Firms	428	428	428	576	576	576	428	428	428	576	576	576	428	428	428	576	576	576

Table 6. Permanent effects of firm risk changes

This table examines the permanency of the changes in firm risk due to shifts in the Delaware takeover regime. DELAFT (-2), DELAFT (-1), DELAFT (0), and DELAFT (+1) are dummy variables that equal one if the firm is incorporated in Delaware and the year is 1993, 1994, 1995, or 1996, respectively. DELAFT (+2) is a dummy variable that equals one if the firm is incorporated in Delaware and the year is 1997 and later. Total Risk is the natural logarithm of the annualized variance of daily returns over the fiscal year. Systematic Risk is the natural logarithm of the annualized variance of the product of the firm beta times the market daily returns. I calculate firm beta by using the market model adjusted for nonsynchronous trading. Unsystematic Risk is the natural logarithm of the annualized variance of the residuals from the market model. Control variables are as described in the Appendix. All regressions include firm and year fixed effects. Dollar values are in millions of year 2004 dollars. Intercepts are not reported. Standard errors are reported in *italics*. Standard errors are clustered by states of incorporation. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

	Total Risk				**Systematic Risk**				**Unsystematic Risk**			
	Non-Staggered Board		Staggered Board		Non-Staggered Board		Staggered Board		Non-Staggered Board		Staggered Board	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
DELAFT (-2)	0.042	0.030	0.006	-0.002	0.003	0.003	0.031	0.022	0.042	0.028	-0.007	-0.014
	0.039	*0.040*	*0.030*	*0.030*	*0.049*	*0.048*	*0.032*	*0.033*	*0.040*	*0.041*	*0.033*	*0.032*
DELAFT (-1)	-0.051	-0.080*	0.004	0.001	-0.032	-0.045	0.077**	0.073**	-0.060	-0.092**	-0.015	-0.017
	0.041	*0.040*	*0.023*	*0.022*	*0.046*	*0.047*	*0.036*	*0.035*	*0.045*	*0.043*	*0.025*	*0.024*
DELAFT (0)	0.001	-0.025	-0.056*	-0.054*	-0.017	-0.042	-0.003	-0.004	-0.002	-0.027	-0.073**	-0.071**
	0.047	*0.046*	*0.030*	*0.027*	*0.065*	*0.065*	*0.040*	*0.039*	*0.048*	*0.047*	*0.032*	*0.029*
DELAFT (+1)	-0.013	-0.036	-0.101***	-0.110***	-0.032	-0.049	0.015	0.007	-0.007	-0.031	-0.128***	-0.137***
	0.044	*0.046*	*0.029*	*0.028*	*0.053*	*0.051*	*0.052*	*0.051*	*0.046*	*0.048*	*0.029*	*0.027*
DELAFT (+2)	0.005	-0.016	-0.072**	-0.070**	-0.011	-0.027	-0.049	-0.053*	0.005	-0.017	-0.084**	-0.081**
	0.035	*0.036*	*0.032*	*0.032*	*0.050*	*0.050*	*0.033*	*0.031*	*0.039*	*0.039*	*0.036*	*0.036*
SIZE	-0.064***	-0.074***	-0.058***	-0.052***	0.006	-0.000	0.004	0.014	-0.093***	-0.104***	-0.074***	-0.069***
	0.018	*0.019*	*0.014*	*0.013*	*0.018*	*0.017*	*0.024*	*0.022*	*0.022*	*0.023*	*0.015*	*0.017*
MB		0.044***		0.031***		0.134***		0.101***		0.019***		0.016***
		0.006		*0.007*		*0.012*		*0.016*		*0.006*		*0.006*
ROA		-1.656***		-1.524***		-1.257***		-0.882***		-1.690***		-1.619***
		0.180		*0.179*		*0.157*		*0.101*		*0.189*		*0.189*
Adj R-Sq	0.7410	0.7526	0.7209	0.7323	0.6678	0.6777	0.6481	0.6530	0.7422	0.7539	0.7184	0.7307
FirmYears	4844	4844	6842	6842	4844	4844	6842	6842	4844	4844	6842	6842
FirmYears (DELAFT=1)	1419	1420	2010	2011	1419	1420	2010	2011	1419	1420	2010	2011
Firms	428	428	576	576	428	428	576	576	428	428	576	576

Table 7. Takeover vulnerability and firm risk changes

This table examines the impact of firm size on the magnitude of risk changes. DELAFT measures the effect of the regime change and takes the value of one for Delaware-incorporated firms for the years 1996 and later, and zero otherwise. SizeD is the demeaned value of the natural logarithm of book assets at the start of the year. DEL is a dummy variable that equals one for Delaware firms, and zero otherwise. Total Risk is the natural logarithm of the annualized variance of daily returns over the fiscal year. Systematic Risk is the natural logarithm of the annualized variance of the product of the firm beta times the market daily returns. I calculate firm beta by using the market model adjusted for nonsynchronous trading. Unsystematic Risk is the natural logarithm of the annualized variance of the residuals from the market model. Control variables are as described in the Appendix. All regressions include firm and year fixed effects. The regressions also include the interaction of year dummies with demeaned size. Dollar values are in millions of year 2004 dollars. Intercepts are not reported. Standard errors are reported in *italics*. Standard errors are clustered by states of incorporation. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

	Total Risk						**Systematic Risk**						**Unsystematic Risk**					
	Non-Staggered Board			Staggered Board			Non-Staggered Board			Staggered Board			No-Staggered Board			Staggered Board		
	(1)	(2)	(3)	(4)	(5)	(6)	(1)	(2)	(3)	(4)	(5)	(6)	(1)	(2)	(3)	(4)	(5)	(6)
DELAFT	-0.008	-0.020	-0.038	-0.068**	-0.075**	-0.067**	0.005	-0.005	-0.024	-0.034	-0.038	-0.028	-0.012	-0.025	-0.042	-0.080**	-0.088***	-0.080**
	0.033	*0.034*	*0.036*	*0.029*	*0.029*	*0.029*	*0.050*	*0.049*	*0.051*	*0.032*	*0.031*	*0.033*	*0.032*	*0.033*	*0.034*	*0.031*	*0.031*	*0.031*
DELAFT*SizeD	-0.003	-0.003	-0.002	-0.040**	-0.032**	-0.035**	0.003	0.007	-0.011	-0.028	-0.026	-0.032*	-0.007	-0.007	-0.000	-0.040**	-0.032*	-0.033*
	0.024	*0.024*	*0.024*	*0.016*	*0.015*	*0.017*	*0.038*	*0.039*	*0.035*	*0.020*	*0.019*	*0.017*	*0.021*	*0.021*	*0.021*	*0.017*	*0.016*	*0.018*
DEL*SizeD	0.022	0.024	0.038	-0.025	-0.005	0.022	-0.008	-0.009	0.004	-0.036	-0.023	0.005	0.036	0.039	0.053*	-0.012	0.009	0.037
	0.028	*0.026*	*0.025*	*0.034*	*0.033*	*0.032*	*0.038*	*0.036*	*0.035*	*0.042*	*0.042*	*0.040*	*0.029*	*0.028*	*0.027*	*0.035*	*0.035*	*0.033*
SizeD	-0.138***	-0.155***	-0.143***	-0.064**	-0.004	0.072*	-0.019	-0.027	-0.196***	0.084**	0.179***	-0.018	-0.168***	-0.186***	-0.143***	-0.111***	-0.070*	0.089**
	0.036	*0.037*	*0.031*	*0.028*	*0.031*	*0.035*	*0.046*	*0.047*	*0.047*	*0.038*	*0.038*	*0.038*	*0.038*	*0.040*	*0.034*	*0.031*	*0.035*	*0.039*
MB		0.037***	0.036***		0.019***	0.032***		0.132***	0.131***		0.107***	0.127***		0.012**	0.010		0.000	0.011*
		0.005	*0.006*		*0.006*	*0.007*		*0.010*	*0.009*		*0.016*	*0.018*		*0.006*	*0.006*		*0.005*	*0.006*
ROA		-1.645***	-1.565***		-1.476***	-1.144***		-1.171***	-1.253***		-0.788***	-0.600***		-1.695***	-1.579***		-1.579***	-1.226***
		0.165	*0.198*		*0.188*	*0.190*		*0.166*	*0.180*		*0.100*	*0.142*		*0.171*	*0.199*		*0.199*	*0.191*
BLEVTOT			0.251***			0.753***			-0.124			0.387***			0.337***			0.834***
			0.071			*0.066*			*0.075*			*0.130*			*0.075*			*0.089*
RD			0.962**			0.314**			0.144			-0.906**			1.199***			0.510***
			0.378			*0.133*			*0.408*			*0.393*			*0.399*			*0.156*
NETCAPEX			0.212			-0.465***			0.623**			-0.295			0.161			-0.439***
			0.464			*0.111*			*0.248*			*0.216*			*0.475*			*0.104*
LN(SEGMENTS)			-0.000			-0.053			0.012			-0.046			-0.009			-0.059
			0.049			*0.044*			*0.059*			*0.033*			*0.052*			*0.045*
SALEHERF			0.108			-0.088			0.012			-0.246***			0.106			-0.066
			0.127			*0.112*			*0.165*			*0.082*			*0.133*			*0.118*
Adj R-Sq	0.7465	0.7580	0.7619	0.7281	0.7390	0.7497	0.6802	0.6894	0.6999	0.6607	0.6656	0.6708	0.7466	0.7585	0.7619	0.7251	0.7373	0.7491
Firm-Years	4844	4844	4606	6842	6842	6630	4844	4844	4606	6842	6842	6630	4844	4844	4606	6842	6842	6630
Firms	428	428	428	576	576	576	428	428	428	576	576	576	428	428	428	576	576	576

Table 8. Effects of CEO equity incentives on firm risk changes - Stock and stock option holdings

This table presents regressions of firm risk on changes in the Delaware takeover regime by separating the sample of firms into those with high and low CEO equity-based incentives in 1994. Panel A shows results based on the percentage of common stock held by the CEO. Panel B shows results based on the total number of options that the CEO holds, scaled by shares outstanding. DELAFTSB measures the effect of the regime change and takes the value of one for Delaware-incorporated firms with staggered boards in 1994 and for the years 1996 and later, and zero otherwise. Total Risk is the natural logarithm of the annualized variance of daily returns over the fiscal year. Systematic Risk is the natural logarithm of the annualized variance of the product of the firm beta times the market daily returns. I calculate firm beta by using the market model adjusted for nonsynchronous trading. Unsystematic Risk is the natural logarithm of the annualized variance of the residuals from the market model. All regressions include firm and year fixed effects. The Wald Test tests whether the coefficients on DELAFTSB are the same across the two subsamples for the corresponding model. Intercepts are not reported. Standard errors are reported in *italics*. Standard errors are clustered by states of incorporation. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Panel A. CEO Ownership

	Total Risk						**Systematic Risk**						**Unsystematic Risk**					
	Low CEO Ownership			High CEO Ownership			Low CEO Ownership			High CEO Ownership			Low CEO Ownership			High CEO Ownership		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
DELAFTSB	-0.118***	-0.114***	-0.124***	-0.006	-0.004	0.008	-0.118***	-0.114***	-0.121***	0.042	0.049*	0.053**	-0.115***	-0.111***	-0.121***	-0.022	-0.021	-0.006
	0.028	*0.028*	*0.028*	*0.021*	*0.018*	*0.019*	*0.027*	*0.026*	*0.025*	*0.030*	*0.025*	*0.023*	*0.028*	*0.029*	*0.028*	*0.021*	*0.020*	*0.020*
SIZE	-0.078***	-0.079***	-0.070***	-0.065***	-0.067***	-0.080***	-0.018	-0.011	-0.020	-0.009	-0.022	-0.047	-0.096***	-0.100***	-0.088***	-0.102***	-0.102***	-0.109***
	0.027	*0.024*	*0.024*	*0.019*	*0.019*	*0.021*	*0.042*	*0.033*	*0.024*	*0.025*	*0.026*	*0.030*	*0.027*	*0.025*	*0.028*	*0.020*	*0.022*	*0.024*
MB		0.028***	0.034**		0.041***	0.044***		0.107***	0.118***		0.119***	0.128***		0.008	0.013		0.019**	0.020*
		0.010	*0.013*		*0.010*	*0.012*		*0.010*	*0.011*		*0.019*	*0.020*		*0.012*	*0.016*		*0.008*	*0.010*
ROA		-1.312***	-1.199***		-1.680***	-1.435***		-1.070***	-1.011***		-0.855***	-0.751***		-1.361***	-1.233***		-1.778***	-1.509***
		0.143	*0.149*		*0.162*	*0.160*		*0.156*	*0.194*		*0.146*	*0.139*		*0.141*	*0.146*		*0.174*	*0.170*
BLEVTOT			0.358***			0.538***			0.106			0.142*			0.448***			0.621***
			0.113			*0.060*			*0.177*			*0.082*			*0.137*			*0.059*
RD			0.277			0.311***			-0.164			-0.933***			0.352			0.563***
			0.376			*0.111*			*0.332*			*0.290*			*0.412*			*0.073*
NETCAPEX			0.239			-0.552***			0.200			-0.034			0.270			-0.622***
			0.510			*0.126*			*0.214*			*0.221*			*0.548*			*0.127*
LN(SEGMENTS)			-0.047			-0.004			-0.026			-0.006			-0.061			-0.011
			0.042			*0.047*			*0.046*			*0.044*			*0.044*			*0.050*
SALEHERF			0.012			-0.041			-0.074			-0.226			0.009			-0.025
			0.102			*0.080*			*0.123*			*0.145*			*0.106*			*0.084*
Adj R-Sq	0.7369	0.7454	0.7496	0.7170	0.7284	0.7349	0.6610	0.6677	0.6776	0.6682	0.6752	0.6816	0.7305	0.7393	0.7431	0.7041	0.7171	0.7242
Wald Test P-Val	0.00	0.00	0.00	-	-	-	0.00	0.00	0.00	-	-	-	0.02	0.02	0.00	-	-	-
FirmYears	5519	5519	5255	3748	3748	3643	5519	5519	5255	3748	3748	3643	5519	5519	5255	3748	3748	3643
FirmYears (DELAFTSB=1)	1024	1024	946	692	692	663	1024	1024	946	692	692	663	1024	1024	946	692	692	663
Firms	443	443	443	314	314	314	443	443	443	314	314	314	443	443	443	314	314	314

Panel B. CEO Option Holdings

	Total Risk						Systematic Risk						Unsystematic Risk					
	Low CEO Option Holdings			High CEO Option Holdings			Low CEO Option Holdings			High CEO Option Holdings			Low CEO Option Holdings			High CEO Option Holdings		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
DELAFTSB	-0.092***	-0.089***	-0.090***	-0.050**	-0.046*	-0.034	-0.123***	-0.119***	-0.117***	0.038	0.046	0.039	-0.084***	-0.082***	-0.083***	-0.070***	-0.067**	-0.050**
	0.026	*0.026*	*0.027*	*0.023*	*0.025*	*0.022*	*0.026*	*0.025*	*0.026*	*0.025*	*0.032*	*0.029*	*0.026*	*0.026*	*0.026*	*0.024*	*0.025*	*0.022*
SIZE	-0.105***	-0.112***	-0.122***	-0.044	-0.039	-0.031	-0.031	-0.034*	-0.049***	-0.004	0.002	-0.023	-0.137***	-0.144***	-0.151***	-0.063*	-0.058*	-0.044*
	0.018	*0.019*	*0.023*	*0.035*	*0.029*	*0.020*	*0.021*	*0.018*	*0.017*	*0.041*	*0.039*	*0.027*	*0.026*	*0.027*	*0.032*	*0.036*	*0.029*	*0.022*
MB		0.020*	0.030***		0.055***	0.053***		0.092***	0.106***		0.148***	0.152***		0.000	0.009		0.032**	0.028**
		0.012	*0.011*		*0.012*	*0.012*		*0.019*	*0.018*		*0.009*	*0.010*		*0.010*	*0.009*		*0.014*	*0.013*
ROA		-1.325***	-1.207***		-1.566***	-1.344***		-1.019***	-0.955***		-0.983***	-0.897***		-1.376***	-1.247***		-1.651***	-1.401***
		0.160	*0.195*		*0.177*	*0.127*		*0.123*	*0.133*		*0.195*	*0.215*		*0.169*	*0.211*		*0.176*	*0.121*
BLEVTOT			0.388***			0.465***			0.191			0.025			0.456***			0.569***
			0.098			*0.091*			*0.176*			*0.064*			*0.097*			*0.109*
RD			-0.222			0.924***			-0.918***			0.042			-0.054			1.086***
			0.231			*0.315*			*0.242*			*0.433*			*0.236*			*0.287*
NETCAPEX			-0.347			0.206			0.032			0.216			-0.378			0.199
			0.212			*0.488*			*0.170*			*0.225*			*0.245*			*0.511*
LN(SEGMENTS)			0.008			-0.069			0.026			-0.078*			-0.013			-0.063
			0.035			*0.062*			*0.039*			*0.042*			*0.038*			*0.067*
SALEHERF			0.051			-0.035			-0.010			-0.309**			0.022			0.031
			0.090			*0.082*			*0.084*			*0.149*			*0.097*			*0.093*
Adj R-Sq	0.7145	0.7222	0.7249	0.7328	0.7453	0.7533	0.6377	0.6431	0.6535	0.6889	0.6981	0.7042	0.7099	0.7182	0.7203	0.7193	0.7328	0.7419
Wald Test P-Val	0.28	0.25	0.13	-	-	-	0.00	0.00	0.00	-	-	-	0.72	0.69	0.40	-	-	-
FirmYears	5467	5467	5218	3800	3800	3680	5467	5467	5218	3800	3800	3680	5467	5467	5218	3800	3800	3680
FirmYears (DELAFTSB=1)	992	992	920	724	724	689	992	992	920	724	724	689	992	992	920	724	724	689
Firms	431	431	431	326	326	326	431	431	431	326	326	326	431	431	431	326	326	326

Table 9. Effects of CEO equity incentives on firm risk changes - CEO delta and vega

This table presents regressions of firm risk on changes in the Delaware takeover regime by separating the sample of firms into those with high and low CEO incentives in 1994. Panel A presents results based on CEO delta, where CEO delta is the dollar change in CEO stock and option portfolio for a 1% change in stock price. Panel B shows results based on CEO vega, where CEO vega is the dollar change in CEO option holdings for a 1% change in stock return volatility. DELAFTSB takes the value of one for Delaware-incorporated firms with staggered boards in 1994, and for the years 1996 and later, and zero otherwise. Total Risk is the natural logarithm of the annualized variance of daily returns over the fiscal year. Systematic Risk is the natural logarithm of the annualized variance of the product of the firm beta and the market daily returns. I calculate firm beta by using the market model adjusted for nonsynchronous trading. Unsystematic Risk is the natural logarithm of the annualized variance of the residuals from the market model. All regressions include firm and year fixed effects. The Wald Test tests whether the coefficients on DELAFTSB are the same across the two subsamples for the corresponding model. Intercepts are not reported. Standard errors are reported in *italics*. Standard errors are clustered by states of incorporation. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Panel A. CEO Delta

	Total Risk						**Systematic Risk**						**Unsystematic Risk**					
	Low CEO Delta			High CEO Delta			Low CEO Delta			High CEO Delta			Low CEO Delta			High CEO Delta		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
DELAFTSB	-0.111***	-0.112***	-0.114***	-0.038*	-0.029	-0.027	-0.119***	-0.122***	-0.105***	0.010	0.023	0.002	-0.104***	-0.105***	-0.112***	-0.053**	-0.046**	-0.036*
	0.023	*0.022*	*0.022*	*0.022*	*0.022*	*0.022*	*0.020*	*0.019*	*0.019*	*0.030*	*0.031*	*0.029*	*0.026*	*0.025*	*0.024*	*0.021*	*0.021*	*0.021*
SIZE	-0.105**	-0.098**	-0.099**	-0.058**	-0.069**	-0.074**	-0.011	0.010	-0.001	0.020	0.010	-0.022	-0.135***	-0.131***	-0.130***	-0.090***	-0.101***	-0.099**
	0.049	*0.046*	*0.041*	*0.025*	*0.027*	*0.031*	*0.071*	*0.067*	*0.058*	*0.020*	*0.020*	*0.026*	*0.043*	*0.039*	*0.035*	*0.030*	*0.032*	*0.037*
MB		0.023	0.030		0.040***	0.045***		0.121***	0.143***		0.113***	0.120***		0.001	0.006		0.018*	0.023***
		0.025	*0.023*		*0.007*	*0.007*		*0.027*	*0.027*		*0.009*	*0.009*		*0.024*	*0.021*		*0.009*	*0.008*
ROA		-1.329***	-1.209***		-1.595***	-1.370***		-0.993***	-0.988***		-1.029***	-0.871***		-1.374***	-1.231***		-1.703***	-1.460***
		0.132	*0.157*		*0.144*	*0.120*		*0.136*	*0.183*		*0.153*	*0.141*		*0.129*	*0.152*		*0.157*	*0.134*
BLEVTOT			0.455***			0.423***			0.195			0.016			0.522***			0.541***
			0.127			*0.091*			*0.154*			*0.118*			*0.145*			*0.091*
RD			0.362*			0.188			-0.196			-1.342***			0.474**			0.467
			0.183			*0.426*			*0.264*			*0.285*			*0.196*			*0.471*
NETCAPEX			0.324			-0.685***			0.342**			-0.221			0.313			-0.717***
			0.461			*0.135*			*0.159*			*0.176*			*0.490*			*0.154*
LN(SEGMENTS)			-0.018			-0.037			-0.030			-0.033			-0.018			-0.054
			0.079			*0.047*			*0.051*			*0.038*			*0.090*			*0.058*
SALEHERF			0.054			-0.064			-0.131			-0.204**			0.082			-0.070
			0.099			*0.134*			*0.101*			*0.099*			*0.114*			*0.164*
Adj R-Sq	0.7302	0.7402	0.7453	0.7299	0.7388	0.7442	0.6625	0.6682	0.6735	0.6613	0.6694	0.6793	0.7250	0.7357	0.7404	0.7168	0.7267	0.7331
Wald Test P-Val	0.05	0.02	0.02	-	-	-	0.01	0.00	0.04	-	-	-	0.20	0.13	0.05	-	-	-
FirmYears	4378	4378	4246	4889	4889	4652	4378	4378	4246	4889	4889	4652	4378	4378	4246	4889	4889	4652
FirmYears (DELAFTSB=1)	794	794	739	922	922	870	794	794	739	922	922	870	794	794	739	922	922	870
Firms	372	372	372	385	385	385	372	372	372	385	385	385	372	372	372	385	385	385

Panel B. CEO Vega

	Total Risk						Systematic Risk						Unsystematic Risk					
	Low CEO Vega			High CEO Vega			Low CEO Vega			High CEO Vega			Low CEO Vega			High CEO Vega		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
DELAFTSB	-0.108***	-0.111***	-0.110***	-0.047	-0.040	-0.033	-0.109***	-0.105***	-0.102***	-0.004	0.004	-0.002	-0.108***	-0.112***	-0.114***	-0.056*	-0.050	-0.037
	0.028	*0.028*	*0.033*	*0.032*	*0.033*	*0.035*	*0.026*	*0.024*	*0.026*	*0.033*	*0.033*	*0.034*	*0.030*	*0.029*	*0.034*	*0.032*	*0.033*	*0.034*
SIZE	-0.132***	-0.121***	-0.140***	-0.047**	-0.055***	-0.040*	-0.031	-0.033	-0.046	-0.011	-0.011	-0.031	-0.175***	-0.162***	-0.180***	-0.061***	-0.072***	-0.050*
	0.017	*0.016*	*0.019*	*0.021*	*0.020*	*0.021*	*0.025*	*0.021*	*0.027*	*0.029*	*0.026*	*0.021*	*0.019*	*0.020*	*0.022*	*0.022*	*0.022*	*0.026*
MB		0.032*	0.037**		0.034***	0.041***		0.123***	0.131***		0.113***	0.124***		0.010	0.015		0.012	0.019*
		0.018	*0.017*		*0.010*	*0.010*		*0.028*	*0.029*		*0.011*	*0.012*		*0.014*	*0.013*		*0.010*	*0.010*
ROA		-1.591***	-1.469***		-1.318***	-1.130***		-0.857***	-0.769***		-1.041***	-0.979***		-1.693***	-1.572***		-1.362***	-1.145***
		0.141	*0.191*		*0.147*	*0.159*		*0.166*	*0.157*		*0.152*	*0.199*		*0.143*	*0.201*		*0.145*	*0.152*
BLEVTOT			0.402***			0.459***			0.201			0.056			0.421***			0.602***
			0.078			*0.113*			*0.131*			*0.156*			*0.096*			*0.118*
RD			0.410**			0.168			-0.290*			-0.982**			0.571***			0.347
			0.155			*0.375*			*0.143*			*0.377*			*0.171*			*0.387*
NETCAPEX			0.003			-0.224			-0.031			0.154			-0.024			-0.194
			0.564			*0.148*			*0.261*			*0.226*			*0.601*			*0.149*
LN(SEGMENTS)			-0.000			-0.052			-0.072			-0.001			0.003			-0.071*
			0.064			*0.035*			*0.048*			*0.032*			*0.071*			*0.038*
SALEHERF			-0.080			0.055			-0.371***			0.000			-0.057			0.052
			0.119			*0.096*			*0.118*			*0.080*			*0.138*			*0.113*
Adj R-Sq	0.7077	0.7182	0.7224	0.7453	0.7537	0.7603	0.6503	0.6564	0.6618	0.6737	0.6815	0.6914	0.7017	0.7137	0.7170	0.7337	0.7424	0.7499
Wald Test P-Val	0.11	0.06	0.04	-	-	-	0.04	0.03	0.06	-	-	-	0.19	0.11	0.05	-	-	-
FirmYears	3849	3849	3729	5418	5418	5169	3849	3849	3729	5418	5418	5169	3849	3849	3729	5418	5418	5169
FirmYears (DELAFTSB=1)	705	705	671	1011	1011	938	705	705	671	1011	1011	938	705	705	671	1011	1011	938
Firms	317	317	317	440	440	440	317	317	317	440	440	440	317	317	317	440	440	440

Table 10. Changes in CEO equity compensation

This table presents the results of regressions of CEO equity incentives on changes in Delaware takeover regime for staggered board firms. CEO Ownership is the percentage of commons stock held by the CEO, and CEO Option Holdings is the total number of options that the CEO holds, scaled by shares outstanding. CEO Delta is the dollar change in CEO stock and option portfolio for a 1% change in stock price and CEO Vega is the dollar change in CEO option holdings for a 1% change in stock return volatility. DELAFTSB measures the effect of the regime change and takes the value of one for Delaware-incorporated firms with staggered boards in 1994, and for the years 1996 and later, and zero otherwise. Control variables are described in Appendix A. All regressions include firm and year fixed effects. Delta and vega are in thousands of year 2004 dollars. SIZE is in millions of year 2004 dollars. Intercepts are not reported. Standard errors are reported in *italics*. Standard errors are clustered by states of incorporation. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

	CEO Ownership			**CEO Option Holdings**			**LN(1+CEO Delta)**			**LN(1+CEO Vega)**		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
DELAFTSB	0.081	0.081	0.045	0.147***	0.147***	0.146***	-0.001	0.000	-0.015	0.153***	0.153***	0.139***
	0.125	*0.125*	*0.130*	*0.038*	*0.037*	*0.038*	*0.047*	*0.043*	*0.041*	*0.040*	*0.040*	*0.036*
SIZE	-0.612***	-0.615***	-0.471***	-0.350***	-0.360***	-0.363***	0.259***	0.300***	0.292***	0.487***	0.506***	0.498***
	0.175	*0.177*	*0.149*	*0.039*	*0.039*	*0.033*	*0.036*	*0.035*	*0.036*	*0.051*	*0.050*	*0.048*
MB		-0.032	0.011		-0.067***	-0.063***		0.232***	0.223***		0.103***	0.102***
		0.026	*0.023*		*0.008*	*0.007*		*0.018*	*0.018*		*0.012*	*0.012*
ROA		0.360	0.560		-0.316	-0.210		1.869***	1.591***		0.973***	0.901***
		0.623	*0.474*		*0.227*	*0.206*		*0.141*	*0.186*		*0.138*	*0.135*
BLEVTOT			0.119			0.360***			-0.890***			-0.019
			0.755			*0.092*			*0.287*			*0.193*
RD			-0.261			0.879*			-1.546***			-0.482**
			0.589			*0.482*			*0.351*			*0.206*
NETCAPEX			-1.946*			0.109			0.555*			0.184
			1.133			*0.197*			*0.279*			*0.375*
LN(SEGMENTS)			0.445			-0.048			0.067			-0.041
			0.310			*0.042*			*0.077*			*0.068*
SALEHERF			0.609			-0.099			0.123			-0.142
			0.467			*0.096*			*0.146*			*0.135*
Adj R-Sq	0.7997	0.7997	0.8129	0.7172	0.7190	0.7239	0.7585	0.7773	0.7774	0.7806	0.7842	0.7811
FirmYears	7914	7914	7537	7914	7914	7537	7914	7914	7537	7914	7914	7537
FirmYears(DELAFTSB=1)	1763	1763	1663	1763	1763	1663	1763	1763	1663	1763	1763	1663
Firms	851	851	851	851	851	851	851	851	851	851	851	851

Table 11. Changes in CEO equity compensation and blockholder monitoring

This table presents regressions of CEO incentives on changes in Delaware takeover regime by separating the firms based on the presence of an institutional blockholder in 1994. Panel A examines the changes in CEO ownership and stock option holdings. Panel B examines changes in CEO delta and vega. CEO Ownership is the percentage of common stock held by the CEO, and CEO Option Holdings is the total number of options that the CEO holds, scaled by shares outstanding. CEO Delta is the dollar change in CEO portfolio for a 1% change in stock price, and CEO Vega is the dollar change in CEO portfolio for a 1% change in stock return volatility. DELAFTSB measures the effect of the regime change and takes the value of one for Delaware-incorporated firms with staggered boards in 1994, and for the years 1996 and later. All regressions include firm and year fixed effects. The Wald Test tests whether the coefficients on DELAFTSB are the same across the two subsamples for the corresponding model. Delta and vega are in thousands of year 2004 dollars. SIZE is in millions of year 2004 dollars. Intercepts are not reported. Standard errors are reported in *italics*. Standard errors are clustered by states of incorporation. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Panel A. CEO Stock Ownership and Option Holdings

	CEO Ownership						**CEO Option Holdings**					
	No Blockholder			Blockholder			No Blockholder			Blockholder		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
DELAFTSB	0.304	0.308	0.412	-0.160	-0.158	-0.134	0.199***	0.196***	0.199***	0.147***	0.149***	0.154***
	0.273	*0.272*	*0.256*	*0.139*	*0.140*	*0.149*	*0.031*	*0.030*	*0.030*	*0.054*	*0.054*	*0.053*
SIZE	-1.755***	-1.676***	-1.465***	-0.313**	-0.317**	-0.214	-0.354***	-0.384***	-0.444***	-0.361***	-0.365***	-0.357***
	0.552	*0.574*	*0.489*	*0.148*	*0.147*	*0.138*	*0.048*	*0.055*	*0.052*	*0.042*	*0.041*	*0.037*
MB		-0.016	0.103		-0.056	-0.048		-0.073***	-0.064***		-0.061***	-0.058***
		0.073	*0.070*		*0.043*	*0.048*		*0.009*	*0.007*		*0.013*	*0.009*
ROA		3.698	3.653		-0.570	-0.293		-0.144	0.149		-0.461	-0.376
		2.955	*2.505*		*0.367*	*0.591*		*0.370*	*0.293*		*0.319*	*0.337*
BLEVTOT			0.253			0.195			0.734*			0.342***
			1.170			*0.920*			*0.402*			*0.099*
RD			-2.915			-0.036			-1.687			1.112**
			5.368			*0.675*			*1.773*			*0.500*
NETCAPEX			-5.011**			-1.781			-0.086			0.064
			2.264			*1.205*			*0.818*			*0.265*
LN(SEGMENTS)			0.895			0.274*			-0.123*			-0.014
			0.776			*0.151*			*0.062*			*0.063*
SALEHERF			1.098			0.698*			-0.365**			0.020
			1.490			*0.381*			*0.169*			*0.134*
Adj R-Sq	0.8200	0.8202	0.8251	0.7815	0.7815	0.8071	0.7971	0.7990	0.8111	0.6759	0.6778	0.6810
Wald Test P-Value	0.19	0.18	0.13	-	-	-	0.51	0.54	0.56	-	-	-
FirmYears	2224	2224	2070	5514	5514	5298	2224	2224	2070	5514	5514	5298
FirmYears(DELAFTSB=1)	498	498	481	1215	1215	1138	498	498	481	1215	1215	1138
Firms	226	226	226	604	604	604	226	226	226	604	604	604

Panel B. CEO Delta and Vega

	LN(1+CEO Delta)						LN(1+CEO Vega)					
	No Blockholder			Blockholder			No Blockholder			Blockholder		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
DELAFTSB	-0.067	-0.058	-0.017	0.036	0.030	0.007	0.091	0.093	0.074	0.175***	0.171***	0.157***
	0.077	*0.073*	*0.074*	*0.055*	*0.046*	*0.043*	*0.073*	*0.076*	*0.075*	*0.046*	*0.048*	*0.048*
SIZE	-0.044	0.093	0.088	0.346***	0.361***	0.357***	0.360***	0.412***	0.447***	0.537***	0.547***	0.537***
	0.127	*0.113*	*0.130*	*0.059*	*0.054*	*0.056*	*0.078*	*0.082*	*0.07*	*0.061*	*0.058*	*0.057*
MB		0.207***	0.211***		0.232***	0.217***		0.031	0.036		0.142***	0.135***
		0.020	*0.025*		*0.027*	*0.026*		*0.023*	*0.027*		*0.026*	*0.024*
ROA		2.751***	2.429***		1.701***	1.396***		1.795***	1.741***		0.844***	0.731***
		0.327	*0.441*		*0.155*	*0.226*		*0.291*	*0.304*		*0.153*	*0.137*
BLEVTOT			-1.294***			-0.821**			-0.333			0.047
			0.285			*0.350*			*0.486*			*0.16*
RD			0.454			-1.783***			3.478**			-1.048**
			0.791			*0.419*			*1.686*			*0.42*
NETCAPEX			0.343			0.562*			0.016			0.35
			0.900			*0.315*			*1.05*			*0.313*
LN(SEGMENTS)			0.132			0.038			-0.13			-0.036
			0.165			*0.067*			*0.124*			*0.068*
SALEHERF			-0.054			0.204			-0.606**			-0.012
			0.411			*0.155*			*0.243*			*0.126*
Adj R-Sq	0.7711	0.7895	0.7921	0.7452	0.7642	0.7663	0.8073	0.8091	0.8038	0.7635	0.7691	0.7690
Wald Test P-Value	0.27	0.32	0.78	-	-	-	0.43	0.46	0.44	-	-	-
FirmYears	2224	2224	2070	5514	5514	5298	2224	2224	2070	5514	5514	5298
FirmYears(DELAFTSB=1)	498	498	481	1215	1215	1138	498	498	481	1215	1215	1138
Firms	226	226	226	604	604	604	226	226	226	604	604	604