**The inevitable disclosure doctrine and CEO risk-taking incentives**

**Abstract:** This study investigates the impact of the inevitable disclosure doctrine (IDD) on risk-taking incentives of chief executive officers (CEOs). Because the IDD restricts CEOs’ external employment opportunities, we expect CEOs to become more risk-averse and firms to increase CEO risk-taking incentives after IDD adoption. Consistent with expectations, we find that IDD adoption is associated with higher CEO risk-taking incentives, measured by the sensitivity of CEOs’ equity holdings to stock return volatility (Vega). The positive impact of IDD adoption on CEO risk-taking incentives is stronger for firms in more homogeneous industries and for CEOs in the later years of their tenure.

**Keywords:** Trade secret law; IDD adoption; CEO risk-taking incentives; equity compensation; external employment opportunities

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**1. Introduction**

The inevitable disclosure doctrine (IDD) is a legal doctrine that can be adopted by state courts in the U.S. to protect trade secrets. Once adopted, the IDD prevents a firm’s employees from working for its rivals to reduce the divulgence of trade secrets. A growing stream of literature has investigated the economic consequences of IDD adoption. Previous studies have documented that IDD adoption affects firms’ capital structure, investment decisions, and voluntary disclosure levels (Ali et al. 2015; Li et al. 2018; Qiu and Wang 2018; Klasa et al. 2018). Our study extends prior research by investigating whether CEO risk-taking incentives are affected by IDD adoption.

By preventing a firm’s employees from working for its rivals, the IDD limits employees’ outside employment opportunities (Ali et al. 2015; Klasa et al. 2018). We hypothesize that, because of such diminished external employment opportunities, CEOs become more risk-averse after IDD adoption. To maintain risk-taking, firms are expected to increase CEO risk-taking incentives in response to IDD adoption. Our hypothesis is motivated by two streams of prior research. First, prior research documents that managers become more risk-averse when they have fewer external employment opportunities (e.g., Chevalier and Ellison 1999; Chakraborty et al. 2007; Samila and Sorenson 2011; Cici et al. 2019). For instance, Cici et al. (2019) find that restrictions on labor mobility affect the risk preferences of fund managers, as demonstrated by the noticeable risk reductions in their portfolios. Second, investors understand CEOs’ risk preferences and adjust risk-taking incentives to maintain an optimal level of risk-taking for the firm (e.g., Smith and Stulz 1985; Coles et al. 2006; Low 2009).

To provide a clean estimate for our hypothesis, we use a difference-in-differences approach by exploiting the staggered IDD adoption by the U.S. state courts over the period 1993–2012. Consistent with prior literature (e.g., Guay 1999; Core and Guay 2002; Coles et al. 2006; Low 2009), we use Vega as our primary measure of CEO risk-taking incentives.[[1]](#footnote-2) Vega is the sensitivity of a CEO’s equity holdings to stock return volatility. Prior literature shows that higher Vega encourages risk-averse CEOs to take more risks (Coles et al. 2006; Low 2009; Armstrong and Vashishtha 2012). We include controls for firm-level factors that affect CEO compensation, controls for state economic conditions, and firm and industry-year fixed effects.

Consistent with our hypothesis, we find that CEO Vega increased after IDD adoption. Because homogeneous industries provide more external employment opportunities (Parrino 1997), we also find that firms increase risk-taking incentives for CEOs working in more homogeneous industries to a greater extent. Moreover, because CEOs tend to be more risk-averse in the later years of their tenure (Berger et al. 1997; Simsek 2007; Zhang and Rajagopalan 2010; Ali and Zhang 2015), we further find that firms increase risk-taking incentives for CEOs during this part of their tenure to a greater extent.

For further analyses, we conduct tests on the association between IDD adoption and CEO delta (the sensitivity of CEOs’ equity holdings to stock price). Consistent with literature indicating that delta’s effect on risk-taking is ambiguous (e.g., Armstrong and Vashishtha 2012; Gormley et al. 2013), we find an insignificant association between IDD and CEO delta. Moreover, to elucidate the impact of the simultaneous change in risk-taking incentives and risk-taking behavior, we identify a group of firms that experienced little change in Vega around the IDD adoption. We find that firm risk-taking levels decreased after IDD adoption for this group of firms, indicating that CEOs would have become more risk-averse after IDD adoption if firms had not adjusted their risk-taking incentives. Our main results persist after restricting our sample to a neighboring-state matched sample and further controlling for the enforceability index of the contractual information protection mechanisms. We also find that board quality strengthens the impact of the IDD on CEO Vega. CEOs who never switch jobs have higher Vega after the IDD adoption. Furthermore, states that reversed their prior decisions of IDD adoption experience less negative impact on CEO Vega than states that never adopted the IDD.

This paper contributes to two streams of literature. First, the findings enrich the growing literature that examines the economic consequences of adoption of the IDD. For example, Li et al. (2018) show that firms respond to IDD adoption by reducing disclosure levels. Klasa et al. (2018) find that firms increase financial leverage in response to IDD adoption. Our paper extends this line of research by showing that firms increase CEOs’ risk-taking incentives after IDD adoption. Second, this paper contributes to the literature that examines the relationship between labor mobility and executive compensation. Different from prior literature examining the cross-sectional differences in general compensation packages under the restriction of labor mobility (e.g., Garmaise 2011; Starr 2019), our study utilizes an exogenous shock to labor mobility and provides specific causal evidence on CEO risk-taking incentives.

This paper proceeds as follows. Section 2 provides background information on the IDD. Section 3 reviews the literature and develops hypotheses. Section 4 describes the research design. Section 5 and 6 describe the sample and report empirical results. Section 7 sets forth our conclusions.

**2. Background information on the IDD**

The IDD is a common law doctrine that substantially enhances the protection of trade secrets by preventing employees from working for competing firms if a court deems this would lead to the divulgence of the employer’s trade secrets. The key concept underlying the IDD is “threatened misappropriation,” which occurs when an employee who has knowledge of a firm’s trade secrets goes to work for a rival firm in a similar position. As discussed in Klasa et al. (2018), under the IDD, an employment injunction can rest on the *mere* *threat*of irreparable harm. Hence, employers do not need to establish actual wrongdoing by employees or disclose the details of their trade secrets in the lawsuits.

Other than the IDD, non-disclosure agreements (NDAs) or non-compete covenants (NCCs) contained in employment contracts also provide protection of trade secrets. However, the IDD provides much stronger protection against mobility-induced information leakage to competitors than NDAs or NCCs. First, contractual arrangements such as NDAs or NCCs require the employer to have prior agreements with employees, and the effectiveness of these agreements depends on their enforceability.[[2]](#footnote-3) In comparison, the IDD does not require the employer to have prior agreements with its employees. Second, the protection offered by NDAs and NCCs is limited because their violations must be detected and proven before the firm can initiate any legal actions against a former employee. Even if the violation is ultimately proven, the secrets would have already been revealed to rival firms in the lawsuit. In contrast, under the IDD, a firm’s lawsuit can rest on the *mere threat* of irreparable harm. Third, it is more difficult to enforce contractual protection mechanisms across state boundaries because the scope of contractual information protection is usually limited to within a state (Cheskin and Lerner 2003; Malsberger 2004; Garmaise 2011). By contrast, the IDD does not entail specific geographic restrictions.

In the U.S., the state courts decide whether to adopt or reject the IDD. Once the IDD is adopted by a state court in a lawsuit, the precedent would become common law and other courts in the state would follow the ruling and apply the IDD. If a subsequent court ruling rejected the IDD, other state courts would then follow the new ruling. Appendix B lists the precedent-setting cases in which state courts adopted or rejected the IDD.

**3. Literature review and hypothesis development**

The IDD protects trade secrets by restricting external employment opportunities (Ali et al. 2015; Qiu and Wang 2018; Klasa et al. 2018). For example, Klasa et al. (2018) document that IDD adoption reduces the career mobility of employees who are likely to have knowledge of the firm’s trade secrets. Moreover, prior research documents that decreased external employment opportunities make managers more risk-averse (e.g., Chevalier and Ellison 1999; Chakraborty et al. 2007; Samila and Sorenson 2011; Cici et al. 2019). For instance, Chakraborty et al. (2007) find that managers who face more difficulty in securing external jobs make less risky investments. Samila and Sorenson (2011) find that restricting external employment opportunities results in a significantly lower appetite for entrepreneurship and innovation.

Further, prior literature provides evidence that equity-based compensation helps overcome managerial risk-aversion and encourages risk-taking (e.g., Coles et al. 2006; Low 2009; Armstrong and Vashishtha 2012; Gormley et al. 2013). Coles et al. (2006) identify a strong causal relationship between managerial compensation and firm risk-taking. They find that higher Vega leads to riskier policy choices of the firm. Using an exogenous increase in takeover protection, Low (2009) finds that firms with low managerial risk-taking incentives experience the most value-destroying risk reduction, and firms respond to risk reduction by increasing managerial risk-taking incentives. Gormley et al. (2013) find that the board understands the impact of exogenous shocks on managerial risk-taking, and adjusts equity incentives to induce optimal risk-taking.

While many studies find that CEO Vega encourages risk-taking, other studies argue that the effectiveness of Vega in inducing CEOs to take value-maximizing risky investments is not straightforward and depends on the effect of increased risk on the managerial utility function. Higher CEO risk-aversion or unhedged risk in the CEO’s equity portfolio could offset the convex nature of the option payoff, making CEOs more risk-averse (Lambert et al. 1991; Carpenter 2000; Ross 2004; Lewellen 2006). For instance, Ross (2004) claims that the common notion of giving managers options to make them more willing to take risks is false. Any risk-taking incentive has the duality of risk-aversion and riskiness, depending on the conditions under which the incentive is given. Therefore, it is not a foregone conclusion that firms would choose to increase CEO risk-taking incentives to induce higher risk-taking after IDD adoption.

We argue that as a result of facing greater barriers to securing external employment after IDD adoption, CEOs are likely to become more concerned about being terminated from their current positions and therefore more risk-averse (e.g., Chevalier and Ellison 1999; Chakraborty et al. 2007; Samila and Sorenson 2011; Cici et al. 2019). In response to the potential risk reduction after IDD adoption, firms are expected to increase CEO risk-taking incentives to encourage more risk-taking. These discussions lead to the first hypothesis.

 **H1**: The adoption of the IDD is positively associated with CEO risk-taking incentives.

CEOs working in more homogeneous industries enjoy greater external employment opportunities because firms in such industries are similar and their CEOs are already familiar with competitors’ products and technologies. Moreover, because assessment of the performance of outside CEOs is easier in more homogeneous industries, the cost of hiring a new CEO is lower for firms in such industries (Parrino 1997; Gillan et al. 2009).

External employment opportunities of CEOs working in more homogeneous industries are likely to be affected by IDD adoption to a greater extent because the IDD can be applied more easily among similar firms. Firms in more homogeneous industries produce similar products; therefore, trade secrets obtained by a CEO can be more readily utilized in a rival firm’s production. Hence, CEOs in more homogeneous industries are expected to suffer greater hindrance to their career mobility after the adoption of the IDD, and potentially become more risk-averse. Therefore, after IDD adoption, firms are expected to increase risk-taking incentives for CEOs working in more homogeneous industries to a greater extent than for CEOs in less homogeneous industries. These discussions lead to the second hypothesis:

**H2**: The positive association between IDD adoption and CEO risk-taking incentives is greater for CEOs in more homogeneous industries.

Prior research shows that CEOs tend to become more entrenched and risk-averse in the later years of their tenure (e.g., Berger et al. 1997; Simsek 2007; Zhang and Rajagopalan 2010; Ali and Zhang 2015). CEOs build up human capital in the early years, and this capital is undiversified. In the later years, risk-seeking places constraints on firm resources, causes uncertainty in performance, and threatens existing human capital. Hence, CEOs tend to become more risk-averse in the later years of their tenure. Consistent with this argument, prior research finds that managerial entrenchment is associated with more conservative corporate policies (Bertrand and Mullainathan 2003; John et al. 2008; Laeven and Levine 2009; Pathan 2009).

We argue that the greater restriction of external employment opportunities after IDD adoption affects CEOs in the later years of their tenure to a greater extent, because such CEOs lose more accumulated human capital. To counter the effect of the adoption of the IDD, firms are expected to increase risk-taking incentives for CEOs in the later years of their tenure to a greater extent than for CEOs in the early years of their tenure. We acknowledge that newly hired CEOs may be under higher pressure to deliver better firm performance in order to enhance their compensation prospects and job security. Hence, CEOs in the early years of their tenure may also be risk-averse because a small mistake may be magnified when the outside labor market has limited information to justify CEOs’ actions. Such a possibility provides a tension in our argument and it remains uncertain whether the impact of IDD adoption on CEO risk-taking incentives is stronger for CEOs in the later years of their tenure or the earlier ones. Considering the competing arguments discussed above, we formulate the following hypothesis as the third hypothesis:

**H3**: The positive association between IDD adoption and CEO risk-taking incentives is conditional on CEO tenure.

**4. Research design**

To test our hypotheses, we use a difference-in-differences method (e.g., Bertrand and Mullainathan 2003; Bertrand et al. 2004; Yun 2008; Low 2009; Armstrong et al. 2012a; Lennox and Li 2012; Klasa et al. 2018; Li et al. 2018).[[3]](#footnote-4) This method exploits the exogenous variations created by the staggered adoption of the IDD over time in different U.S. states, which helps circumvent the endogeneity problem that typically arises when comparing heterogeneous firms. Our model to test H1 is specified as follows:



Consistent with prior research (Guay 1999; Core and Guay 2002; Rajgopal and Shevlin 2002; Coles et al. 2006; Low 2009; Armstrong et al. 2012b; Armstrong and Vashishtha 2012; Gormley et al. 2013), we use Vega as our primary measure of CEO risk-taking incentives. Vega is the sensitivity of a CEO’s equity compensation to stock return volatility, and is measured as the natural logarithm of one plus the change in the risk-neutral (i.e., Black–Scholes) value of the CEO’s option portfolio for 1 percent change in the standard deviation of underlying stock returns (Core and Guay 2002). For each unit of risk, a higher value of Vega provides a higher payoff to CEOs from their equity-based compensation, hence encouraging CEOs to take greater risk.

*AfterIDD* is an indicator equal to 1 for state-years when the IDD is adopted by the state court, and 0 in all other state-years. All other state-years include both the state-years when the prior adoption was reversed and the state-years when the IDD was never adopted. The advantage of this design is that the staggered adoptions (rejections) of the IDD over time allow a firm in a given U.S. state to belong to the treatment and control groups at different points in time. Because equation (1) controls for firm fixed effects and industry-year fixed effects, this model essentially compares the change in CEO risk-taking incentives (i.e., Vega) for a firm before and after IDD adoption with that for a control firm over the same period. The coefficient on *AfterIDD* () is effectively the difference-in-differences estimate capturing the effect of IDD adoption on CEO risk-taking incentives. Under H1, we expect to be significantly positive.

Consistent with prior literature, we include a series of control variables (e.g., Guay 1999; Coles et al. 2006; Low 2009; Li et al. 2018). Specifically, we include the natural log of market value of equity (*Size*) to control for firm size, book-to-market ratio (*BTM*) as a proxy for investment and future growth opportunities, return on assets (*ROA*) to control for profitability, and CEO tenure (*Tenure*) to control for the impact of tenure. Because the impact of the decreased external employment opportunities on managerial risk-aversion also depends on the risk preferences of managers, we control for CEO risk attitude in equation (1). While directly measuring CEO risk attitude is difficult, literature suggests that higher level of risk-aversion can be identified in firms with high probabilities of default and firms with low spending on research and development activities. Hence, we include the Altman (1968)’s Z-score (*Zscore*) to control for the firm’s default probabilities; we additionally include research and development expenditure (*R&D*) (Low 2009). he compensation literature (e.g., Guay 1999; Coles et al. 2006) suggests that the different components of CEO compensation can affect the risk preferences of CEOs, we also include the different components of CEO compensation, including the CEO’s salary (*Salary*), bonus (*Bonus*), and other compensation (*Other).*

We follow Low (2009) by including several measures to control for a firm’s risk-taking policy, including leverage (*Lev*), net capital expenditure (*Capx*), and number of business segments (*Seg*).[[4]](#footnote-5) To address the potential omitted variables related to the state’s economic conditions, we include in our regression models observed state-level GDP growth (*Gdpgr*) and unemployment rates (*Unemp*). We include the sensitivity of CEO equity portfolios to stock price (delta) because prior studies suggest that delta is positively related to Vega (Guay 1999; Coles et al. 2006). We cluster standard errors by state in which the headquarters of the firm is located.

To test H2, we interact *AfterIDD* with an indicator for industry homogeneity (*IndHomogeneity*). *IndHomogeneity* is an indicator that equals 1 for firms whose homogeneity is above the annual median for their industry, and 0 otherwise. Industry homogeneity is computed as the two-digit SIC industry mean value of the partial correlation between a firm’s return and the equally weighted industry index’s monthly returns over the sample period (Parrino 1997). The model is specified as follows:

 

We expect the coefficient on *AfterIDD×IndHomogeneity* () to be significantly positive. A positive value of  indicates that the positive association between IDD adoption and CEO risk-taking incentives is greater for CEOs in more homogeneous industries. *Controls* in this model are the control variables included in equation (1).

To test H3, we interact *AfterIDD* with an indicator for the later years of the CEO’s tenure (*LaterYears*). The first three years of the CEO’s service are considered to be early years of the CEO tenure (e.g., Zhang and Rajagopalan 2010; Ali and Zhang 2015); the CEO tenure should also include a middle stage.[[5]](#footnote-6) Hence, we measure the later years of the CEO tenure (*LaterYears*) as an indicator whose value equals 1 for firm-years within the final three years of the CEO tenure, and 0 otherwise. The model is specified as follows:

 

We expect the coefficient on *AfterIDD×LaterYears* () to be significantly positive. A positive value of  indicates that the positive association between IDD adoption and CEO risk-taking incentives is greater for CEOs in the later years of their tenure. *Controls* in this model refer to the control variables included in equation (1).

**5. Sample, descriptive statistics, and primary results**

## 5.1 Sample and descriptive statistics

Our sample is drawn from all firms included in the ExecuComp database between 1993 and 2012, with data available on the CEO, firm headquarters, and risk-taking incentives. Our sample starts from 1993 and ends in 2012 because the ExecuComp database has limited data available for calculating risk-taking incentives before 1993 and IDD adoption information is available until 2012. We exclude financial firms (SIC 6000–6999) and utilities firms (SIC 4900–4999), because these firms are subject to special regulations. Our control variables, including firm financial and market data, are collected from the Compustat and Center for Research in Security Prices (CRSP) databases. The interaction of these data sources yields a sample of 17,257 firm-year observations, representing 2,067 firms.

Table 1 presents the descriptive statistics of the variables used in the main tests. To mitigate the influence of outliers, the continuous variables are winsorized at the top and bottom 1 percent. The mean of *AfterIDD* is 0.50, indicating that half the sample observations belong to the treatment group (i.e., firms headquartered in the states where IDD is adopted). Descriptive statistics of the other variables are generally consistent with those reported in prior studies (e.g., Coles et al. 2006; Armstrong and Vashishtha 2012).

[Table 1 near here]

Table 2 presents correlations between the variables used in the main tests. As shown in Table 2, *AfterIDD* and *Vega* are significantly and positively correlated at the 1 percent level. Moreover, both *AfterIDD* and *Vega* are positively correlated with the different components of CEO compensation, including salary (*Salary*), bonus (*Bonus*), and other components (*Other*). We also find that *Vega* is significantly and positively correlated with leverage (*Lev*) and R&D expenditure (*R&D*), and significantly and negatively correlated with capital expenditure (*Capx*). These results are consistent with the prior research documenting that higher CEO Vega encourages more risk-taking (e.g., Coles et al. 2006; Low 2009).

[Table 2 near here]

## 5.2 Primary results

## 5.2.1 The IDD and Vega

Table 3 reports the results of estimating equation (1). Column 1 reports the results estimated with the basic control variables of size (*Size*), book-to-market ratio (*BTM*), profitability (*ROA*), CEO tenure (*Tenure*), State GDP growth (*Gdpgr*) and state unemployment rate (*Unemp*), the different components of CEO compensation including CEO salary (*Salary*), CEO bonus (*Bonus*), CEO other compensation (*Other*). Column 2 reports the results estimated with the additional controls for firm risk-taking policies and CEO risk attitude, which include leverage (*Lev*), capital expenditure (*Capx*), research and development expenditure (*R&D*), default probabilities (*Zscore*) and business complexity (*Seg*). Column 3 reports the results estimated with the additional control for CEO equity portfolio delta (*Delta*).

[Table 3 near here]

As reported in Table 3, *AfterIDD* is significantly and positively associated with *Vega* at the 1 percent level across all three columns. The magnitudes of the coefficients are economically significant.[[6]](#footnote-7) For instance, the coefficient on *AfterIDD* is 0.157 in Column 1 (0.148 and 0.130 in Columns 2 and 3, respectively), which indicates that CEO Vega increases by 20.37 percent (19.20 and 16.86 percent for Columns 2 and 3, respectively) after IDD adoption. Overall, the results are consistent with H1.

Turning to the control variables, we find that *Vega* is positively associated with *Size*, *ROA*, and *Tenure,* suggesting that larger and profitable firms and CEOs with longer tenure tend to relate to higher *Vega*. Moreover, *Vega* is positively associated with *R&D*, which suggests that CEOs with higher level of risk preference are provided with higher Vega in their compensation. *Vega* is positively associated with *Zscore*, which suggests that CEOs who potentially tolerate higher firm risk are provided with higher Vega. *Vega* is also positively associated with salary (*Salary*) and other compensation (*Other*). For the state-level variables, state GDP growth (*Gdpgr*) is positively associated with *Vega*. We find that *Vega* is positively associated with variables indicating risk-taking policies, such as leverage (*Lev*). Overall, the signs of the coefficients on the control variables are consistent with those reported in prior research (e.g., Guay 1999; Coles et al. 2006; Low 2009).

*5.2.2 The IDD, Vega, and industry homogeneity*

We also investigate whether the impact of the IDD adoption on CEO Vega varies according to industry homogeneity. According to H2, the positive association between IDD adoption and CEO Vega is greater for CEOs in more homogeneous industries. Table 4 reports the results of estimating equation (2) in relation to H2. In Column 1, the coefficient on the interaction term *AfterIDD* ×*IndHomogeneity* is significantly positive at the 5 percent level, which is consistent with H2. Although the coefficient on *AfterIDD* is insignificant, the sum of the coefficients on *AfterIDD* and *AfterIDD* ×*IndHomogeneity* is significantly positive (F-value= 6.01), suggesting that the positive association between IDD adoption and CEO Vega concentrates in the more homogeneous industries.

[Table 4 near here]

Although the IDD is applied according to the location of the firm’s headquarters, there is a possibility that CEOs may want to avoid the IDD by exploiting the different geographic locations of the firm’s operations. To strengthen our argument on industry homogeneity, we further restrict our industry homogeneity measure to only include firms in homogeneous industries that have below the median value of the number of geographic locations for homogeneous industries (*IndHomogeneity(geo)*). This restriction reduces the possibility of CEOs avoiding the IDD by exploiting the firm’s different geographic locations.[[7]](#footnote-8) The results of estimating equation (2) using the restricted industry homogeneity measure are reported in Column 2 and they remain qualitatively similar to the results in Column 1.

*5.2.3 The IDD, Vega, and CEO tenure*

We also investigate whether the impact of the IDD adoption on CEO Vega varies according to CEO tenure. According to H3, it is hypothesized that the positive association between IDD adoption and CEO Vega is conditional on CEO tenure. Table 5 reports the results of estimating equation (3) in relation to H3. As reported in Column 1 of Table 5, the coefficient on the interaction term of *AfterIDD*×*LaterYears* is significantly positive at the 5 percent level. These results provide evidence consistent with H3 and suggest that Vega is higher for CEOs in the later years of their tenure. To test the robustness of the results in Column 1, we change the number of years defined as the later years to the final two years (*LaterYears2*) and the final one year (*LaterYears1*) of the CEO tenure in Columns 2 and 3. The results of estimating equation (3) using the alternative measures of the later years remain qualitatively similar to the results in Column 1.

[Table 5 near here]

**6. Further analyses**

***6.1 IDD adoption and CEO delta***

We choose Vega as the primary measure of risk-taking incentives because prior literature provides evidence that Vega has a positive effect on CEO risk-taking (e.g., Core and Guay 2002; Rajgopal and Shevlin 2002; Coles et al. 2006; Low 2009; Gormley et al. 2013). In comparison, the effect of CEO equity portfolio delta on CEO risk-taking is ambiguous. Although delta provides incentives to reduce firm risk by magnifying CEO exposure to firm risk, it also encourages CEOs to take sufficient risk to bring about an increase in firm value (John and John 1993). For example, while Armstrong and Vashishtha (2012) find that delta is associated with greater risk, Gormley et al. (2013) find that higher delta is associated with lower managerial risk-taking, as evidenced by a larger reduction in leverage and larger increase in cash holdings. Therefore, ex ante, we do not make a prediction regarding the effect of IDD adoption on delta.

Column 1 of Table 6 reports the results of estimating the effect of IDD adoption on CEO delta. The coefficient on *AfterIDD* is not statistically significant, suggesting that IDD adoption is not significantly associated with the CEO equity portfolio delta. This result is consistent with the ambiguity of the effect of CEO delta on risk-taking, as suggested in prior literature and supports the use of CEO Vega as the preferred measure of CEO risk-taking incentives.

[Table 6 near here]

***6.2 IDD adoption and CEO risk-taking preferences***

Prior research suggests that managers tend to be more risk-averse when restrictions on employment mobility are stronger (e.g., Chevalier and Ellison 1999; Chakraborty et al. 2007; Samila and Sorenson 2011; Cici et al. 2019). Because the IDD significantly restricts employment mobility, CEOs would become more risk-averse after IDD adoption. This prediction provides the underlying assumption for our arguments. The challenge in providing empirical evidence for this prediction is the possibility that firms would respond to changes in CEO risk-taking preferences by changing CEO risk-taking incentives simultaneously. To overcome this challenge, we construct an empirical test on the impact of IDD adoption on CEO risk-taking for a subsample of firms *where risk-taking incentives are little changed.*

Our empirical test aims to examine the impact of IDD adoption on the risk-taking level of a group of firms that experience small changes in CEO Vega around the time of the adoption of the IDD. To do this, we exclude firms in states that never adopted the IDD and those in states that adopted the IDD before the sample period. This exclusion process results in 6,097 remaining firm-year observations. We then calculate the change in Vega around IDD adoption. Specifically, we define the change in Vega as the difference between average Vega in the post-IDD period (*t* to *t*+2) and average Vega in the pre-IDD period (*t*–3 to *t*–1). We divide the sample into three groups based on the change in Vega around the adoption of the IDD and focus on the middle group in order to exclude large positive and negative changes in Vega from our sample.[[8]](#footnote-9) We use a comprehensive measure based on return volatility to measure the risk-taking level of firms. Specifically, *Risk* equals the natural log of the annualized variance of monthly stock returns over the following two years.

Column 2 of Table 6 reports the results of this test. We find a significantly negative coefficient on *AfterIDD* (*t*-statistic*=* –2.01), which suggests that stock return volatility decreases after IDD adoption for firms that experience relatively small change in CEO Vega around IDD adoption. The results support our argument that CEOs would become more risk-averse after IDD adoption if CEO risk-taking incentives were little changed.

***6.3 Neighboring-state matched sample***

To further address the potential concern that our results are driven by confounding local factors, we conduct a matched-sample analysis by matching each adopting state with its neighboring states (e.g., Ljungqvist et al. 2017; Li et al. 2018).[[9]](#footnote-10) If IDD adoption was driven by unobserved changes in local conditions, firms would respond to these changes in local conditions instead of to the adoption of the IDD. Accordingly, firms in both the adopting states and neighboring non-adopting states would appear to react to the IDD adoption similarly, given that unobserved changes in local conditions are likely to spill across state borders.[[10]](#footnote-11)

Column 1 of Table 7 reports the results of estimating equation (1) using the neighboring-state-matched sample. The positive effect of IDD adoption on Vega persists, suggesting that firms in adopting states experience greater increase in CEO risk-taking incentives relative to firms in neighboring non-adopting states. The results estimated from the neighboring-state-matched sample provide further evidence that our primary data are not likely driven by unobserved changes in local conditions around the adoption of the IDD.

[Table 7 near here]

***6.4 Contractual information protection mechanism***

We test whether our results are driven by an omitted variable for contractual information protection mechanisms such as NDAs and NCCs. Although the IDD and contractual information protection mechanisms can both protect trade secrets, they are distinct in that the IDD provides much stronger protection and imposes greater restrictions on labor mobility than contractual information protection mechanisms. Thus, we expect the impact of the IDD on CEO Vega to persist after controlling for contractual information protection mechanisms. Because contractual information protection mechanisms rely on the strength of contractual enforcement, we use an enforceability index (*Enforce*) to measure the enforcement strength of contractual information protection mechanisms. Thisenforceability index was first proposed by Kini et al. (2019) for each U.S. state from 1993 to 2013. A higher value of *Enforce* indicates greater strength of enforcement of contractual agreements. Similar to Klasa et al. (2018), we add *Enforce* as an additional control variable to equation (1).

Column 2 of Table 7 reports the results of estimating equation (1) after including the enforceability index of the contractual information protection mechanism (*Enforce*). The coefficients on *AfterIDD* remain significantly positive at the 1 percent level. The coefficient on *Enforce* is marginally significant. The results indicate that the IDD has an incremental effect on Vega additional to that of contractual information protection mechanisms. The findings are consistent with the notion that the IDD, which is not subject to the limitations of contractual agreements, provides stronger protection of trade secrets.

***6.5 IDD adoption and board quality***

CEO risk-aversion is unobservable to outsiders, but may be observable to the board of directors through their close interactions. Hence, it is interesting to investigate how board quality affects the impact of IDD adoption on CEO Vega. We identify two proxies of board quality, i.e., board independence and expertise. Independent boards and boards with greater expertise are able to provide assurance that their monitoring role is more effectively discharged (e.g., Carcello et al. 2002; Fields et al. 2012). Consistent with the literature, we identify an independent board as a board where the majority of directors is independent, and create an indicator equal to 1 for firm-years when the board is independent (*Independence*).[[11]](#footnote-12) We measure board expertise by the average number of outside directorships held by non-executive directors and create an indicator equal to 1 for firm-years when the average outside directorships held by the board is above the sample median (*Expertise*).[[12]](#footnote-13) We then interact *Independence* and *Expertise* with *AfterIDD*. The results are reported in Column 1 of Table 8. The results show that the interaction terms of both *Independence* and *Expertise* with *AfterIDD* are significantly positive, suggesting that higher board quality positively affects the impact of IDD adoption on CEO Vega.

[Table 8 near here]

***6.6 IDD adoption and CEO job-switching***

Because switching careers is inherently risky, CEOs who tend to switch jobs are likely to be risk-takers and, by contrast, those who do not are likely to be more risk-averse. If the increase in Vega is attributable to the introduction of CEO risk-aversion due to IDD adoption, we expect the change in Vega for CEOs who have never switched jobs to differ from that for CEOs who tended to switch jobs before the adoption of the IDD. To test this prediction, we identify CEOs who never switched jobs before IDD adoption and create an indicator for such CEOs (*Nswitch*).[[13]](#footnote-14) We then interact *NSwitch* with *AfterIDD* and report the results in Column 2 of Table 8. The results show that the interaction term between *Nswitch* and *AfterIDD* is significantly positive at the 5 percent level, suggesting that more risk-averse CEOs are provided with higher Vega after IDD adoption.

***6.7 IDD non-adoption***

As shown in Appendix B, there are two types of scenarios where the IDD was not adopted. The first is when the IDD was never adopted: we create an indicator for such a scenario (*Nreversal*). The second is when the prior adoption was reversed; for this scenario, we create the indicator *Reversal*. In the place of *AfterIDD*, we use these two indicators to differentiate the effects of these two types of IDD non-adoption on CEO Vega. The results are reported in Column 3 of Table 8. The results show that the coefficient on *Nreversal* is more significantly negative than the coefficient on *Reversal*, suggesting that, of the two, the scenario wherein the IDD was never adopted has a more negative impact on CEO risk-taking incentives.

***6.8 Including CEO-fixed effects and excluding CEO turnover events***

We argue that CEO risk-taking incentives increase after IDD adoption. An alternative argument is that the changes in Vega are driven by unobserved changes in CEO characteristics around IDD adoption. To better control for the potential changes in CEO characteristics, we further include CEO fixed effects in our regression and find that the untabulated results remain qualitatively similar to the primary results. These results indicate that our primary results are not driven by unobserved changes in CEO characteristics.

To further mitigate the endogeneity concern, we exclude firms that experience any CEO turnover event within the five-year window around the state’s adoption of the IDD.[[14]](#footnote-15) The results remain qualitatively similar to the primary results after this exclusion.

**7. Conclusion**

This study investigates how the IDD affects CEO risk-taking incentives as reflected by Vega. The IDD restricts employment mobility to reduce mobility-induced information leakage of trade secrets. The staggered adoption of the IDD by U.S. states over time creates a natural experiment in which the relationship between employment mobility and CEO risk-taking incentives can be examined. We find that firms provide higher CEO Vega after IDD adoption, suggesting a positive association between labor mobility restriction and CEO risk-taking incentives. Moreover, we find that the positive association between adoption of the IDD and CEO risk-taking incentives is greater for firms in more homogeneous industries and for CEOs in the later years of their tenure.

Our study has several implications. First, our findings imply that the restriction of employment mobility affects CEO risk-taking and that firms adjust CEO risk-taking incentives to maintain optimal risk-taking levels. Second, our results provide a new perspective on the determinants of executive compensation. Employment mobility is an important factor that should be taken into consideration when assessing managerial incentive structures adopted by firms. Third, our results are relevant to the ongoing debate on firms’ decision-making processes related to CEO compensation. They shed light on how the competitive business environment in which firms operate affects the process of determining CEO compensation at the firm level.

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| **Appendix A.** Variable definitions |
| *Vega* | = | Natural log of dollar change in a CEO’s stock and option holdings for a 1% change in stock return volatility (in thousands), calculated using the method of Core and Guay (2002). |
| *AfterIDD* | = | Indicator equal to 1 for state-years when IDD is adopted by the state court, and 0 in all other state-years. All other state-years include both the state-years when the prior adoption was reversed and the state-years when IDD was never adopted. |
| *IndHomogeneity* | = | Indicator equal to 1 for firms with above yearly median industry homogeneity, and 0 otherwise. Industry homogeneity is computed as the (two-digit SIC) industry mean value of the partial correlation between a firm’s return and the equally weighted industry index’s monthly returns over the sample period, calculated using the method of Parrino (1997). |
| *IndHomogeneity(geo)* | = | Indicator equal to 1 for firms in homogeneous industries with below the median value of the number of geographic locations for homogeneous industries, and 0 otherwise.  |
| *LaterYears* | = | Indicator equal to 1 for firm-years within the final three years of the CEO tenure, and 0 otherwise. |
| *LaterYears2* | = | Indicator equal to 1 for firm-years within the final two years of the CEO tenure, and 0 otherwise. |
| *LaterYears1* | = | Indicator equal to 1 for firm-years within the final one year of the CEO tenure, and 0 otherwise. |
| *Size* | = | Natural log of the firm’s market value of equity. |
| *BTM* | = | Book-to-market ratio, measured as the book value of assets divided by the market value of assets. |
| *ROA* | = | Return on assets, measured as income before extraordinary items divided by total assets. |
| *Tenure* | = | Natural log of the number of years the CEO has held the position. |
| *Salary* | = | Natural log of 1 plus the salary of the CEO. |
| *Bonus* | = | Natural log of 1 plus the bonus of the CEO. |
| *Other* | = | Natural log of 1 plus the other compensation of the CEO. |
| *Gdpgr* | = | Percentage growth in GDP of the firm’s headquarter state.  |
| *Unemp* | = | Unemployment rate of the firm’s headquarter state. |
| *Lev* | = | Total debt divided by total assets. |
| *Capx* | = | Net capital expenditure divided by total assets. |
| *R&D*  | = | the firm's research and development expenditure divided by its total assets. |
| *Zscore* | = | *Zscore* is based on Altman (1968) and =1.2×(working capital/total assets)+1.4×(retained earnings/total assets)+3.3×(EBIT/total assets)+0.6×(market value of equity/total liabilities)+0.999×(sales/total assets). |
| *Seg* | = | Natural log of the number of business segments in the firm. |
| *Delta* | = | Natural log of dollar change in a CEO’s stock and option holdings for a 1% change in stock price (in thousands), calculated using the method of Core and Guay (2002). |
| *Risk* | = | Natural log of the annualized variance of monthly stock returns over the following two years. |
| *Enforce* | = | Enforceability index of non-compete covenants. Taken from Table A2 of Kini et al. (2019), who created an NCA enforceability index for each U.S. state and the District of Columbia for the period 1992 to 2014. The index values range from 0 to 12, where a higher value means greater enforceability of NCAs. |
| *Independence* | = | Indicator equal to 1 for firm-years when the majority (over 50%) of the directors are independent, and 0 otherwise. Directors are independent when they do not hold material relationship with the firm.  |
| *Expertise* | = | Indicator equal to 1 for firm-years when the average number of outside directorships held by non-executive directors on the board is above the sample median, and 0 otherwise.  |
| *Nswitch* | = | Indicator equal to 1 for CEOs who never switched jobs before IDD adoption, and 0 otherwise.  |
| *Nreversal* | = | Indicator equal to 1 for the states that never adopted IDD, and 0 otherwise.  |
| *Reversal* | = | Indicator equal to 1 for state-years when prior IDD adoption was reversed, and 0 otherwise. |

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| **Appendix B.** Precedent-setting legal cases adopting or r, ejecting IDD, from Klasa et al. (2018) |
| State | Precedent-Setting Case(s) | Date | Decision |
| AR | *Southwestern Energy Co v. Eickenhorst*, 955 F. Supp. 1078 (W.D. Ark. 1997)  | 3/18/1997  | Adopt |
| CT | *Branson Ultrasonics Corp. v. Stratman*, 921 F. Supp. 909 (D. Conn. 1996) | 3/28/1996 | Adopt |
| DE  | *E.I. du Pont de Nemours & Co. v. American Potash & Chem. Corp.,* 200 A.2d 428 (Del. Ch. 1964)  | 5/5/1964 | Adopt |
| FL | *Fountain v. Hudson Cush-N-Foam Corp.*, 122 So.2d 232 (Fla. Dist. Ct. App. 1960) | 7/11/1960  | Adopt |
|  | *Del Monte Fresh Produce Co. v. Dole Food Co. Inc.*, 148 F. Supp. 2d 1326 (S.D. Fla. 2001) | 5/21/2001 | Reject |
| GA  | *Essex Group Inc. v. Southwire Co.*, 501 S.E.2d 501 (Ga. 1998)  | 6/29/1998 | Adopt |
| IL  | *Teradyne Inc. v. Clear Communications Corp.,* 707 F. Supp. 353 (N.D. 111. 1989)  | 2/9/1989  | Adopt |
| IN  | *Ackerman v. Kimball Int’l Inc.,* 652 N.E.2d 507 (Ind. 1995)  | 7/12/1995  | Adopt |
| IA | *Uncle B’s Bakery v. O’Rourke*, 920 F. Supp. 1405 (N.D. Iowa 1996)  | 4/1/1996  | Adopt |
| KS  | *Bradbury Co. v. Teissier-duCros*, 413 F. Supp. 2d 1203 (D. Kan. 2006)  | 2/2/2006 | Adopt |
| MA  | *Bard v. Intoccia*, 1994 U.S. Dist LEXIS 15368 (D. Mass. 1994)  | 10/13/1994  | Adopt |
| MI  | *Allis-Chalmers Manuf. Co. v. Continental Aviation & Eng. Corp.*, 255 F. Supp. 645 (E.D. Mich. 1966)  | 2/17/1966  | Adopt |
|  | *CMI Int’l Inc. v. Internet Int’l Corp.*, 649 N.W.2d 808 (Mich. Ct. App. 2002)  | 4/30/2002  | Reject |
| MN  | *Surgidev Corp. v. Eye Technology Inc.*, 648 F. Supp. 661 (D. Minn. 1986) | 10/10/1986 | Adopt |
| MO  | *H&R Block Eastern Tax Servs. Inc. v. Enchura*, 122 F. Supp. 2d 1067 (W.D. Mo. 2000)  | 11/2/2000  | Adopt |
| NJ  | *Nat’l Starch & Chem. Corp. v. Parker Chem. Corp.*, 530 A.2d 31 (N.J. Super. Ct. 1987)  | 4/27/1987 | Adopt |
| NY  | *Eastman Kodak Co. v. Powers Film Prod.*, 189 A.D. 556 (N.Y.A.D. 1919)  | 12/5/1919 | Adopt |
| NC  | *Travenol Laboratories Inc. v. Turner,* 228 S.E.2d 478 (N.C. Ct. App. 1976) |  6/17/1976  | Adopt |
| OH  | *Procter & Gamble Co. v. Stoneham*, 747 N.E.2d 268 (Ohio Ct. App. 2000)  | 9/29/2000 | Adopt |
| PA  | *Air Products & Chemical Inc. v. Johnson*, 442 A.2d 1114 (Pa. Super. Ct. 1982)  | 2/19/1982  | Adopt |
| TX  | *Rugen v. Interactive Business Systems Inc.,* 864 S.W.2d 548 (Tex. App. 1993)  | 5/28/1993  | Adopt |
|  | *Cardinal Health Staffing Network Inc. v. Bowen*, 106 S.W.3d 230 (Tex. App. 2003)  | 4/3/2003  | Reject |
| UT  | *Novell Inc. v. Timpanogos Research Group Inc.,* 46 U.S.P.Q.2d 1197 (Utah D.C. 1998)  | 1/30/1998 | Adopt |
| WA  | *Solutec Corp. Inc. v. Agnew*, 88 Wash. App. 1067 (Wash. Ct. App. 1997)  | 12/30/1997  | Adopt |
| This table, reproduced from Table 1 of Klasa et al. (2018), lists the precedent-setting legal cases in which state courts adopted IDD or rejected it after adopting it. The states omitted from the table did not consider or considered but rejected IDD. |

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| **Table 1.** Descriptive statistics |
|   | Mean | Q1 | Median | Q3 | Std. |
| *Vega* (in thousands) | 3.365 | 2.219 | 3.623 | 4.743 | 1.885 |
| *AfterIDD* | 0.500 | 0.000 | 0.000 | 1.000 | 0.500 |
| *Size* | 7.304 | 6.179 | 7.160 | 8.337 | 1.668 |
| *BTM* | 0.641 | 0.438 | 0.627 | 0.826 | 0.275 |
| *ROA* | 0.037 | 0.017 | 0.053 | 0.091 | 0.120 |
| *Tenure* | 2.017 | 1.386 | 2.079 | 2.565 | 0.751 |
| *Salary* | 6.364 | 6.066 | 6.447 | 6.804 | 0.756 |
| *Bonus* | 3.090 | 0.000 | 3.296 | 6.130 | 3.129 |
| *Other* | 6.869 | 6.017 | 7.370 | 8.383 | 2.216 |
| *Gdpgr* | 0.046 | 0.030 | 0.046 | 0.064 | 0.032 |
| *Unemp* | 6.316 | 4.800 | 5.700 | 7.600 | 2.134 |
| *Lev* | 0.216 | 0.050 | 0.198 | 0.326 | 0.183 |
| *Capx* | 0.039 | 0.000 | 0.022 | 0.054 | 0.051 |
| *R&D*  | 0.032 | 0.000 | 0.000 | 0.039 | 0.057 |
| *Zscore* | 3.088 | 1.506 | 2.553 | 3.924 | 2.835 |
| *Seg* | 0.580 | 0.000 | 0.000 | 1.099 | 0.645 |
| *Delta* (in thousands) | 5.276 | 4.280 | 5.318 | 6.367 | 1.683 |
| N |   |   | 17,257 |   |   |
| This table reports the descriptive statistics of the variables used in the main test. The variables are defined in Appendix A. |

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| **Table 2.** Correlations |
|   | *(1)* | *(2)* | *(3)* | *(4)* | *(5)* | *(6)* | *(7)* | *(8)* | *(9)* | *(10)* | *(11)* | *(12)* | *(13)* | *(14)* | *(15)* | *(16)* | *(17)* |
| *(1) Vega* |  | **0.047** | **0.508** | **-0.125** | **0.112** | -0.012 | **0.345** | **0.110** | **0.475** | **-0.058** | **0.035** | **0.082** | **-0.104** | **0.034** | **-0.114** | **0.120** | **0.457** |
| *(2) AfterIDD* | **0.047** |  | **0.051** | 0.002 | **0.019** | -0.012 | **0.046** | **0.016** | **0.024** | **-0.059** | **-0.087** | 0.006 | **-0.024** | **-0.081** | **0.069** | **0.066** | **0.032** |
| *(3) Size* | **0.508** | **0.051** |  | **-0.393** | **0.322** | **-0.029** | **0.377** | **0.110** | **0.486** | **-0.021** | **0.060** | **0.027** | **-0.062** | **-0.070** | **0.112** | **0.184** | **0.600** |
| *(4) BTM* | **-0.125** | 0.002 | **-0.393** |  | **-0.328** | **-0.028** | **0.075** | **-0.130** | **-0.060** | **-0.133** | **0.053** | **0.219** | **-0.116** | **-0.254** | **-0.121** | **0.115** | **-0.382** |
| *(5) ROA* | **0.112** | **0.019** | **0.322** | **-0.328** |  | **0.090** | **0.094** | **0.132** | **0.079** | **0.068** | **-0.016** | **-0.183** | **0.051** | **-0.296** | **-0.094** | 0.003 | **0.296** |
| *(6) Tenure* | -0.012 | -0.012 | **-0.029** | **-0.028** | **0.090** |  | **0.055** | -0.001 | **-0.119** | **0.024** | -0.004 | **-0.033** | **0.055** | **-0.026** | **-0.110** | 0.003 | **0.356** |
| *(7) Salary* | **0.345** | **0.046** | **0.377** | **0.075** | **0.094** | **0.055** |  | **0.024** | **0.418** | **-0.153** | **0.155** | **0.137** | **-0.126** | **-0.129** | **0.044** | **0.147** | **0.196** |
| *(8) Bonus* | **0.110** | **0.016** | **0.110** | **-0.130** | **0.132** | -0.001 | **0.024** |  | **-0.057** | **0.294** | **-0.331** | **0.021** | **0.097** | **-0.066** | **-0.144** | **0.023** | **0.118** |
| *(9) Other* | **0.475** | **0.024** | **0.486** | **-0.060** | **0.079** | **-0.119** | **0.418** | **-0.057** |  | **-0.155** | **0.187** | **0.101** | **-0.132** | 0.000 | **-0.123** | **0.135** | **0.208** |
| *(10) Gdpgr* | **-0.058** | **-0.059** | **-0.021** | **-0.133** | **0.068** | **0.024** | **-0.153** | **0.294** | **-0.155** |  | **-0.456** | 0.004 | **0.146** | -0.008 | **0.065** | **-0.067** | **0.045** |
| *(11) Unemp* | **0.035** | **-0.087** | **0.060** | **0.053** | **-0.016** | -0.004 | **0.155** | **-0.331** | **0.187** | **-0.456** |  | **-0.057** | **-0.138** | **0.107** | **0.043** | 0.011 | **-0.035** |
| *(12) Lev* | **0.082** | 0.006 | **0.027** | **0.219** | **-0.183** | **-0.033** | **0.137** | **0.021** | **0.101** | 0.004 | **-0.057** |  | **-0.026** | **-0.215** | **-0.134** | **0.073** | **-0.037** |
| *(13) Capx* | **-0.104** | **-0.024** | **-0.062** | **-0.116** | **0.051** | **0.055** | **-0.126** | **0.097** | **-0.132** | **0.146** | **-0.138** | **-0.026** |  | **-0.048** | **0.162** | **-0.145** | **0.031** |
| *(14) R&D*  | **0.034** | **-0.081** | **-0.070** | **-0.254** | **-0.296** | **-0.026** | **-0.129** | **-0.066** | 0.000 | -0.008 | **0.107** | **-0.215** | **-0.048** |  | **-0.062** | **-0.080** | **-0.060** |
| *(15) Zscore* | **-0.116** | **0.138** | **0.121** | **-0.084** | **-0.107** | **-0.063** | **0.064** | **-0.139** | **-0.121** | **0.182** | **0.177** | **-0.202** | **0.109** | **-0.058** |  | 0.005 | -0.006 |
| *(16) Seg* | **0.120** | **0.066** | **0.184** | **0.115** | 0.003 | 0.003 | **0.147** | **0.023** | **0.135** | **-0.067** | 0.011 | **0.073** | **-0.145** | **-0.080** | 0.005 |  | **0.075** |
| *(17) Delta* | **0.457** | **0.032** | **0.600** | **-0.382** | **0.296** | **0.356** | **0.196** | **0.118** | **0.208** | **0.045** | **-0.035** | **-0.037** | **0.031** | **-0.060** | -0.006 | **0.075** |   |
| The Spearman (Pearson) correlations for the sample are reported above (below) the diagonal. Correlations significant at the 5 percent level in a two-tailed test are in boldface. The variables are defined in Appendix A. |

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| **Table 3.** IDD adoption and CEO Vega  |
| Dep. Var. = *Vega*  | (1) | (2) | (3) |
| Constant | –3.791\*\*\* | –4.112\*\*\* | –3.526\*\*\* |
|  | (–4.79) | (–5.15) | (–4.63) |
| *AfterIDD* | 0.157\*\*\* | 0.148\*\*\* | 0.130\*\*\* |
|  | (2.80) | (2.56) | (3.00) |
| *Size* | 0.475\*\*\* | 0.423\*\*\* | 0.128\*\*\* |
|  | (11.62) | (10.25) | (2.55) |
| *BTM* | 0.669\*\*\* | 0.685\*\*\* | 0.961\*\*\* |
|  | (8.77) | (8.12) | (10.21) |
| *ROA* | 0.327\*\*\* | 0.475\*\*\* | 0.295\*\*\* |
|  | (2.64) | (3.01) | (2.63) |
| *Tenure* | 0.176\*\*\* | 0.136\*\*\* | –0.103\*\*\* |
|  | (5.98) | (5.32) | (–3.58) |
| *Salary* | 0.202\*\*\* | 0.163\*\*\* | 0.206\*\*\* |
|  | (3.77) | (2.96) | (3.97) |
| *Bonus* | 0.002 | 0.001 | 0.002 |
|  | (0.23) | (0.03) | (0.56) |
| *Other* | 0.089\*\*\* | 0.072\*\*\* | 0.082\*\*\* |
|  | (8.32) | (6.75) | (8.38) |
| *Gdpgr* | 1.170\*\*\* | 1.052\*\* | 0.982\*\* |
|  | (2.66) | (2.08) | (2.17) |
| *Unemp* | 0.007 | 0.002 | –0.009 |
|  | (0.31) | (0.11) | (–0.32) |
| *Lev* |  | 0.232\* | 0.258\* |
|  |  | (1.97) | (2.02) |
| *Capx* |  | –0.063 | –0.101 |
|  |  | (–0.18) | (–0.43) |
| *R&D*  |  | 1.235\*\*\* | 1.103\*\*\* |
|  |  | (2.98) | (3.00) |
| *Zscore* |  | 0.611\*\* | 0.783\*\* |
|  |  | (2.31) | (2.52) |
| *Seg* |  | 0.040 | 0.054 |
|  |  | (1.03) | (1.38) |
| *Delta* |  |  | 0.451\*\*\* |
|  |  |  | (12.15) |
|  |  |  |  |
| Firm fixed effects | Yes | Yes | Yes |
| Industry× Year fixed effects | Yes | Yes | Yes |
| R2 | 0.28 | 0.28 | 0.40 |
| N | 17,257 | 17,257 | 17,257 |
| This table reports the results from OLS regressions of CEO Vega on the indicator for the IDD adoption. The dependent variable is *Vega.* The variables are defined in Appendix A. Standard errors are corrected for heteroskedasticity and clustering at the state level. \*, \*\*, and \*\*\* denote significance at the 10%, 5%, and 1% levels, respectively.  |

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| **Table 4.** IDD adoption and CEO Vega: The impact of industry homogeneity |
| Dep. Var. = *Vega*  | (1) | (2) |
| Constant | –2.673\*\*\* | –3.807\*\*\* |
|  | (–4.16) | (–4.63) |
| *AfterIDD* | 0.030 | 0.102 |
|  | (0.43) | (1.13) |
| *IndHomogeneity* | –0.423 |  |
|  | (–0.47) |  |
| *AfterIDD×IndHomogeneity* | 0.168\*\* |  |
|  | (2.37) |  |
| *IndHomogeneity(geo)* |  | –0.572 |
|  |  | (–1.05) |
| *AfterIDD×IndHomogeneity(geo)* |  | 0.237\*\*\* |
|  |  | (2.65) |
|  |  |  |
| Controls | Yes | Yes |
| Firm fixed effects | Yes | Yes |
| Industry× Year fixed effects | Yes | Yes |
| R2 | 0.37 | 0.38 |
| N | 17,257 | 17,257 |
| This table reports the results from OLS regressions of CEO Vega on the indicator for IDD adoption and partition variable based on industry homogeneity. The dependent variable is *Vega*. Controls are the control variables identified in equation (1). The variables are defined in Appendix A. Standard errors are corrected for heteroskedasticity and clustering at the state level. \*, \*\*, and \*\*\* denote significance at the 10%, 5%, and 1% levels, respectively. |

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| **Table 5.** IDD adoption and CEO Vega: The impact of CEO tenure |
| Dep. Var. = *Vega*  | (1) | (2) | (3) |
| Constant | –2.528\*\*\* | –2.683\*\*\* | –2.761\*\*\* |
|  | (–4.36) | (–4.11) | (–4.03) |
| *AfterIDD* | 0.048 | 0.076 | 0.057 |
|  | (0.61) | (0.81) | (0.63) |
| *LaterYears* | 0.265\*\*\* |  |  |
|  | (4.34) |  |  |
| *AfterIDD×LaterYears* | 0.112\*\* |  |  |
|  | (2.08) |  |  |
| *LaterYears2* |  | 0.306\*\*\* |  |
|  |  | (4.52) |  |
| *AfterIDD×LaterYears2* |  | 0.138\*\* |  |
|  |  | (2.20) |  |
| *LaterYears1* |  |  | 0.317\*\*\* |
|  |  |  | (4.68) |
| *AfterIDD×LaterYears1* |  |  | 0.151\*\* |
|  |  |  | (2.36) |
|  |  |  |  |
| Controls | Yes | Yes | Yes |
| Firm fixed effects | Yes | Yes | Yes |
| Industry× Year fixed effects | Yes | Yes | Yes |
| R2 | 0.37 | 0.37 | 0.38 |
| N | 17,257 | 17,257 | 17,257 |
| This table reports the results from OLS regressions of CEO Vega on the indicator for IDD adoption and partition variable based on CEO tenure. The dependent variable is *Vega*. Controls are the control variables identified in equation (1). The variables are defined in Appendix A. Standard errors are corrected for heteroskedasticity and clustering at the state level. \*, \*\*, and \*\*\* denote significance at the 10%, 5%, and 1% levels, respectively. |

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| **Table 6.** IDD Adoption, CEO delta and firms’ risk-taking  |
|   | (1) | (2) |
| Dep. Var. | *Delta* | *Risk* |
| Constant | 0.372 | –1.103 |
|  | (0.74) | (–1.64) |
| *AfterIDD* | –0.003 | –0.126\*\* |
|  | (–0.06) | (–2.01) |
|  |  |  |
| Controls | Yes | Yes |
| Firm fixed effects | Yes | Yes |
| Industry× Year fixed effects | Yes | Yes |
| R2 | 0.55 | 0.69 |
| N | 17,257 | 2,092 |
| This table reports the results from OLS regressions of CEO delta (*Delta)* on the indicator for the IDD adoption in Column (1), and firms’ risk-taking (*Risk*) on the indicator for the IDD adoption for a group of firms that experience relatively small change in CEO Vega around the IDD adoption in Column (2). Controls are the control variables identified in equation (1) plus *Vega* in both columns, and minus *Lev, Capx, R&D, Zscore* and *Seg* in Column 2. For Column 1, *Delta* is excluded from the controls. The variables are defined in Appendix A. Standard errors are corrected for heteroskedasticity and clustering at the state level. \*, \*\*, and \*\*\* denote significance at the 10%, 5%, and 1% levels, respectively. |

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| **Table 7.** Matched sample analyses and controlling for enforceability index  |
|   | *Matched Sample Analyses* | *Controlling for Enforceability Index* |
| Dep. Var.=*Vega* | (1) | (2) |
| Constant | –2.105\*\*\* | 0.615 |
|  | (–4.11) | (0.01) |
| *AfterIDD* | 0.163\*\* | 0.137\*\*\* |
|  | (2.38) | (3.02) |
| *Enforce* |  | 0.048\* |
|  |  | (1.68) |
|  |  |  |
| Controls | Yes | Yes |
| Firm fixed effects | Yes | Yes |
| Industry× Year fixed effects | Yes | Yes |
| R2 | 0.41 | 0.39 |
| N | 10,339 | 17,240 |
| Column 1 of this table reports the results from OLS regressions of CEO Vega on the indicator for the IDD adoption based on a neighbouring-state matched sample. The matching procedure yields 13 matched state groups: (NY:VT), (FL: AL), (DE: DC, MD), (NC: VA, SC, TN), (MN: ND, SD, WI), (IL: KY), (TX: NM, OK, LA), (MA: RI, NH), (IA: NE), (AR: MS), (WA: OR, ID), (UT: NV, CO, WY, AZ), and (OH: WV). |
| Column 2 of this table reports the results from OLS regressions of CEO Vega on the indicator for IDD adoption after controlling for the enforceability index (*Enforce*). A higher value of *Enforce* indicates greater strength in enforcement of contractual agreements.  |
| Controls are the control variables identified in equation (1). The variables are defined in Appendix A. Standard errors are corrected for heteroskedasticity and clustering at the state level. \*, \*\*, and \*\*\* denote significance at the 10%, 5%, and 1% levels, respectively. |

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| **Table 8.** Board quality, job switching, and IDD non-adoption |
| Dep. Var.=*Vega* | (1) | (2) | (3) |
| Constant | –2.105\*\*\* | –2.598\*\*\* | –2.365\*\*\* |
|  | (–3.38) | (–3.81) | (–3.65) |
| *AfterIDD* | 0.113\* | 0.112\*\*\* |  |
|  | (1.87) | (2.63) |  |
| *Independence* | –0.023 |  |  |
|  | (–0.31) |  |  |
| *AfterIDD×Independence* | 0.152\*\*\* |  |  |
|  | (2.57) |  |  |
| *Expertise* | –0.011 |  |  |
|  | (–0.21) |  |  |
| *AfterIDD×Expertise* | 0.085\*\* |  |  |
|  | (2.01) |  |  |
| *Nswitch* |  | 0.035 |  |
|  |  | (0.63) |  |
| *AfterIDD×Nswitch* |  | 0.047\*\* |  |
|  |  | (1.98) |  |
| *Nreversal* |  |  | –0.108\*\*\* |
|  |  |  | (–2.67) |
| *Reversal* |  |  | –0.058\*\* |
|  |  |  | (–2.00) |
|  |  |  |  |
| Controls | Yes | Yes | Yes |
| Firm fixed effects | Yes | Yes | Yes |
| Industry× Year fixed effects | Yes | Yes | Yes |
| R2 | 0.36 | 0.41 | 0.40 |
| N | 11,289 | 17,257 | 17,257 |
| Column 1 of this table reports the OLS regression results of the impact of board quality on the relation between CEO Vega and the IDD adoption. Board quality is proxied by board independence (*Independence*) and board expertise (*Expertise*).  |
| Column 2 of this table reports the OLS regression results of the impact of CEO job-switching (*Nswitch*) on the relation between CEO Vega and the IDD adoption.  |
| Column 3 of this table reports the OLS regression results on the relation between CEO Vega and the IDD non-adoption. The IDD non-adoption is separated into where the IDD was never adopted (*Nreversal*) and where the prior IDD adoption was reversed (*Reversal*). |
| Controls are the control variables identified in equation (1). The variables are defined in Appendix A. Standard errors are corrected for heteroskedasticity and clustering at the state level. \*, \*\*, and \*\*\* denote significance at the 10%, 5%, and 1% levels, respectively. |

1. We focus on Vega because prior literature shows that Vega has a positive effect on managerial risk-taking. However, the evidence for how increased CEO delta affects managerial risk-taking incentives is inconclusive. For example, while Armstrong and Vashishtha (2012) find that delta is associated with greater risk, Gormley et al. (2013) find that higher delta is associated with lower managerial risk-taking, as evidenced by a larger reduction in leverage and a larger increase in cash holdings. [↑](#footnote-ref-2)
2. Garmaise (2011) reports that 30 per cent of the sample firms do not use NCCs with their top executives. [↑](#footnote-ref-3)
3. Section 4.1 in Klasa et al. (2018) discusses the legal background surrounding state courts’ recognition of the IDD. The paper concludes that the occurrence of adoption of the IDD is unlikely to be systemically associated with changes in business or political conditions in a state, or lobbying, or to be anticipated by firms. Empirically, they find that a state’s labor laws, adoption of the Uniform Trade Secrets Act, worker characteristics, and economic or political conditions do not affect the state courts’ decisions to adopt the IDD. [↑](#footnote-ref-4)
4. The variables of *R&D* and *Zscore* also help control for the firm’s risk-taking policies. [↑](#footnote-ref-5)
5. The mean (median) value of the sample CEO tenure is 7.5151(8) years. [↑](#footnote-ref-6)
6. Because the dependent variable is in the form ln(1+*y*), its first derivative should be *y*/(1+*y*), and the economic magnitude is estimated by *β*×(1+*y*)/*y*. Thus, the economic magnitude of the coefficients is 20.37% (0.157×(1+3.365)/3.365) in Column 1, 19.20% (0.148×(1+3.365)/3.365) in Column 2, and 16.86% (0.130×(1+3.365)/3.365) in Column 3. [↑](#footnote-ref-7)
7. The sample median value of the number of geographic locations for homogeneous industries is six. The geographic locations are at county-level. When county-level data are unavailable, state-level data are used. The data collection procedure is similar to Garcia and Norli (2012). [↑](#footnote-ref-8)
8. The mean (median) of change in *Vega* in this group is 8.90 (7.71). The mean (median) of change in *Vega* in the lowest group is -42.09 (-22.32). The mean (median) of change in *Vega* in the highest group is 109.02 (64.29). [↑](#footnote-ref-9)
9. The neighboring-state-matched sample is created by matching the treatment firms (those that are located in the states that adopted the IDD) with the control firms in the same two-digit SIC industry and in the neighboring states that did not adopt the IDD. [↑](#footnote-ref-10)
10. As discussed in Section 2, IDD adoption is based on a judicial decision by the state court. Such judicial decisions are more likely to be driven by the merits of precedent-setting cases than by the state’s local economic conditions. [↑](#footnote-ref-11)
11. About 70 percent of sample firms have independent boards. [↑](#footnote-ref-12)
12. Similar to Carcello et al. (2002), our sample median of outside directorships held by non-executive directors is 2.1. [↑](#footnote-ref-13)
13. About half of the sample CEOs never switched jobs before IDD adoption. [↑](#footnote-ref-14)
14. In our sample, there is no CEO turnover event in the three-year window around the state’s adoption of the IDD. [↑](#footnote-ref-15)