

ESSAYS IN CORPORATE FINANCE

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ABSTRACT

My dissertation consists of three chapters that explore various aspects of corporate finance with a focus on issues related to corporate governance.

Chapter 1 investigates how CEO bargaining power affects the level of CEO compensation. Contracting theories predict that CEO power plays an essential role in the pay-setting process. I provide causal empirical evidence of how changes in the bargaining power of CEOs affect the level of CEO compensation. Using the staggered adoption of the Inevitable Disclosure Doctrine (IDD) by US state courts as an exogenous shock to CEOs' bargaining power, I find that the recognition of the IDD results in significantly lower levels of CEO compensation. The effect is present only in subsamples of firms whose CEOs experience a substantial decline in their bargaining power. These results support the idea that bargaining power is the channel through which the IDD recognition decreases CEO compensation. Economic impact of the IDD is also substantial in the subsamples, ranging from 16.4% to 20.5% decline in total compensation. Examination of the structure of compensation reveals that changes in the bargaining power of CEOs reduce total current compensation and option awards. The recognition of the IDD also increases turnover-performance sensitivity and shareholder wealth.

Chapter 2 examines the impact of corporate religious culture on CEO compensation structure. Recent studies document the effect of corporate culture on corporate behavior. This study examines how a firm's religious culture affects the structure of CEO compensation. Using county-level religiosity as a proxy for a firm's culture, I find that firms in highly religious counties use about 12.4% less performance-based compensation

in their CEO compensation packages. I consider two characteristics of religious cultures that are likely to have implications on executive compensation: extrinsic motivation and locus of control. To determine which characteristic is driving the results, I examine how turnover decisions differ depending on religious culture of firms. If locus of control – the extent to which human effort can affect future outcomes – is driving the main result, less turnover-performance sensitivity is expected in highly religious firms. The results show that turnover-performance sensitivity does not vary according to county-level religiosity, suggesting that locus of control is not the driver behind the main result. These findings indicate that firms with highly religious cultures use less performance-based compensation because religious cultures' work ethic is less financially motivated.

Lastly, Chapter 3 investigates how insider-dominance of corporate boards affect firm value. The agency literature posits that insider-dominated boards are likely to face severe agency problems. However, some theories on board control argue that insider-dominated boards are sometimes optimal for shareholders. I evaluate the theories using SOX-related board reforms in the early 2000s that presented an exogenous change in board control. Specifically, I analyze the heterogeneous treatment effects based on firm characteristics that theoretically favor insider-dominated boards – firm size, proprietary knowledge, and information transparency. Preliminary results suggest that firms with theoretically optimal insider-dominated boards experienced a net increase in shareholder value when boards became independent. These results indicate that benefits of enhanced monitoring by independent boards outweighed any loss in value associated with insider control of the board.

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CHAPTER 1

CEO BARGAINING POWER AND COMPENSATION

Introduction

Chief executive officer (CEO) compensation in the United States is a contentious subject among the academic and business communities. Continuously growing level of CEO compensation and wage disparity have sparked a debate among researchers about the nature of the pay-setting process. While financial economists have yet to reach a consensus on the primary driver of the pay-setting process, the role of bargaining power of the CEOs is widely acknowledged. However, there is little causal empirical evidence supporting the contracting theories. This paper aims to establish a causal relation between the bargaining power of CEOs and CEO compensation levels using the Inevitable Disclosure Doctrine (henceforth IDD) to capture an exogeneous shift in bargaining power of the affected CEOs.

CEO compensation researchers agree that CEO's bargaining power plays a significant role in the pay-setting process.¹ Previous studies also show a positive association between CEO power and CEO compensation, suggesting that CEOs may use their powers to increase their wealth at the expense of the shareholders. However, while the literature clearly shows an association between powerful CEOs and different components of compensation, unobservable factors still present an endogeneity concern.

¹ The literature proposes broadly two perspectives regarding how CEO compensation is determined: rent extraction and optimal contracting. Both perspectives suggest that CEO's bargaining power plays a significant role, albeit to a different extent, in the pay-setting process. The literature is discussed in detail in the '*IDD and CEO Compensation*' section.

In other words, there is little causal evidence that CEO's bargaining power plays an economically significant role in the pay-setting process. I attempt to fill this gap in the literature by showing casual evidence of how changes in CEO's bargaining power affects the level of CEO compensation.

Establishing a causal impact of CEO's bargaining power on compensation is empirically difficult due to the endogenous nature of CEO's bargaining power in contracting environments. To illustrate, commonly used proxies of CEO power – such as CEO tenure, CEO-chair duality, and founder status – are likely to be highly correlated with CEO compensation. Thus, identifying an exogenous shock that affects the bargaining power of CEOs is key to establishing a causal interpretation. To do this, I exploit the staggered adoption of the IDD by U.S. state courts. The IDD is a legal doctrine that states a firm can prevent its former employee from working for a rival firm if the new employment would inevitably lead to disclosure of trade secrets. The state courts can enjoin an employee from working for a competitor even if the employee did not sign a nondisclosure or a noncompetition agreement and even if the competitor is in another state. Moreover, the IDD is applicable even when no actual wrongdoing has yet occurred. Thus, the IDD offers strong protection of firms' trade secrets; and its main implication for CEOs is their mobility restrictions.² This mobility restriction, in turn, reduces the bargaining power of CEOs in the pay-setting dynamics.

I use the recognition of the IDD as an identification strategy for the following reasons. First, the IDD is arguably exogenous to firm-level contracting environments. The

² Klasa et al. (2018) show empirically that mobility of workers who possess trade secrets decrease significantly after the adoption of the IDD.

decision to adopt or reject the IDD is made at the U.S. state courts. As the IDD's primary purpose is to increase the protection of trade secrets for firms, it is not meant to directly influence compensation policies. Moreover, the court's decision is unrelated to any firm-specific characteristics. Thus, it is reasonable to argue that a state-level decision on the IDD is exogenous to firm-level contracting dynamics. Second, the staggered adoption of the IDD across different states allows for the use of difference-in-differences framework. This staggered nature of events affects different firms at different points in time, alleviating the concern that other contemporaneous events might be influencing the results (Roberts and Whited 2013). Third, I use the recognitions of the IDD, as opposed to the rejections of the IDD, to better capture the shock to bargaining power of CEOs. Some studies use the rejections of the IDD to capture changes in CEO mobility restrictions (e.g., Na 2020). By doing so, their IDD identifier includes states that reject the IDD without prior recognition of the IDD.³ Since the IDD provides a very strong form of protection of trade secrets, the ex-ante presumption of states that never considered the IDD is that such strong protection is inapplicable. That is, CEOs and the board are likely to assume that CEOs can work for any competitor in the future if a nondisclosure or noncompetition agreement was not signed. This assumption is upheld when IDD is rejected by state courts. However, when the IDD is recognized, CEOs can no longer work for competitors even in the absence of a nondisclosure or noncompetition agreement, providing an extraordinary level of trade

³ States, at a given point in time, fall into the following categories regarding the IDD. First, there are states that have never considered the IDD. Second, there are states that adopted the IDD. Third, there are states that rejected the IDD without ever adopting it. Fourth, there are states that rejected the IDD after having adopted it in the past. I argue that the second category captures the true 'shock' to CEO mobility. More detailed explanation is provided in the '*IDD as an Exogenous Shock to CEO Bargaining Power*' section.

secret protection for firms. Thus, using the recognition of the IDD is likely to capture the true *shock* regarding CEO mobility and bargaining power.

Using a difference-in-difference approach, I show that firms in states where the IDD is recognized have significantly lower CEO compensation. On average, the recognition of the IDD leads to about 9.22% lower total CEO compensation. The result holds after controlling for economic determinants of CEO compensation, firm fixed effects, year fixed effects, and the mean values of CEO compensation in the state-year and industry-year.⁴ Regarding the validity of the parallel trends assumption, I show that pre-treatment trends do not explain the observed results. That is, the observed decrease in CEO compensation in the treated firms occurs after the adoption of the IDD. Thus, my main result suggests that the recognition of the IDD causes the level of CEO compensation to decline by exogenously reducing the bargaining power of the CEO.

To provide further evidence that the IDD affects CEO compensation through the bargaining power channel, I identify CEO/firm characteristics that are likely to result in heterogeneous treatment effects of the IDD recognition on CEO's bargaining power. If the IDD recognition affects CEO compensation by weakening the CEO's bargaining position, then the effect of the IDD recognition will be more pronounced in subsamples where the CEOs experience the largest shock to their bargaining power. I use the following four characteristics to subgroup the sample: type of skillset possessed by the CEO, number of

⁴ Including the annual mean values of the dependent variable (excluding the firm itself) in the state and the industry enables me to separate the effect of the IDD recognition from other contemporaneous shocks in the state of location and the industry (John, Li, and Pang 2017).

business segments managed by the CEO, firm's competitive environment, and the CEO's founder status.

First, the impact of the IDD on CEO's bargaining power is likely to depend on the management specialty of the CEO. The literature on CEOs suggests that one way to categorize the CEOs is based on what type of skills they bring to the firm. For example, Custódio, Ferreira, and Matos (2013) find that CEOs with general managerial skills are paid higher than ones with firm-specific skills. In the context of this study, CEOs with general management skills should experience less mobility restrictions after the adoption of the IDD because general management skills can be applied to other firms without the concern of revealing trade secrets of the former employer. In contrast, CEOs with firm-specific skills should experience substantial mobility restrictions when the IDD is in effect because most of their value comes from knowledge about the firm. I show evidence consistent with this prediction. On average, CEOs with firm-specific skills experience a 17.3% decline in the level of compensation when the IDD is recognized in their states. The results for other types of CEOs are closer to zero and statistically insignificant.

The second characteristic used to divide the sample is the number of business segments the CEO manages. The rationale is similar to that of the CEOs with firm-specific skills. CEOs of firms with only one business segment are likely to develop skills that are very specific to the firm. Thus, the recognition of the IDD is likely to restrict their outside opportunities more than CEOs of firms with multiple business segments. I find that CEOs of firms with one business segment experience a 20.1% decline in compensation after the

IDD is adopted. Test of CEOs who manage multiple business segments yield statistically insignificant results.

The third characteristic is the firm's competitive environment. Murphy and Zábojník (2004) argue that the recent increase in CEO compensation can be explained by increased competition in the labor market for CEOs. Their argument boils down to CEOs having greater bargaining power in competitive labor markets. In highly competitive industries, CEOs have many employment opportunities and firms have many potential candidates. When the IDD is recognized, firms can no longer hire CEOs from competing firms within the same state, but they can hire anyone from other states. CEOs, however, cannot work for any competitors when the IDD is in effect, regardless of the state if there is potential for trade secrets misappropriation. Thus, the relative bargaining power of CEOs decline more in highly competitive industries than in less competitive industries when the IDD is adopted. My findings confirm that CEOs in highly competitive industries experience a 16.4% decline in compensation, and test of CEOs in less competitive industries yield statistically insignificant results.

The last characteristic that is likely to result in heterogenous treatment effects of the IDD recognition on CEO's bargaining power is the CEO's founder status. The prediction based on the founder status of the CEOs is less clear. On one hand, founder CEOs may be too powerful that the IDD might not affect their bargaining power at all. On the other hand, founder CEOs might face great reduction in bargaining power because they know all the trade secrets of their firms and have very firm-specific management skills. Thus, the heterogeneous treatments effects of the IDD based on the founder status of the

CEO is an empirical issue. The results show that founder CEOs experience 20.5% decline in compensation on average, whereas non-founder CEOs experience an insignificant effect. Overall, examinations of the heterogeneous treatment effects of the IDD support my claim that the recognition of the IDD decreases the level of CEO compensation by reducing the bargaining power of the CEOs.

Next, I examine which components of compensation change the most after the IDD is adopted. Executive compensation research often focuses on the structure of CEO compensation and the purpose of each component. For example, some compensation forms (e.g., stock and options) mainly serve the role of aligning the interests of the CEO and the shareholders. Others, such as perquisites, are more controversial and the precise role of such compensation is less clear (Frydman and Jenter 2010). While this study does not attempt to explain how the structure of CEO compensation is determined, it is still informative to document which components of compensation changes the most as the bargaining power of the CEOs change. I examine changes in the following categories of compensation from Execucomp: total current compensation (salary + bonus), stocks, options, and other compensation. Using the full sample, I find statistically weak results. However, using subsamples of CEOs that are likely to face the largest decline in bargaining power, results show that the recognition of the IDD has the largest impact on total current compensation and options. Specialist CEOs experience 19.4% decline in total current compensation and 29.7% decline in option compensation.

In the final set of tests, I examine the impact of the IDD recognition on CEO turnover decisions and shareholder wealth. Unlike in CEO compensation, CEO's

bargaining power is not the only obvious channel through which the IDD can influence CEO turnover decisions and shareholder wealth. To illustrate, the recognition of the IDD is significant for firms in two ways: i) it provides additional protection of trade secrets of the firms and ii) reduces the bargaining power of the CEOs through mobility restrictions. Both of these channels can affect CEO turnover decisions and shareholder wealth. Regarding CEO turnover decisions, i) knowing that the trade secrets are protected should make it easier for firms to fire an underperforming CEO and ii) weaker CEO power is likely to be associated with higher performance-turnover sensitivity. Regarding shareholder wealth, i) trade secret protection is valuable because loss of proprietary information can be detrimental to firm value and ii) shareholders might prefer weaker CEO power due to rent extraction and agency concerns. To indirectly show the channel, I first test the effect of the IDD recognition using the full sample, and then re-test the relationships using groups that experience the most change in CEO's bargaining power (i.e., firms with specialist vs. generalist CEOs). If the relation between the recognition of the IDD and the outcome of interest becomes stronger in the subsample of firms with largest shock to CEO's bargaining power, then I take it as indirect evidence that the bargaining power channel is the main force behind the observed relation.

With regard to CEO turnover decisions, I test whether turnover-performance sensitivity changes after the adoption of the IDD. Lin and Seo (2018) show that exogenous shocks to the protection of a firm's proprietary information increases the likelihood of a CEO being fired after poor performance. My results, using an extended sample period compared to theirs, confirm their findings that turnover-performance sensitivity is stronger when the IDD is in effect. Testing of subsamples show that specialist CEOs are no more

likely to get fired than generalist CEOs when the IDD is recognized by the state. These results suggest that the adoption of the IDD makes it easier for firms to fire CEOs after poor performance and that the main channel for the flexible CEO turnover decisions comes from the protection of trade secrets.

Finally, I examine shareholder wealth effects of the adoption of the IDD. When the IDD is adopted by state courts, I find a significant positive market reaction for firms located in those states. Similar to previous analyses, the sample is split into groups based on the types of CEOs. The results show that the adoption of the IDD is associated with a statistically significant 0.95-2.02% abnormal return in firms with specialist CEOs.⁵ The adoption of the IDD has a statistically insignificant market reaction in firms with generalist CEOs. The fact that only firms with specialist CEOs experience a positive market reaction implies that the market views the IDD news favorably because of the shift in the power dynamics, rather than protection of trade secrets.

I test various specifications to verify the robustness of my results. My results hold using various sets of control variables and industry classifications. Also, the results remain consistent when using different numbers of quartiles to rank the firms based on CEO characteristics. Increasing the number of quartiles makes the results stronger in most cases, suggesting that the bargaining power channel is what underlies the main result.

This paper makes contributions to several strands of the literature. First, this study adds to the literature on the role of bargaining power in the contracting dynamics. Studies

⁵ The magnitude of the CARs varies depending on the event windows and model used to calculate the abnormal returns.

have looked at how bargaining power of various parties involved in the pay-setting process affect CEO compensation. For example, Malmendier and Tate (2009) show that “superstar CEOs” can extract additional rent from their firms. Cronqvist and Fahlenbrach (2013) focus on the bargaining power of the principals and show that strong principals redesign CEO contracts after leveraged buyouts. Focke, Maug, and Niessen-Ruenzi (2017) further show that prestigious firms, through their enhanced bargaining power, offer CEOs lower compensation. Huang et al. (2017) show that firms with strong unions pay CEOs less. My study complements these papers by providing causal evidence that changes in CEO’s bargaining power decreases the level of CEO compensation.

Second, this paper relates to the literature on how labor laws affect corporate policies. Recently, studies have shown that the labor market restrictions can affect corporations in various ways. These include capital structure decisions (Klasa et al. 2018), financial reporting practices (Tai-Yuan Chen, Zhang, and Zhou 2018; Li, Lin, and Zhang 2018; and Ali, Li, and Zhang 2019), mergers and acquisition (Chen, Gao, and Ma 2020), and relative performance evaluation (Na 2020). This paper adds to this literature by showing that compensation levels are also affected by the labor laws.

Literature Review and Empirical Predictions

The IDD and CEO Compensation

CEO compensation is a complex and controversial topic that has drawn attention from politicians, regulators, investors, and academics. Understanding the pay-setting process is at the core of CEO compensation research, and the interest has been fueled by the drastic increase in the level of CEO compensation over the years. Broadly, there are

two schools of thought on this topic: *rent extraction view* and *optimal contracting view* (Frydman and Jenter 2010). Proponents of the rent extraction view (e.g., Bebchuk and Fried 2009) argue that powerful CEOs exert influence on the pay-setting process, resulting in inefficiently high levels of compensation. On the contrary, optimal contracting view suggests that the observed high levels of CEO compensation mainly result from competitive market equilibriums. The literature seems to show that neither view alone can fully capture the pay-setting dynamics.

One common component in both regimes is the CEO's bargaining power. In the rent extraction regime, the underlying presumption is that CEOs exert tremendous influence in the internal affairs of their firms. Powerful CEOs have been shown to influence a wide range of firm-level decisions and outcomes such as board composition (Coles, Daniel, and Naveen 2014; Baldenius, Melumad, and Meng 2014), investments (Glaser, Lopez-De-Silanes, and Sautner 2013; Pan, Wang, and Weisbach 2016), and variability of firm performance (Adams, Almeida, and Ferreira 2005). Thus, it seems possible that powerful CEOs would try to extract rent from the firm at the expense of the shareholders. In the optimal contracting regime, CEO compensation is thought to be determined, in part, by CEOs' outside options and firms' outside options in a competitive market for talent (Edmans, Gabaix, and Jenter 2017). In other words, the equilibrium level of compensation is an outcome of the relative bargaining power dynamics of the two parties. While the two regimes provide a slightly different description of the pay-setting process, there is little doubt that the CEO's bargaining power plays an important role.

The compensation literature finds that powerful CEOs are associated with questionable compensation-related outcomes. For example, Core, Holthausen, and Larcker (1999) show that firms with weaker governance structures are associated with greater CEO compensation. Grinstein and Hribar (2004) show that powerful CEOs receive larger bonuses after M&A deals. Morse, Nanda, and Seru (2011) argue that powerful CEOs rig their incentive contracts by influencing boards to adjust the weight on performance measures to better performing measures. While these studies show association between powerful CEOs and compensation, there is no definitive causal evidence that CEOs' bargaining power plays an economically significant role in the pay-setting process. The main reason is that identifying an exogenous variation in CEO's bargaining power is empirically challenging. I attempt to fill that gap in the literature by showing casual evidence of how changes in the CEO's bargaining power affects CEO compensation.

An exogenous change in the CEO's bargaining power is identified by recognitions, and sometimes subsequent rejections, of the IDD by state courts.⁶ The IDD, by providing legal protection of firms' trade secrets, restricts the mobility of executives who possess proprietary knowledge (Klasa et al. 2018). Reduced mobility, in turn, limits CEOs' outside options and reduces the bargaining power of the CEOs. Since the IDD is adopted at the state-level, adoption of the IDD represents an exogenous decrease in the bargaining power of the CEOs whose firms are located in the particular state.⁷ Hence, *ceteris paribus*, CEO compensation should be lower in firms located in states where the IDD is adopted. This leads to the main hypothesis of this study: a decrease in CEO's bargaining power will lead

⁶ 'The Inevitable Disclosure Doctrine' section describes the IDD in detail.

⁷ Exogeneity of the IDD is described in the 'Empirical Framework' section.

to lower CEO compensation. This empirical prediction should hold true regardless of whether rent extraction or optimal contracting is the main driver of the pay-setting process.

The Bargaining Power Channel

I also perform additional tests to strengthen the argument for the bargaining power channel. If the adoption of the IDD truly captures a shift in the CEO's bargaining power, the relation between IDD recognition and compensation changes should be strongest in firms where the CEOs experience the biggest shift in bargaining power. In other words, the relation between IDD recognition and CEO compensation should be strongest in environments where CEOs are likely to experience the greatest mobility restrictions when the IDD is adopted. I argue that the recognition of the IDD is likely to have heterogeneous treatment effects in the following groups: i) CEOs whose skills are mainly firm-specific, ii) CEOs whose firm operates in only one business segment, iii) CEOs in highly competitive industries, and iv) CEOs who are the founders or family descendants.

First, I argue that CEOs who mainly possess firm-specific human capital will experience the largest decline in compensation when the IDD is adopted. One of the characteristics that researchers use to categorize CEOs is by the type of skillset they bring to their firms. For example, Murphy and Zájbojník (2004) make a distinction between general managerial skills and firm-specific skills and argue that the former has recently become more important in the labor market for CEOs. Custódio, Ferreira, and Matos (2013) provide empirical support that CEOs with general management skills (generalist CEOs) receive greater compensation compared to CEOs with mostly firm-specific skills (specialist CEOs). This classification based on CEO skillset is useful in the context of my

research question. My argument is based on the idea that general management skills can be applied to other firms without revealing trade secrets from previous employment. Consequently, the IDD should not affect the mobility of generalist CEOs as much as it affects specialist CEOs. Specialist CEOs would experience significant mobility restrictions after adoption of the IDD because they only possess firm-specific skills that are not widely applicable to other firms. Thus, the recognition of the IDD is likely to reduce the bargaining power of the specialist CEOs more than that of generalists, and I expect CEO compensation to decline more for specialist CEOs when the IDD is adopted.

The second prediction is that CEOs in firms with one business segment should experience greater compensation decline from the IDD recognition. The logic is like the one used in CEO skillset argument. CEOs of firms with one business segment (focused firms) are likely to possess mostly firm-specific or industry-specific knowledge relative to firms with multiple business segments (diversified firms).⁸ Firms that would most value these CEOs are the ones that operate in similar industries (i.e. rivals). Since the IDD's mobility restrictions are designed specifically for these circumstances, the recognition of the IDD should greatly reduce the mobility of the CEOs of firms with one business segment. Thus, I expect to see the largest decline in CEO compensation, after the IDD adoption, in firms with only one business segment.

The third test focuses on CEOs in highly competitive industries. As previously cited, Murphy and Zábajník (2004) argue that the recent shift in demand for generalist CEOs has led to increased competition in the labor market for CEOs, leading to increase in overall

⁸ One could argue that the number of business segments is another proxy for what type of skillset, general management or firm-specific, the CEO possesses.

compensation. This implies that generalist CEOs who have many outside opportunities can demand more compensation. Similar logic can be applied to CEOs in competitive industries. All else equal, CEOs in highly competitive industries presumably have more outside opportunities than those in less concentrated industries. At the same time, firms in competitive markets also have a wide range of CEOs to choose from. When the IDD is adopted, the following happens. Firms can no longer hire new CEOs from the same state's competing firms, but they can still hire from other states. CEOs, on the other hand, are not able to go to any other competing firm. Thus, the relative bargaining power between the firms and the CEOs decreases more for the CEOs. This change in relative bargaining power of CEOs should be greater in competitive industries than less competitive industries. Thus, I expect CEO compensation to decline more for CEOs in competitive industries, as compared to ones in less competitive industries, when the IDD is adopted.

The last group I examine is founder CEOs and family-descendant CEOs (founder CEOs, hereafter). The empirical prediction on founder CEOs is less clear. On one hand, the IDD might not affect founder CEOs because they are extremely powerful. The power of founder CEOs within their firm is well-documented in the literature. For example, Leone and Liu (2010) documents founder CEO power by showing that founder CEOs are less likely to be fired than non-founder CEOs when accounting irregularities occur. Thus, it is possible that the recognition of the IDD does not have a significant effect on founder CEOs' bargaining powers. On the other hand, founder CEOs may experience substantial decline in bargaining power when the IDD is adopted. Founders know all the trade secrets of the firm and their experience is likely to be very firm-specific. In other words, they are an extreme case of a specialist CEO with all the proprietary knowledge. Further, although

powerful, they are not invincible as documented by Leone and Liu (2010). Thus, the recognition of the IDD might significantly reduce the bargaining power of founder CEOs and subsequently lower their compensation levels. Whether founder CEOs experience a significant drop in bargaining power and compensation because of the IDD is, therefore, an empirical question.

Components of CEO Compensation

Next, I examine which components of pay are most affected by the change in CEO's bargaining power. Understanding the structure of compensation is an important area of the CEO compensation research. To illustrate, there has been a dramatic increase in the level of CEO compensation since the 1980s; and one of the ways researchers tried to explain the phenomenon is by analyzing which components of compensation are responsible for such increase (Frydman and Jenter 2010). For example, the literature documents that there was a surge in option compensation during the 1980s and the 1990s, which was later replaced by restricted stock compensation (Edmans, Gabaix, and Jenter 2017). Researchers also examine why certain components of compensation exist. For example, use of 'stealth' compensation – such as perquisites, pensions, and severance pay – has been criticized by some scholars (e.g., Bebchuk and Fried 2009) as an indication of rent extraction by powerful CEOs. However, others suggest that such stealth compensation still may be an outcome of optimal contracting (Rajan and Wulf 2006). While there is no consensus on the precise role of each component of compensation, it is still useful to document which component of compensation changes the most when the IDD is adopted. Significant changes in more 'controversial' forms of compensation may shed light on

whether rent extraction or optimal contracting is the dominant force in the contracting dynamics. Due to lack of readily available data on each component of compensation, I examine the following components from Execucomp: total current compensation (salary + bonus), stocks, options, and other compensation. As with total compensation, I further examine each component in subsamples that are likely to be impacted the most by the recognition of the IDD.

Additional Tests

The recognition of the IDD is a major event for firms for two reasons: i) it protects the trade secrets of the firms and ii) it reduces the bargaining power of the CEOs by restricting CEO mobility. While the recognition of the IDD is a single event, how it influences a particular outcome depends on the channel through which the doctrine affects the outcome. For instance, the level of CEO compensation is unlikely to decrease because better trade secret protection is in place. Thus, I argued that reduction of CEO's bargaining power is the channel through which the recognition of the IDD affects compensation. In the final set of tests, I investigate how the adoption of the IDD affects CEO turnover decisions and shareholder wealth. These two outcomes, unlike CEO compensation, can be impacted by both channels of the IDD adoption. Thus, I first document whether the adoption of the IDD affects turnover decisions and shareholder value and attempt to provide indirect evidence on which channel is facilitating the relationships using subsample analysis.

I investigate whether CEOs are more likely to get fired due to poor performance when the IDD is in effect. CEO turnover decision is one of the key governance mechanisms

to discipline the CEO for poor performance (e.g., Hermalin and Weisbach 2003; Jenter and Kanaan 2015). Guo and Masulis (2015), for example, show that sensitivity of forced CEO turnover to performance increases when board independence increases. As board independence usually signifies stronger corporate governance, their results imply that CEOs are more likely to get fired when their relative bargaining power decreases. Further, a guaranteed protection of trade secrets will make it easier for firms to fire CEOs for poor performance. Lin and Seo (2018) confirm that exogenous shocks to the protection of a firm's proprietary information increases both the likelihood of forced CEO turnover and the turnover-performance sensitivity. Despite the pre-documented evidence, I test the relation between turnover-performance sensitivity and the IDD using a longer sample period. My empirical prediction is that the recognition of the IDD will increase the turnover-performance sensitivity. To indirectly test which channel – protection of trade secrets or reduction in CEO's bargaining power – is the main driving force, I examine whether CEO's skillset matters in the relation. If the bargaining power channel is the main cause, I expect to find a stronger turnover-performance sensitivity in the specialist CEO subsample. Otherwise, I suspect that protection of trade secrets is the main driver of the IDD and turnover relation.

Finally, I examine how the market reacts to the adoption of the IDD using the event-study methodology. The adoption of the IDD is likely to be perceived by the market as a positive news. First, it protects the trade secrets of the firms. Since loss of proprietary knowledge is detrimental to firm value, the recognition of the IDD should receive a positive reaction from the market. Second, the IDD reduces the bargaining power of the CEOs. Because of rent extraction and agency concerns, reduction of CEO's bargaining power

should also receive a positive reaction from the market.⁹ As in the turnover-performance sensitivity, I first test shareholder reactions in the whole sample and in different subsamples to see which channel is driving the results. If the reduction in CEO's bargaining power is the main source of the positive market reaction, then I expect to find a stronger result in the specialist CEO subsample. Otherwise, protection of trade secrets might be the main source of the positive market reaction to the IDD adoption. The argument is as follows. The importance of trade secret protection is arguably similar in firms where generalist or specialist CEOs are employed. The observation that only firms with specialist CEOs experience a positive market reaction would imply that the market views the news favorably because of the shift in the CEO-board power dynamics.

Related Study

It is worth noting that Garmaise (2011) provides some evidence that executive compensation decreases when enforceability of noncompetition agreements is increased. While the primary result of my paper yields a similar inference, I argue that the IDD framework provides much stronger identification for the following reasons. First, noncompetition agreements are endogenously chosen by the firm. That is, the decision to enter into a noncompetition agreement is another outcome of the contracting dynamics. Relative bargaining power of the CEO plays a role in whether the agreement is put in place. Thus, even if variation of enforceability at the state-level is exogenous, which firms are affected by that variation is likely to depend on firm-specific characteristics. Garmaise (2011) notes that around 70% of firms in his sample utilize noncompetition agreements.

⁹ For example, Graham, Kim, and Leary (2020) find that announcement of the departure of powerful CEOs lead to higher abnormal return.

That means 30% of the firms in his sample, presumably with systematically different characteristics, are unaffected by the changes in noncompetition enforceability. Second, the IDD provides stronger mobility restrictions. As previously mentioned, the IDD is applicable even in the absence of nondisclosure or noncompetition agreements, is enforceable before detection of any wrongdoing, and is not subject to any geographic restrictions. Thus, changes in attitudes of state courts regarding the IDD produce a stronger shock to CEO mobility that affects all firms in the state. These reasons suggest that the IDD framework is more appropriate in addressing my research question.

The Inevitable Disclosure Doctrine

This section explains how the IDD, through the concept of “threatened misappropriation”, restricts CEO mobility. It also illustrates why the IDD offers stronger protection of trade secrets compared to contractual agreements that firms put in place. Lastly, I explain why the IDD provides a good empirical framework within which my research question can be addressed.

Trade secrets are confidential business information – including commercial secrets, sales methods, distribution methods, consumer profiles, advertising strategies, list of suppliers and clients, etc. – that provides a firm a competitive advantage over its rivals. Some estimate the value of trade secrets in the U.S. public firms to be as much as \$5 trillion (Gao, Zhang, and Zhang 2018). The importance of trade secrets has led legislators and firms to incorporate various methods to ensure the protection of trade secrets.

The IDD is a legal doctrine that provides firms with protection of their trade secrets. The doctrine maintains that, upon the former employer’s request, state courts can prevent

the employee with trade secrets from working for a competing firm if it would inevitably lead to a spillover of trade secrets and cause the firm irreparable harm. The key underlying concept in the applicability of the IDD is “threatened misappropriation”. That is, firms can obtain an injunction, even in the absence of actual wrongdoing, if they can establish that (i) the former employee had access to trade secrets, (ii) the employee’s role in the new firm would inevitably lead to disclosure of the trade secrets, and (iii) the disclosure of trade would cause irreparable harm to the business.

Firms often use a nondisclosure agreement (NDA) or noncompetition covenant (NCC) in employment contracts to protect their trade secrets. While NDAs and NCCs provide a layer of protection to firms, the IDD provides more effective protection for the following reasons. First, IDD’s applicability does not have geographic restrictions. While the scope of enforceability of NDAs or NCCs is usually within a city or a state, the IDD is applicable even when the former employee has moved to another state whose courts have not adopted the IDD. Second, the IDD improves the protection offered by NDAs and NCCs. To illustrate, the protection offered by NDAs depends on the former employer’s ability to detect and prove misappropriation. Even if successful, the damage would have already been incurred. The IDD, however, allows courts to issue an injunction before the actual misappropriation is detected. Finally, the IDD is applicable even if the former employer did not have an NDA or NCC in the employment contract.

From the perspective of identification, the exogeneity of the doctrine is perhaps more important than the additional protection offered by the IDD is the exogeneity of the doctrine. As previously mentioned, NDAs and NCCs are contractual agreements between

the employers and the employees. While Garmaise (2011) used the variation of NCC enforceability across states to examine its effect on executive compensation, the endogeneity of firms' choosing NDAs/NCCs is not resolved. Moreover, firms that do not have NDAs or NCCs in the employment contracts are unaffected by the variation of NCC enforceability across states. On the other hand, the decision by state courts to adopt or reject IDD is more exogenous and affects all firms in that jurisdiction regardless of whether NDAs or NCCs are in the contracts. The exogeneity of the IDD is further discussed in the 'Empirical Framework' section.

Klasa et al. (2018) provides a list of precedent-setting legal cases in which state courts adopted the IDD or rejected it after adopting it. Since their sample period ends in 2011, I extend the list to update the information up to 2019. I follow a similar procedure as in Klasa et al. (2018). I read through the court documents to identify whether each state adopted the IDD after 2011 or rejected a previously adopted IDD.¹⁰ For court decisions that explicitly use the IDD or reject it, the process is simple. However, there are some court rulings that are less clear about whether the state court recognizes the IDD.¹¹ In order to be classified as a state that has adopted the IDD, the state court should explicitly express the approval of the IDD or identical principles. Similar standard applies when identifying rejections of the IDD. To illustrate, the court's decision to deny the enjoinder of a former employee, by itself, does not qualify as the court rejecting the IDD. For example, in IBM

¹⁰ Like Klasa et al. (2018), I exclude the states that either never considered the IDD or rejected the IDD without previously adopting it. This is in line with my research design, because I attempt to identify exogenous decrease in CEO mobility (decrease in bargaining power).

¹¹ This leads to discrepancies among published papers on whether or not and when a state adopts/rejects the IDD. For example, Na (2020) treats Arkansas as having rejected the IDD in 2009. However, Klasa et al. (2018) treats Arkansas as not having rejected the IDD as of 2011.

Corp. v. Seagate Technology, Inc., 941 F. Supp. 98 (D. Minn. 1992) case, the court denied the plaintiff's motion for preliminary injunction not because the court rejected the IDD, but the plaintiff failed to show that there is a high likelihood of inevitable disclosure. In this case, I classify the state as having recognized the IDD. Table 1 shows the list of the precedent-setting cases up to 2019.

Empirical Framework

IDD as an Exogenous Shock to CEO Bargaining Power

The relation between CEO's bargaining power and the IDD is straightforward. As illustrated previously, the recognition of the IDD largely removes the possibility of a firm's CEO joining a competitor. Klasa et al. (2018) provides empirical evidence that labor mobility of workers with knowledge of trade secrets declines after the adoption of the IDD. The restriction of CEO mobility, in turn, reduces the bargaining power of the CEO in the contracting dynamics. As the outside options of a CEO becomes scarce, his or her ability to negotiate a better contract is diminished.

Regarding identification, the relation between CEO's bargaining power and the IDD must be exogenous. I argue that recognition of the IDD by the state courts captures exogenous variation in the bargaining power of the CEOs for the following reasons. First, the primary purpose of the IDD is to provide protection of individual firm's trade secrets. Thus, it is not directly related to firm-level contracting environments. Second, court decisions regarding the IDD is unlikely to be influenced by corporate lobbying. Klasa et al. (2018) notes that the court decisions are typically driven by the merits of the specific case, and the judges are largely immune to political pressure. Thus, the IDD framework is not

subject to the concern that the state-level decision may still be endogenous due to corporate lobbying.¹² Third, the outcome and timing of the court decisions are unlikely to be anticipated by firms. Since I am using unprecedented recognitions of the IDD in each state and, in few cases, the subsequent rejection of the IDD, the court decisions should come as a surprise to the firms in the state. Moreover, the timing of the court cases cannot be anticipated as they are case-specific. Overall, the recognition of the IDD by a state court is arguably an exogenous event.

As previously noted, some studies use the adoption of the IDD (e.g., Gao, Zhang, and Zhang 2018; Klasa et al. 2018; Chen, Gao, and Ma 2020; Lin and Seo 2018) and others use the rejection of the IDD (e.g., Flammer and Kacperczyk 2019; Na 2020) to capture the variation in CEO mobility. I argue that the adoption of the IDD captures the true shock to CEO mobility and the relative bargaining power. The difference is subtle, albeit significant in terms of the research design. At a given time, a state can fall into the following four categories: 1) the state court has never considered the IDD (*neutral*), 2) the state court has adopted the IDD (*adopted*), 3) the state court has rejected the IDD without prior recognition (*rejected*), and 4) the state court has rejected the IDD after having adopted it in the past (*rejected*). The subtlety comes from the third case and the fourth case. Using the rejection of the IDD implicitly assumes that the third and the fourth cases both capture the same ‘amount’ of change in CEO mobility. That is, going from a neutral to a rejected state and going from an adopted to a rejected state are assumed to represent the same change in CEO mobility. This, however, is unlikely. The IDD provides a significant protection of trade

¹² Karpoff and Wittry (2018), for example, identifies numerous firms that motivated the business combination laws in their states.

secrets and the ex-ante presumption of states prior to consideration of the IDD is that such strong doctrine is inapplicable. Thus, rejecting the IDD from a neutral state should not come as much of a surprise. Adopting the IDD, however, represents a significant change compared to the neutral state. Since the aim of the research design is to capture a significant change in CEO mobility and bargaining power, using the adoption of the IDD seems more appropriate.

Staggered Difference-in-Differences Framework

I use the difference-in-differences methodology to evaluate how changes in CEO's bargaining power affects the level of CEO compensation. The main regression equation is as follows:

$$\ln(\text{Comp})_{i,t} = \alpha_0 + \beta_1 \text{IDD}_{j,t} + \text{controls}_{i,t} + \text{Firm}_i + \text{Year}_t + \varepsilon_{i,t} \quad (1)$$

where i , j , and t index firms, states of headquarters, and years, respectively. The main dependent variable, $\ln(\text{Comp})_{i,t}$, is the natural log of total compensation. $\text{IDD}_{j,t}$ is an indicator variable that equals 1 if the IDD is being recognized (i.e., IDD is adopted sometime in the past) in state j in year t and 0 otherwise. $\text{Controls}_{i,t}$ is a vector of control variables that affect CEO compensation. Firm_i and Year_t are firm-fixed effects and year-fixed effects, respectively.

The key independent variable is the IDD indicator variable. The coefficient on $\text{IDD}_{j,t}$ captures the effect of the IDD on the level of CEO compensation. As Bertrand and Mullainathan (2003) illustrates, the staggered adoption of the IDD means that the 'control' group is not restricted to the states that never adopt the IDD. The staggered difference-in-

differences methodology implicitly takes as the control group all firms headquartered in states that do not recognize the doctrine at time t .

It is worth noting that I use the state of headquarters to indicate whether the firm is under the protection of the IDD. While firms often have offices or plants in more than one state, workers who possess knowledge of trade secrets are more likely to work in the headquarters. Since the IDD aims to restrict the mobility of these higher-ranking employees, using the state of headquarters is appropriate in the context of this research.

The control variables used in the baseline specification are based on the prior literature on the determinants of CEO compensation. They include firm size, leverage, Tobin's Q, ROA, prior return, firm risk, industry competition, CEO tenure, CEO ownership, CEO/chair duality, independent board representation, board size, independent board ownership, female board representation, *state year*, and *industry year*. *State year* and *industry year* are defined as the annual mean of the dependent variable in the firm's state of headquarters and the two-digit Standard Industrial Classification (SIC) industry, respectively, excluding the firm itself. These variables are there to isolate the effect of the IDD from other contemporaneous shocks in the state of headquarters and the industry (Bertrand and Mullainathan 2003; John, Li, and Pang 2017).

Following the literature, standard errors in all models are clustered by the state of headquarters. This is to account for the following correlation of the error terms: (i) cross-sectional correlation across different firms in a given state and year, (ii) serial correlation across different firms in the same state over time, (iii) and serial correlation within the same firm over time. Cross-sectional correlation is a concern because the recognition of the IDD

affects all firms in a given state at time t . Serial correlation is a concern because the IDD indicator variable does not change much over time.

Filters Applied in the Regressions

I also apply the following two filters when I run the main regressions. First, I remove the first year in which the IDD is recognized. To illustrate, consider a firm in Missouri whose fiscal year ends on December 31st. The state court of Missouri adopted the IDD on November 2nd, 2000. Since the IDD indicator variable marks whether the observation's date is during the period in which the IDD is recognized, the IDD variable for the above firm in fiscal year 2000 would take on the value of 1. However, the compensation details reported as of December 31st, 2000 is a result of the compensation contract devised at the beginning of the fiscal year. That is, when the compensation contract was made, the IDD was not adopted in Missouri. Therefore, including the first year in which the IDD is recognized is an inaccurate way to test my research question.¹³ Second, I remove the CEOs who joined the firm while the IDD was being recognized in the state. The rationale is that CEOs who comes into office while the IDD is in effect sign their contracts knowing that their outside options will be limited in the future. They are unlikely to accept lower compensation packages with that knowledge. CEOs who are already in office when the IDD gets adopted experience the true shock in bargaining power when renewing their contracts. Thus, removing CEOs who join their firms while the IDD is in

¹³ According to various sources (e.g., American Society of Association Executives), typical CEO contract durations range from 2 to 5 years. Thus, removing only the first year of the IDD-adopted period is a conservative measure.

effect is a more accurate way to capture the bargaining power-compensation relation.¹⁴ Removing the filters, however, yields qualitatively robust results.

Data and Results

Data and Sample Selection

All data used in this study comes from publicly available sources. CEO characteristics and compensation data are obtained from S&P's ExecuComp database; Board characteristics and ownership data is from BoardEx; stock information is from CRSP; firm accounting data and location is obtained from Compustat. In addition, data on whether CEOs possess general management skills or firm-specific skills and data on forced turnover is provided by the authors of the relevant papers.¹⁵ I exclude financial and utility firms, as is common in the literature. As described in the 'Inevitable Disclosure Doctrine' section, I extend the IDD data obtained from Klasa et al. (2018) to 2019. By the end of 2019, a total of 21 states have adopted the IDD, and 6 of the 21 states later rejected the IDD. States that rejected the IDD without prior recognition are not included in the analysis, for the reasons illustrated in the 'Empirical Framework' section. The final sample consists of 11,100 firm-year observations from 1992 to 2017. Table 2 reports the summary statistics. My data are comparable to those used in prior compensation research (e.g., Na 2020).

¹⁴ The '*Removing the CEOs who Join while the IDD is in Effect*' section shows empirical evidence of the validity of this second filter.

¹⁵ I am grateful to the authors of Custódio, Ferreira, and Matos (2013) for providing the CEO skill type data and to the authors of Peters and Wagner (2014) and Jenter and Kanaan (2015) for providing the forced CEO turnover data.

Main Results

Table 3 shows the impact of the IDD recognition on the level of CEO compensation of firms located in the affected states. Model 1 uses the natural logarithm of one plus total CEO compensation ('*tdc1*' in *Execucomp*) as the dependent variable. In Model 2, I use inflation adjusted value of total compensation to calculate the dependent variable.¹⁶ Both models include the full set of control variables listed in the 'Empirical Framework' section and firm and year fixed effects.

The recognition of the IDD has a negative and statistically significant impact on the level of CEO compensation in firms in affected states. The results are consistent with the prediction that the recognition of the IDD by the state courts reduces the bargaining power of the CEOs and decreases the level of CEO compensation. The economic magnitudes of the coefficients are also significant. The coefficients on the IDD indicator suggest that the recognition of the IDD by the state courts leads to approximately 9.22% (9.00%) decrease in the nominal (inflation adjusted) level of total compensation. For simplicity, the rest of the analyses use nominal level of compensation. The estimated coefficients on the IDD indicator are statistically significant at 5% and 10% (p-values of 0.047 and 0.054). While this level of precision seems less than ideal, further analysis using split samples shows that this is because the full sample contains group of firms whose CEOs are less likely to be affected by the IDD. In other words, results become much

¹⁶ Following Na (2020), I deflate total compensation by the ratio of the Consumer Price Index (CPI) of the fiscal month to the CPI of January 1992. This adjusts the units to constant 1992 dollars.

stronger and more precise (p-value of 0.001) when the groups that are potentially most affected (in regard to CEO bargaining power, to the IDD) is analyzed separately.

The Parallel Trends Assumption

A critical assumption in the difference-in-differences framework is the parallel trends assumption. That is, the trends in CEO compensation of firms in affected states should not differ from those in unaffected states. If there is a decreasing trend in CEO compensation of firms in affected states prior to the adoption of the IDD, my main result could be driven by reverse causality.

In Figure 1, I show that the parallel trends assumption holds. Using the same specification as in Table 3, I replace the IDD indicator variable with variables indicating the relative time until or after the adoption of the IDD. IDD^{-3} takes on a value of one if the firm's state will adopt the IDD in three years; IDD^{-2} indicates that the firm's state will adopt the IDD in two years; IDD^{-1} indicates that the firm's state will adopt the IDD in one year; IDD^0 indicates the year in which the IDD is adopted; IDD^1 indicates that the firm's state adopted the IDD one year ago; IDD^2 indicates that the firm's state adopted the IDD two year ago; IDD^3 indicates that the firm's state adopted the IDD three; IDD^{4+} indicates that the firm's state adopted the IDD four or more years ago; IDD^R indicates that the firm's state rejected the IDD as of year t after adopting it earlier. Coefficient estimate of IDD^R is not shown in Figure 1.

The coefficients on IDD^{-3} , IDD^{-2} , and IDD^{-1} are important because their statistical significance would indicate a difference in pre-treatment trends between the affected and unaffected firms. Figure 1 shows that the coefficient on IDD^{-1} is significantly positive. This

is not a concern for the following reasons. First, the staggered nature of the adoption of the IDD and the randomness in the timing of the adoption make it implausible that there is an economic reason behind what is observed. If the adoption of the IDD occurred on the same date in all affected states, there could be a possibility of some economically concerning factor one year prior to the shock. However, since state courts recognize the IDD based on specific court cases that occur on a wide range of dates and the decisions cannot be anticipated by firms, the observed positive coefficient on IDD^{-1} is less concerning. Second, a significant negative trend prior to treatment would raise concerns of reverse causality, but that is not the case. If firms were somehow affecting court decisions to lower CEO compensation, which is highly unlikely, I would not expect to see a rise in CEO compensation in affected states prior to the adoption of the IDD. Overall, I argue that the significantly positive coefficient on IDD^{-1} is trivial. Most importantly, there is a clear negative trend after the adoption of the IDD.

There seems to be a delayed impact of the IDD recognition on CEO compensation. The coefficient on IDD^1 is negative but statistically insignificant. The coefficients on IDD^2 , IDD^3 , and IDD^{4+} are significantly negative and the magnitudes become larger. I suspect that the reason for the delayed impact is as follows. Anecdotal evidence and some academic papers (e.g., Murphy 1999) suggest that the typical duration of a CEO contract lasts between 2 to 5 years. This suggests that the effect of the IDD adoption will not be observable until the previous contract expires, even if the IDD is adopted prior to the expiration. In other words, the compensation data in years immediately after the adoption of the IDD will contain compensation that were agreed upon before the contracting dynamics changed. Thus, it is not surprising to see coefficient estimates becoming more

precise as the number of years after the IDD adoption increases. Overall, Figure 1 shows that the parallel trends assumption holds in this empirical framework and provides support for the validity of my casual interpretation.

Removing the CEOs who Join while the IDD is in Effect

As mentioned in the ‘*Filters Applied in the Regressions*’ section, I exclude CEOs who take the job while the IDD is being recognized in the state. The rationale is that CEOs who sign the contracts while the IDD is in effect (*incoming CEOs*) know their future opportunities will be restricted by the doctrine; thus, they are unlikely to agree to a lower compensation. However, CEOs who are already in office when the IDD gets adopted (*incumbent CEOs*) experience a shock to their bargaining power and are forced to accept lower compensation.

Table 4 tests whether applying the filter is appropriate. Specifically, given that the IDD is being recognized in the state, I examine whether the *incoming CEOs* receive higher pay than the *incumbent CEOs*. Column (1) shows that *incoming CEOs* earn about 18.6% higher compensation than the *incumbent CEOs* when the IDD is in effect. The results are consistent with the argument that *incoming CEOs* are not subject to the same decrease in bargaining power as the *incumbent CEOs*. That is, only the *incumbent CEOs* experience the shock to their bargaining power and the subsequent decrease in compensation. Column (2) presents the regression results of the same specification excluding CEOs from New York. The state of New York adopted the IDD in 1919. Thus, every CEO from New York during my sample period was hired while the IDD was in effect. Since the average salary of CEOs from New York is significantly higher than those from other states, the result

from Column (1) could be driven by the higher salaries of New York's CEOs. Column (2) shows that the results hold even after dropping observations from New York. Overall, Table 4 shows excluding the *incoming CEOs* from the main analyses is appropriate. Including them will deteriorate the ability of the IDD indicator to capture the true shock to CEO's bargaining power.

CEO Characteristics and Heterogeneous Effects of the Recognition of the IDD

As illustrated in the 'Literature Review and Empirical Predictions' section, I identify situations where the CEOs should experience the greatest shock to their bargaining powers because of the recognition of the IDD. The effects of the recognition of the IDD would be different according to the following characteristics: i) the type of skillset the CEOs possess (firm-specific vs. general management skills), ii) number of business segments that the CEOs manage (one business segment vs. many business segments), iii) competitive environment of the firm (highly competitive vs. less competitive industries), and iv) founder status of the CEOs. I examine the relation between the IDD recognition and CEO compensation in those groups by using split samples and comparing the coefficient on the IDD indicator.

To test for heterogeneous treatment effects in different groups, researchers often incorporate two designs. Some studies (e.g., Duchin, Matsusaka, and Ozbas 2010) interact a variable that might be driving the heterogeneous effects with the main variable of interest and examine the interaction term. Others (e.g., Aggarwal, Saffi, and Sturgess 2015) split the sample based on the characteristic related to the heterogeneous effects and run separate regressions. I argue that the latter method is more appropriate in this study for the following

reasons. First, using subsamples is less restrictive because using the interaction method implicitly assumes that all other covariates have an identical effect on the dependent variable. That is, the coefficients on the control variables are forced to be identical.¹⁷ Second, the split sample method allows me to clearly see which group is driving the main relation. That is, dividing the sample into finer quantiles can reveal whether the observed relation is indeed strongest in the most extreme quantile and in which group the relation ceases to exist. In the context of this study, for example, dividing the sample into firms with one business segment, two business segments, and three or more business segments reveals the following observation: the relation between the IDD and CEO compensation is strongly negative and significant in the one business segment subgroup, less strong but significantly negative in the two business segments subgroup, and insignificant in the last subgroup. Thus, using the split sample method allows for a more detailed inspection of the results. Using the interaction method still yields qualitatively similar results.

Table 5 shows the results using split samples based on how specialized the CEO is. Based on the General Ability Index (GAI) from Custódio, Ferreira, and Matos (2013), CEOs are divided into terciles.¹⁸ The lowest tercile represents the CEOs with the least general management skills, indicating that the nature of their skillset is firm-specific. My prediction that the relation between the IDD recognition and CEO compensation should be the strongest in the lowest tercile (i.e., specialist CEOs) is confirmed in Table 5. The coefficient on the IDD indicator is negative and statistically significant at 1% level. In terms of economic magnitude, the recognition of the IDD decreases the level of CEO

¹⁷ Some studies address this issue by interacting every variable.

¹⁸ I get robust results when using 2, 4, or 5 subgroups.

compensation by 17.3% on average. The coefficient on the IDD indicator in the lowest tercile is statistically different from those of the other tercile (p-value of 0.032). Results show that the recognition of the IDD does not affect the compensation levels of generalist CEOs. This is consistent with the notion that CEOs who possess general management skills will still have many outside opportunities even when the IDD is adopted. Thus, the doctrine does not affect their bargaining power significantly and there is no change to their compensation levels.

Table 6 presents results using split samples based on the number of business segments. As illustrated in the ‘Literature Review and Empirical Predictions’ section, I expect the strongest results in the subsample of firms with one business segment. The results confirm my prediction that the recognition of the IDD has a negative and statistically significant effect on CEO compensation in the subsample of firms with one business segment. On average, CEOs who manage one business segment experiences a 20.1% decline in compensation (p-value of 0.009) after the IDD is adopted. The coefficient on the IDD indicator in the multiple segments subgroup is negative, but statistically insignificant. Testing the difference in coefficients of the two groups shows that the coefficients are statistically different at 10% level. To further examine heterogeneous treatment effects in detail, I divide the groups into the following: firms with one business segment, firms with two business segments, and firms with three or more business segments. The results (not shown) reveal that the coefficient on the IDD indicator in the two business segments subsample is negative and statistically significant in some specifications (p-values around 0.10). Overall, the results confirm that bargaining powers

of the CEOs who manage only one business segment are most affected by the recognition of the IDD, leading to a decrease in the level of compensation when the doctrine is adopted.

Table 7 presents how a firm's competitive environment influences the relation between the recognition of the IDD and CEO compensation. The 'Literature Review and Empirical Predictions' section describes in detail why CEOs in more competitive industries are likely to experience greater drop in compensation after the IDD is adopted. I use the Herfindahl-Hirschman Index (HHI) to proxy for the competition level of the industry in which a firm operates. Following Masulis and Mobbs (2011), I define high competition industry as an industry that has an HHI score above 75th percentile and low competition industry as ones with an HHI score below 25th percentile. The rest are categorized as medium competition industry. The results confirm that CEOs in highly competitive industries experience a decrease compensation. On average, CEOs in highly competitive industries lose about 16.4% in compensation when the IDD is recognized in their states. The coefficient is statistically significant at the 1% level. In medium and low competition industries, the coefficient on the IDD indicator is statistically insignificant. Testing the difference in coefficients shows that the coefficient of interest in high competition subsample is different from those of other subsamples (p-value of 0.089).

Lastly, I examine whether there are heterogeneous treatment effects based on the founder-status of the CEOs. More precisely, I divide the sample into two groups. The first group consists of firms where the CEO is either the founder or a family descendant. The second group consists of all other firms. As described in the 'Literature Review and Empirical Predictions' section, the empirical prediction is less clear on this test. On one

hand, founders are so powerful that the recognition of the IDD should not really affect their bargaining power. On the other hand, founders know all the trade secrets of the firm and possess only firm-specific knowledge. Therefore, eliminating the possibility of working for another firm could be detrimental to their bargaining power. Results presented in Table 8 shows that the latter argument prevails in data, on average. The recognition of the IDD causes CEO compensation to drop 20.5% (p-value of 0.016) in the founder CEO subsample. In the non-founder CEO subsample, the coefficient on the IDD indicator is positive and statistically insignificant. The coefficients on the IDD indicator in the two samples are statistically different.

Various split sample analyses reveal that the recognition of the IDD by the state courts only affects the compensation levels of the CEOs that are likely to experience the substantial mobility restrictions. In other words, CEO compensation is influenced by the IDD only when the CEOs experience a shock to their bargaining power. Overall, these results show evidence that changes to CEO's bargaining power is the channel through which the IDD affects CEO compensation.

Components of CEO Compensation

Table 9 shows how different components of CEO compensation change as a result of the recognition of the IDD. Total current compensation (salary + bonus + non-equity incentives), stocks, options, and other compensation are examined. The main purpose of this analysis is to document which components are affected the most when there is a shock to the contracting dynamics. Column (1) of Table 9 shows that that the explanatory power of the IDD indicator is statistically weak or insignificant for most components in the full

sample. To examine further, I divide the sample into subgroups to see whether results are stronger in groups where CEOs experience greater shocks to bargaining power. Column (2), the main group of interest, shows that the recognition of the IDD is associated with negative and statistically significant changes in total current compensation and options. For specialist CEOs, the recognition of the IDD leads to 19.4% less total current compensation and 29.7% less option awards. Thus, the economic magnitudes are substantial.

A surprising result is that there is significant drop in stock awards for generalist CEOs (column (4)). The coefficient on the IDD indicator is highly significant (p-value of 0.005) and large in magnitude (48.3% decrease). As previous analyses show insignificant effect of the IDD in generalist groups, it is unclear why this result is observed.

Turnover-performance Sensitivity

Table 10 shows how turnover-performance sensitivity changes when the IDD is adopted. Estimation is performed using a probit model of the likelihood that forced turnover will occur in a given year. Both models include control variables, year-fixed effects, and robust standard errors adjusted for state-level clustering. In model 1, industry-fixed effects are included to account for the possibility that the propensity to fire a CEO can vary across industries. In model 2, firm-fixed effects are used to control for all time-invariant firm characteristics. While model 2 has the benefit of controlling for time-invariant firm characteristics, it only includes the firms that experience a forced turnover event during the sample period. Considering the advantage and disadvantage of using firm-fixed effects, both models are examined.

In both models, the coefficient on the past performance variable is negative and statistically significant, meaning that better prior performance decreases the likelihood of a forced CEO turnover. The coefficient on the interaction term is also negative and statistically significant. That is, the rate at which better prior performance decreases the likelihood of a forced turnover is amplified when the IDD is adopted. In other words, poor prior performance increases the likelihood of forced turnover and that relation is magnified when the state adopts the IDD. The results confirm my hypothesis that the turnover-performance sensitivity increases during the IDD adopted periods.

As mentioned in the ‘*Additional Tests*’ section, the IDD can affect the turnover-performance sensitivity through two channels: protection of trade secrets and reduction of CEO’s bargaining power. Untabulated results reveal that the relation between the IDD and turnover decisions do not vary depending on the GAI scores of CEOs. This provides indirect evidence that the main channel through which the IDD affects turnover decisions is by protection of trade secrets. If bargaining power were the main channel, data should have revealed a stronger relation in the specialist CEO subsample because those CEOs experience the biggest shock to their bargaining powers. Thus, it seems that firms fire CEOs more easily when the IDD is adopted because they know that their trades secrets will be kept safe.

Event-study Results

Table 11 documents the impact of the IDD recognition on shareholder value of the affected firms. As previously discussed, I expect a positive shareholder reaction to the adoption of the IDD. Following previous studies, I use market-adjusted excess daily stock

returns (Graham, Kim, and Leary 2020) in Panel A and one-factor market model (Masulis and Mobbs 2011) in Panel B to calculate the cumulative abnormal returns. CARs during [-1, 1], [-1, 2], and [-1, 3] event windows are reported.¹⁹

Column (1) shows the event study results of the IDD adoptions using the full sample of firms that has stock price information and state of incorporation data. The full sample consists of 3,962 observations (2,117 adoptions) from 1960 to 2013. Results from both panels indicate that there is a positive market reaction, in the full sample, to the adoption of the IDD. Other than the CAPM-based CARs in [-1, 1] and [-1, 2] event windows, CARs for the full sample are positive and statistically significant. Thus, on average, shareholders react positively to the news that the IDD is recognized in their states.

Like previous analyses, Columns (2) and (3) divide the firms based on the General Ability Index scores of the CEOs. Note that the sample size is drastically reduced because of the availability of the GAI scores. In both panels, the adoption of the IDD results in a positive and statistically significant market reactions in the specialist subsample. The magnitudes of the cumulative abnormal returns range from 0.95% to 2.02% during the event windows. Column (3) shows that the non-specialist subsample does not experience any significant abnormal returns. The abnormal returns in the specialist and non-specialist subsamples are statistically different (p-values from 0.003 to 0.048) in all cases.

Event-study results using subsamples provide indirect evidence that the positive market reaction is driven by the reduction of bargaining power of the CEOs. This is because splitting the sample based on the GAI score of the CEOs is unlikely to result in groups with

¹⁹ Using different event windows and different asset pricing models yields qualitatively robust results.

significantly different amount of proprietary information. That is, the protection of trade secrets is important in both specialist CEO and non-specialist CEO groups. The fact that there is a statistically significant and positive market reaction only in the specialist CEO subsample indicates that the positive reaction from the market is being driven by the reduction of the bargaining power of the CEOs. A simple univariate analysis (not tabulated) of proxies of trade secrets confirms that the amount of trade secrets is not greater in the specialist CEO subsample.²⁰

Conclusion

This paper contributes to the CEO compensation literature by providing causal evidence that CEO's bargaining power has an economically significant effect on the level of CEO compensation. In line with extensive literature (e.g., Frydman and Jenter 2010) that attempts to explain the high levels of CEO compensation, I hypothesize that the level of CEO compensation should be lower when the bargaining power of the CEOs experiences a shock due to mobility restrictions. I test my hypothesis using a difference-in-difference framework that exploits the staggered recognition of the IDD by state courts over the 1992-2017 period. The recognition of the IDD provides an arguably exogenous decrease in bargaining power of the CEOs by reducing their outside opportunities.

Consistent with my main hypothesis, the recognition of the IDD by state courts causes the level of CEO compensation to decline in the affected states. To clearly show that changes in bargaining power is the channel through which the recognition of the IDD

²⁰ I used the innovation measure from Kogan et al. (2017) and the intangible capital measure from (Peters and Taylor (2017) to proxy for the amount of proprietary information.

is affecting the level of CEO compensation, I split the sample into groups based on how much mobility restrictions the CEOs are likely to experience after the court decisions. The negative relation between the recognition of the IDD and CEO compensation is present only in the groups of CEOs who experience substantial mobility restrictions because of the doctrine. These groups are: i) CEOs with firm-specific skills as opposed to general managerial skills, ii) CEOs of firms with one business segment, iii) CEOs in highly competitive industries, iv) founder or family descendant CEOs. Further analysis shows that total current compensation (salary + bonus + nonequity incentives) and option components of CEO compensation are most affected by the recognition of the IDD. Overall, the tests confirm that the recognition of the IDD decreases the level of CEO compensation through the bargaining power channel.

In additional analyses, I examine how the recognition of the IDD affects CEO turnover decisions by firms and shareholder wealth. Turnover-performance sensitivity increases after the recognition of the IDD; however, the channel through which the doctrine affects CEO turnover decisions seems to be protection of trade secrets, not bargaining power. Also, the market reacts positively to the news of the IDD recognition. The magnitude of the market reactions is only present in the specialist CEO subsample, indicating that changes in the power dynamics of the firm is what drives the positive market reactions in the full sample.

My paper reveals the extent to which the bargaining power of the CEOs can affect the level of CEO compensation. It might be desirable for future research to look further into how changes in the bargaining power of the CEOs affect the structure of CEO

compensation. A deeper investigation of how details of CEO compensation packages change when the CEO-shareholder power dynamics shift can further shed light on pay-setting process.

Table 1

Precedent-setting Cases by State

State	Precedent-setting case(s)	Date	Decision
AR	<i>Southwestern Energy Co. v. Eickenhorst</i>	3/18/1997	Adopt
CT	<i>Branson Ultrasonics Corp. v. Stratman</i>	2/28/1996	Adopt
DE	<i>E.I. duPont de Nemours & Co. v. American Potash & Chem. Corp.</i>	5/5/1964	Adopt
FL	<i>Foundtain v. Hudson Cush-N-Foam Corp.</i>	7/11/1960	Adopt
	<i>Del Monte Fresh Produce Co. v. Dole Food Co. Inc.</i>	5/21/2001	Reject
GA	<i>Essex Group Inc. v. Southwire Co.</i>	6/29/1998	Adopt
	<i>Holton v. Physician Oncology Services, LP</i>	5/6/2013	Reject
IA	<i>Uncle B's Bakery v. O'Rourke</i>	4/1/1996	Adopt
IL	<i>Teradyne Inc. v. Clear Communications Corp.</i>	2/9/1989	Adopt
IN	<i>Ackerman v. Kimball Int'l Inc.</i>	7/12/1995	Adopt
KS	<i>Bradbury Co. v. Teissier-duCros</i>	2/2/2006	Adopt
MA	<i>Bard v. Intoccia</i>	10/13/1994	Adopt
	<i>U.S. Electrical Services, Inc. v. Schmidt</i>	6/19/2012	Reject
MI	<i>Allis-Chalmers Manuf. Co. v. Continental Aviation & Eng. Corp.</i>	2/17/1966	Adopt
	<i>CMI Int'l, Inc. v. Internet Int'l Corp.</i>	4/30/2002	Reject
MN	<i>Surgidev Corp. v. Eye Technology Inc.</i>	10/10/1986	Adopt
MO	<i>H&R Block Eastern Tax Servs. Inc. v. Enchura</i>	11/2/2000	Adopt
NC	<i>Travenol Laboratories Inc. v. Turner</i>	6/17/1976	Adopt
NJ	<i>Nat'l Starch & Chem. Corp. v. Parker Chem. Corp.</i>	4/27/1987	Adopt
	<i>SCS Healthcare Marketing, LLC v. Allergan USA, Inc.</i>	12/7/2012	Reject
NY	<i>Eastman Kodak Co. v. Powers Film Prod.</i>	12/5/1919	Adopt
OH	<i>Procter & Gamble Co. v. Stoneham</i>	9/29/2000	Adopt
PA	<i>Air Products & Chemical Inc. v. Johnson</i>	2/19/1982	Adopt
TX	<i>Rugen v. Interactive Business Systems Inc.</i>	5/28/1993	Adopt
	<i>Cardinal Health Staffing Network Inc. v. Bowen</i>	4/3/2003	Reject
UT	<i>Novell Inc. v. Timpanogos Research Group Inc.</i>	1/30/1998	Adopt
WA	<i>Solutec Corp. Inc. v. Agnew</i>	12/30/1997	Adopt

Precedent-setting legal cases adopting or rejecting the Inevitable Disclosure Doctrine. Court decisions prior to 2012 are from Klasa et al. (2018). Information is up-to-date as of December 2019. The states that has not considered or considered but rejected the IDD (without prior recognition) are omitted from the table. *The 'Empirical Framework' section* describes the rationale in detail.

Table 2

Descriptive Statistics

Variable	N	Mean	Median	SD
Total Compensation	11,012	5,638.78	3,740.58	5,878.44
Ln(Total Compensation)	11,012	8.15	8.23	1.05
IDD	11,012	0.15	0.00	0.35
Ln(Sales)	11,012	7.41	7.31	1.49
Market-to-Book Assets	11,012	2.11	1.68	1.37
Past Stock Return	11,012	0.04	-0.01	0.44
Return on Assets	11,012	0.14	0.13	0.10
CEO Tenure	11,012	9.76	7.00	8.49
CEO Ownership (%)	11,012	3.78	1.06	7.63
CEO-Chairman	11,012	0.51	1.00	0.50
Independent Directors (%)	11,012	0.73	0.75	0.15
Independent Director Ownership (%)	11,012	1.43	0.40	3.80
Board Size	11,012	8.78	9.00	2.19
General Ability Index	7,994	-0.12	-0.27	0.90
# of Business Segments	10,541	0.40	0.00	0.49
Industry Competition (HHI)	11,012	0.29	0.23	0.21
Founder	6,254	0.17	0.00	0.37
Family Descendent	6,254	0.07	0.00	0.25

Table 3

The Recognition of the IDD and CEO Compensation

DV: ln(tdc1)	Nominal	Inflation adjusted
	(1)	(2)
IDD	-0.0922** (0.047)	-0.0900* (0.054)
Ln(sales)	0.365*** (0.000)	0.367*** (0.000)
Market-to-book assets	0.0626*** (0.000)	0.0611*** (0.000)
Past stock return	0.0756*** (0.000)	0.0759*** (0.000)
Return on assets	0.443** (0.015)	0.436** (0.017)
CEO tenure	-0.00484*** (0.008)	-0.00485*** (0.008)
CEO ownership (%)	-0.00489 (0.248)	-0.00510 (0.222)
CEO-Chairman	0.0577 (0.163)	0.0578 (0.166)
Independent directors (%)	0.00267** (0.012)	0.00272** (0.010)
Independent dir. ownership (%)	0.000952 (0.834)	0.000668 (0.877)
Board size	-0.00268 (0.679)	-0.00235 (0.720)
State-year	0.0250 (0.457)	0.0219 (0.510)
Industry-year	0.0846*** (0.001)	0.0821*** (0.001)
Firm FE	Yes	Yes
Year FE	Yes	Yes
N	11,012	10,982
Adjusted R ²	0.206	0.128

This table presents results from OLS regressions of CEO compensation on the IDD recognition. The dependent variable in model (1) is the natural logarithm of one plus total CEO compensation (tdc1 in Execucomp). The dependent variable in model (2) is the inflation-adjusted measure. IDD is the indicator variable equal to one if the firm is located in a state that has adopted the IDD by year t. All other variables are defined in Table 12. All specifications include firm fixed effects and year fixed effects. Standard errors

are corrected for heteroskedasticity and clustering at the state level. P-values are reported below the coefficient estimates. ***, **, * denote significance at the 1%, 5%, and 10% levels, respectively.

Table 4

Timing of Hire and CEO Compensation During the IDD Recognition

DV: ln(tdc1)	Full	Excluding NY
	(1)	(2)
Hired During IDD	0.186*** (0.009)	0.204*** (0.009)
Ln(sales)	0.273*** (0.000)	0.269*** (0.000)
Market-to-book assets	0.0562** (0.012)	0.0492* (0.065)
Past stock return	0.0599** (0.040)	0.0636* (0.055)
Return on assets	1.073*** (0.005)	1.030** (0.014)
CEO tenure	0.00222 (0.488)	0.00430 (0.239)
CEO ownership (%)	-0.00849** (0.049)	-0.00872* (0.087)
CEO-Chairman	0.0459 (0.145)	0.0693*** (0.009)
Independent directors (%)	0.00218* (0.081)	0.00255* (0.072)
Independent dir. ownership (%)	-0.00534* (0.057)	-0.00664** (0.040)
Board size	0.0133* (0.055)	0.0136 (0.105)
State-year	0.0719 (0.106)	0.0747 (0.165)
Industry-year	0.116** (0.041)	0.0947 (0.102)
Firm FE	Yes	Yes
Year FE	Yes	Yes
N	11,012	10,982
Adjusted R ²	0.206	0.128

This table presents results from OLS regressions of CEO compensation on the timing of hire of CEOs. The dependent variable is the natural logarithm of one plus total CEO compensation (tdc1 in Execucomp) in both models. Hired-during-IDD is the indicator variable equal to one if the CEO took the position while the IDD was being recognized in the state. All other variables are defined in Table 12. All specifications include firm fixed effects and year fixed effects. Standard errors are corrected for heteroskedasticity and clustering at the

state level. P-values are reported below the coefficient estimates. ***, **, * denote significance at the 1%, 5%, and 10% levels, respectively.

Table 5

The Recognition of the IDD and CEO Compensation Using Split Samples – A

	Subgroups			T-test
	Specialist	Middle	Generalist	(p-value)
	(1)	(2)	(3)	(1 vs. (2,3))
IDD	-0.173*** (0.000)	-0.0308 (0.609)	0.00183 (0.987)	(0.032)
Ln(sales)	0.520*** (0.000)	0.271*** (0.000)	0.368*** (0.000)	
Market-to-book assets	0.0782*** (0.001)	0.102*** (0.001)	0.0537** (0.016)	
Past stock return	0.0492** (0.022)	0.0149 (0.625)	0.110*** (0.002)	
Return on assets	0.189 (0.536)	1.006*** (0.005)	0.160 (0.794)	
CEO tenure	-0.00859 (0.260)	0.00237 (0.650)	0.000923 (0.890)	
CEO ownership (%)	-0.00513 (0.250)	-0.000746 (0.900)	0.0354 (0.140)	
CEO-Chairman	0.142** (0.028)	0.00302 (0.953)	-0.0883 (0.391)	
Independent directors (%)	0.000808 (0.690)	0.00436** (0.014)	-0.00227 (0.452)	
Independent dir. ownership (%)	0.0148** (0.046)	-0.00390 (0.451)	-0.00785* (0.053)	
Board size	-0.0305** (0.029)	-0.00601 (0.644)	0.00292 (0.825)	
State-year	0.0381 (0.647)	-0.0428 (0.424)	0.104** (0.031)	
Industry-year	-0.0796 (0.501)	0.103** (0.033)	0.229** (0.037)	
Firm FE	Yes	Yes	Yes	
Year FE	Yes	Yes	Yes	
N	2,675	2,722	2,512	
Adjusted R ²	0.135	0.126	0.087	

This table presents results from OLS regressions of CEO compensation on the IDD recognition using different subsamples. The dependent variable is the natural logarithm of one plus total CEO compensation (tdc1 in Execucomp). IDD is the indicator variable equal to one if the firm is located in a state that has adopted the IDD by year t. Columns (1), (2), and (3) are regression results using split samples based on the General Ability Index of the CEOs. All other variables are defined in Table 12. All specifications include firm fixed

effects and year fixed effects. Standard errors are corrected for heteroskedasticity and clustering at the state level. P-values are reported below the coefficient estimates. ***, **, * denote significance at the 1%, 5%, and 10% levels, respectively.

Table 6

The Recognition of the IDD and CEO Compensation Using Split Samples – B

	One Segment	Multiple Segments	T-test (p-value)
	(1)	(2)	(1) vs. (2)
IDD	-0.201*** (0.009)	-0.0601 (0.322)	(0.095)
Ln(sales)	0.371*** (0.000)	0.329*** (0.000)	
Market-to-book assets	0.0854*** (0.000)	0.0279 (0.106)	
Past stock return	0.0786*** (0.000)	0.0715*** (0.005)	
Return on assets	0.186 (0.321)	1.173*** (0.001)	
CEO tenure	-0.00468** (0.039)	-0.00374 (0.355)	
CEO ownership (%)	-0.00572 (0.102)	-0.00353 (0.592)	
CEO-Chairman	0.0178 (0.753)	0.0857** (0.028)	
Independent directors (%)	0.00166 (0.356)	0.00372*** (0.008)	
Independent dir. ownership (%)	0.000413 (0.961)	0.00203 (0.428)	
Board size	-0.00106 (0.919)	-0.0000910 (0.994)	
State-year	0.0811* (0.055)	0.0106 (0.840)	
Industry-year	-0.00878 (0.912)	0.116** (0.037)	
Firm FE	Yes	Yes	
Year FE	Yes	Yes	
N	5,971	5,041	
Adjusted R ²	0.176	0.205	

This table presents results from OLS regressions of CEO compensation on the IDD recognition using different subsamples. The dependent variable is the natural logarithm of one plus total CEO compensation (tdc1 in Execucomp). IDD is the indicator variable equal to one if the firm is located in a state that has adopted the IDD by year t . Column (1) presents results using a subsample of firms with only one business segment. Column (2) presents the results for the rest of the sample. All other variables are defined in Table 12. All specifications include firm fixed effects and year fixed effects. Standard errors are corrected for

heteroskedasticity and clustering at the state level. P-values are reported below the coefficient estimates. ***, **, * denote significance at the 1%, 5%, and 10% levels, respectively.

Table 7

The Recognition of the IDD and CEO Compensation Using Split Samples – C

	Competition			T-test
	High	Medium	Low	(p-value)
	(1)	(2)	(3)	(1) vs. (2,3)
IDD	-0.164*** (0.001)	0.0377 (0.623)	-0.0938 (0.410)	(0.089)
Ln(sales)	0.366*** (0.000)	0.303*** (0.000)	0.345*** (0.000)	
Market-to-book assets	0.0441* (0.057)	0.0740*** (0.000)	0.0362 (0.185)	
Past stock return	0.0560 (0.124)	0.0423* (0.068)	0.106** (0.015)	
Return on assets	0.453* (0.075)	0.513*** (0.009)	0.495 (0.144)	
CEO tenure	-0.00875*** (0.008)	-0.00429** (0.031)	-0.00410 (0.544)	
CEO ownership (%)	-0.00825* (0.061)	-0.00703 (0.155)	-0.000642 (0.956)	
CEO-Chairman	0.139*** (0.000)	-0.0190 (0.739)	0.0793** (0.034)	
Independent directors (%)	0.00281 (0.202)	0.00141 (0.340)	-0.00158 (0.507)	
Independent dir. ownership (%)	-0.00442 (0.264)	0.00198 (0.713)	-0.00224 (0.884)	
Board size	-0.0113 (0.232)	-0.0153 (0.319)	-0.00275 (0.836)	
State-year	-0.00499 (0.937)	-0.0710 (0.194)	0.206** (0.036)	
Industry-year	0.190*** (0.004)	-0.00322 (0.949)	0.156** (0.017)	
Firm FE	Yes	Yes	Yes	
Year FE	Yes	Yes	Yes	
N	2,995	5,345	2,672	
Adjusted R ²	0.212	0.197	0.136	

This table presents results from OLS regressions of CEO compensation on the IDD recognition using different subsamples. The dependent variable is the natural logarithm of one plus total CEO compensation (tdc1 in Execucomp). IDD is the indicator variable equal to one if the firm is located in a state that has adopted the IDD by year t . Columns (1), (2), and (3) are regression results using split samples based on industry

competition measured by the Herfindahl-Hirschman Index (HHI) of sales. All other variables are defined in Table 12. All specifications include firm fixed effects and year fixed effects. Standard errors are corrected for heteroskedasticity and clustering at the state level. P-values are reported below the coefficient estimates. ***, **, * denote significance at the 1%, 5%, and 10% levels, respectively.

Table 8

The Recognition of the IDD and CEO Compensation Using Split Samples – D

DV: ln(tdc1)	Founder Family CEOs	Non-founder CEOs	T-test (p-value)
	(1)	(2)	(1) vs. (2)
IDD	-0.205** (0.016)	0.146 (0.278)	(0.000)
Ln(sales)	0.306*** (0.000)	0.372*** (0.000)	
Market-to-book assets	-0.0554 (0.524)	0.128*** (0.000)	
Past stock return	0.0563 (0.262)	0.0671** (0.012)	
Return on assets	1.564*** (0.000)	0.251 (0.161)	
CEO tenure	-0.00347 (0.274)	-0.00115 (0.737)	
CEO ownership (%)	0.00785 (0.405)	-0.00377 (0.449)	
CEO-Chairman	-0.0209 (0.869)	0.0866* (0.072)	
Independent directors (%)	-0.00571 (0.144)	0.00152 (0.183)	
Independent dir. ownership (%)	-0.00852 (0.141)	-0.00302 (0.385)	
Board size	0.0310 (0.278)	-0.00823 (0.164)	
State-year	0.148 (0.115)	0.0215 (0.714)	
Industry-year	0.0797 (0.237)	0.102** (0.017)	
Firm FE	Yes	Yes	
Year FE	Yes	Yes	
N	1,429	4,781	
Adjusted R ²	0.120	0.161	

This table presents results from OLS regressions of CEO compensation on the IDD recognition using subsamples based on whether the CEO is the founder of the firm or a descendant to such. The dependent variable is the natural logarithm of one plus total CEO compensation (tdc1 in Execucomp). IDD is the indicator variable equal to one if the firm is located in a state that has adopted the IDD by year t. Column (1) presents the results for subset of firms with founder family CEOs and column (2) presents the results for the

rest of the firms in the sample. All other variables are defined in Table 12. All specifications include firm fixed effects and year fixed effects. Standard errors are corrected for heteroskedasticity and clustering at the state level. P-values are reported below the coefficient estimates. ***, **, * denote significance at the 1%, 5%, and 10% levels, respectively.

Table 9

The Recognition of the IDD and Different Components of CEO Compensation

DV	Full	GAI			T-test	
		Specialist	Middle	Generalist	(p-value)	
	(1)	(2)	(3)	(4)	(2) vs. (3,4)	
TCC	IDD	-0.0724 (0.125)	-0.194*** (0.001)	0.0658 (0.455)	0.0394 (0.597)	(0.005)
	Adjusted R ²	0.217	0.167	0.241	0.217	
	N	11013	2,688	2723	2521	
Option	IDD	-0.115 (0.156)	-0.297** (0.029)	-0.174 (0.212)	0.108 (0.331)	(0.002)
	Adjusted R ²	0.100	0.104	0.100	0.151	
	N	6239	1404	1729	1760	
Stock	IDD	-0.201 (0.280)	-0.0428 (0.839)	0.00371 (0.995)	-0.483*** (0.005)	(0.003) [†]
	Adjusted R ²	0.298	0.217	0.262	0.248	
	N	5906	1144	1354	1426	
Other	IDD	-0.379* (0.060)	-0.346 (0.181)	-1.366 (0.221)	0.202 (0.307)	-
	Adjusted R ²	0.025	0.034	0.072	0.016	
	N	10551	2539	2539	2444	

[†] For stock awards, the test of difference in coefficients compares column (4) vs. columns (2) and (3).

This table presents results from OLS regressions of various components of CEO compensation on the IDD recognition. The dependent variable is the natural logarithm of one plus each component of CEO compensation. The components are total current compensation (base salary + bonus), option awards, stock awards, and other compensation (tcd1 – total current compensation – option awards – stock awards). IDD is the indicator variable equal to one if the firm is located in a state that has adopted the IDD by year t. Column (1) presents the results using the full sample, and Columns (2), (3), and (4) are regression results using split samples based on the General Ability Index (GAI). All other variables are defined in Table 12. All specifications include firm fixed effects and year fixed effects. Standard errors are corrected for heteroskedasticity and clustering at the state level. P-values are reported below the coefficient estimates. ***, **, * denote significance at the 1%, 5%, and 10% levels, respectively.

Table 10

The Recognition of the IDD and Turnover-performance Sensitivity

DV: Forced turnover	(1)	(2)
Past stock return	-0.034*** (0.000)	-0.089*** (0.000)
IDD	-0.001 (0.735)	0.013 (0.724)
Past stock return x IDD	-0.022* (0.078)	-0.147** (0.023)
Ln(sales)	-0.001 (0.724)	-0.055 (0.156)
Market-to-book assets	-0.003 (0.335)	-0.064*** (0.000)
Return on assets	-0.067*** (0.005)	-0.426*** (0.002)
CEO tenure	-0.001** (0.027)	0.016*** (0.001)
CEO ownership (%)	-0.002*** (0.001)	-0.012*** (0.000)
CEO-Chairman	-0.013*** (0.000)	-0.084*** (0.001)
Independent directors (%)	0.000 (0.413)	0.000 (0.684)
Independent dir. ownership (%)	0.000 (0.914)	0.007* (0.080)
Board size	0.001 (0.304)	0.014** (0.049)
N	8,800	1,794
Pseudo R ²	0.113	0.215

This table presents results from probit regressions of forced turnover on the IDD recognition. Marginal effects are presented. The dependent variable is a binary variable indicating forced turnover. IDD is the indicator variable equal to one if the firm is located in a state that has adopted the IDD by year t . Column (1) presents the results using year fixed effects and industry fixed effects. Column (2) presents the results using year fixed effects and firm fixed effects. Standard errors are corrected for heteroskedasticity and clustering at the state level. P-values are reported below the coefficient estimates. ***, **, * denote significance at the 1%, 5%, and 10% levels, respectively.

Table 11

Cumulative Abnormal Returns (CARs) Following the Adoption of the IDD

Panel A: Market-adjusted excess return				
Event window	All firms (1)	Specialist (2)	Non-specialist (3)	Difference (p) (4)
[-1, 1]	0.0042*** (0.005)	0.0124** (0.018)	-0.0027 (0.452)	(0.017)
[-1, 2]	0.0057*** (0.001)	0.0134*** (0.008)	0.0001 (0.989)	(0.042)
[-1, 3]	0.0067*** (0.000)	0.0202*** (0.000)	-0.0027 (0.510)	(0.003)
N	2,117	85	180	
Panel B: One-factor market model				
Event window	All firms (1)	Specialist (2)	Non-specialist (3)	Difference (p) (4)
[-1, 1]	0.0018 (0.222)	0.0095* (0.067)	-0.0034 (0.336)	(0.039)
[-1, 2]	0.0028 (0.111)	0.0100** (0.045)	-0.0031 (0.570)	(0.048)
[-1, 3]	0.0042** (0.025)	0.0163*** (0.003)	-0.0053 (0.317)	(0.004)
N	2,117	85	180	

Table 12

Variable Definitions

Variable	Definition
<u>Firm Characteristics</u>	
<i>Ln(Sales)</i>	Natural logarithm of year-end sales. Compustat: $\ln(\text{sale})$
<i>Market-to-Book Assets</i>	$(\text{Total Assets} - \text{Book Equity} + \text{Market Value of Equity}) / \text{Total Assets}$ Compustat: $(at - ceq + prcc_f * csho) / at$
<i>Return on Assets</i>	EBITDA / Total Assets Compustat: $oibdp / at$
<i>Past Stock Return</i>	Cumulative stock return during the past 1 year
<u>CEO & Board Characteristics</u>	
<i>CEO Tenure</i>	Number of years since the executive became CEO (ExecuComp)
<i>CEO Ownership (%)</i>	Shares held by the CEO / Number of shares outstanding (ExecuComp)
<i>CEO-Chairman</i>	Indicator variable that equals 1 if CEO is also the Chairman and 0 otherwise (RiskMetrics)
<i>Independent Directors (%)</i>	Number of independent directors / Board size (RiskMetrics)
<i>Independent Director Ownership (%)</i>	Cumulative share ownership of independent directors / Number of shares outstanding
<i>Board Size</i>	Total number of directors on the board (RiskMetrics)
<u>Key Explanatory Variables</u>	
<i>IDD</i>	Indicator variable that equals 1 if the state in which the firm is located has adopted the IDD as of year t and 0 otherwise
<i>Specialist (Generalist) CEOs</i>	Indicator variable that equals 1 if a CEO's General Ability Index Score is below the 33 th percentile (above the 67 th percentile) of the CEOs in a given year and 0 otherwise
<i>High (Low) Competition</i>	Indicator variable that equals 1 if a firm's 2-digit SIC industry is above the 75 th percentile (below the 25 th percentile) of industry Herfindahl-Hirschman Index based on sales in a given year and 0 otherwise
<i>Business Segments</i>	Based on the number of business segments listed in Compustat
<i>Founder (Descendant)</i>	Indicator variable that equals 1 if CEO is a founding member (or descendant) of the firm

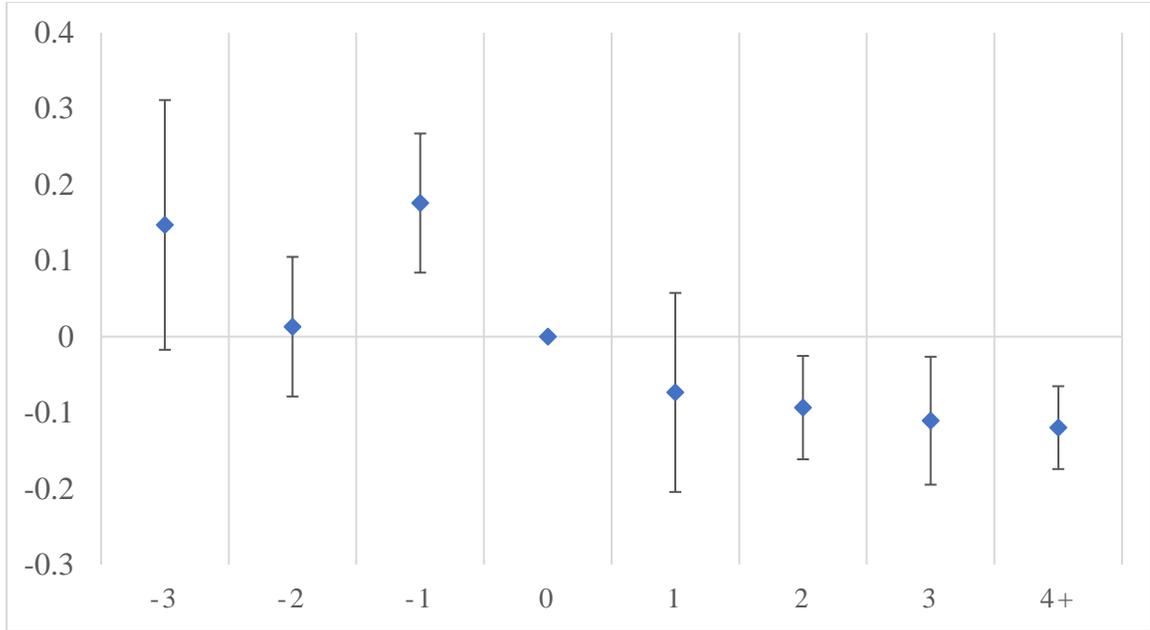


Figure 1. Test of the Parallel Trends Assumption

This figure presents the coefficient estimates of IDD_k from the equation below. IDD_k 's are binary variables that equals one if the firm is headquartered in a state that will adopt (have adopted) the IDD in k years (k years ago). The plot represents the difference in the level of compensation between treated and untreated groups, before and after the adoption of the IDD. The year in which the IDD is adopted is omitted as in the main regressions. Four or more years post-treatment are grouped.

$$\ln(\text{compensation})_{i,t} = \alpha_i + \alpha_t + \sum_k IDD_k + \text{controls}_{i,t} + \varepsilon_{i,t}$$

CHAPTER 2

RELIGIOSITY AND THE USE OF PERFORMANCE-BASED COMPENSATION

Introduction

Researchers across various disciplines document the effect of culture on both individual and organizational behaviors (e.g., Weber 1930). Recent finance literature also shows that culture has a significant effect on corporate behavior (e.g., La Porta et al. 1999; Pan, Siegel, and Yue Wang 2020). Specifically, many studies focus on how religiosity affects various corporate outcomes (e.g., Hilary and Hui 2009; Grullon, Kanatas, and Weston 2009; Chen et al. 2016; Jiang et al. 2018). This paper extends this literature by showing how and why a firm's religious culture affects CEO compensation structure.

While there is some evidence that local religiosity is associated with CEO compensation levels (Grullon, Kanatas, and Weston 2009), it is unclear why such association exists. To illustrate, religious individuals have a wide range of fundamentally different economic preferences, leading to systematic differences in behavior. In this paper, I attempt to identify two fundamentally unique characteristics of religious cultures that have implications on the use of performance-based compensation.

As a first step, it is important to understand the assumptions behind performance-based compensation. Performance-based compensation assumes that 1) managers will exert low effort in the absence of monitoring and that tying firm performance to their pay will motivate them to exert higher effort, and 2) if managers exert higher effort the expected

future firm value will increase. In other words, the first assumption deals with the sensitivity of manager's effort to additional compensation and the second assumption deals with the ability of the managers to affect future outcome. In this paper, I argue that two fundamental characteristics of religious cultures – attitude towards *extrinsic motivation* and *locus of control* – affect the perceived effectiveness of performance-based compensation for firms in religious cultures, which in turn alters the perceived optimal compensation structure.

Extrinsic motivation describes the extent to which one's motivations are driven by external rewards such as money. Anecdotal evidence suggest that religious individuals are less motivated by extrinsic rewards. For example, Christian practice of tithing – the practice of giving ten percent of one's income to the church – seems like a very irrational behavior.²¹ A person primarily driven by financial rewards is unlikely to engage in such practices. Moreover, Christian doctrine encourages believers to work hard for the glory of God, not for financial rewards.²² This characteristic of religious cultures suggests that the use performance-based compensation to motivate managers may not be as necessary as in more secular cultures. That is, 1) the change in effort level due to a dollar change in expected pay is smaller in religious cultures and 2) people with religious beliefs are likely to exert higher effort than those who are purely driven by financial rewards. Thus, I expect the

²¹ Other major religions have similar attitudes toward money. For example, Islam has the concept of 'zakat', which involves a process of donating certain portion of your wealth to the poor. However, since the majority of the population across the U.S. is Christian-based, I mainly illustrate Christian beliefs in this paper.

²² "Whatever you do, work at it with all your heart, as working for the Lord, not for human masters" (Colossians 3:23). "So whether you eat or drink or whatever you do, do it all for the glory of God" (1 Corinthians 10:31).

firms in religious cultures to use less performance-based compensation in their CEO compensation packages.

Locus of control describes the extent to which human effort can affect the future outcome. Religious cultures arguably have a unique perspective on locus of control. Most major religions in the United States believe in an all-mighty and all-knowing God, who has the divine authority and a plan regarding the future. In Christianity, for example, believers are encouraged to work hard but the ultimate outcome depends on God's plans.²³ In the context of compensation structure, this implies that the effectiveness of performance-based compensation may be limited because the ability of the managers to increase the expected future firm value is limited. In contrast, a dominant secular belief is that human beings are able to significantly affect the future outcome. Thus, compared to firms in more secular cultures, firms in religious cultures are less likely to assign performance-based compensation to their CEOs.

The unique perspective of religious cultures on extrinsic motivation and locus of control suggests that firms in religious areas are likely to use less performance-based compensation. To precisely understand the perspective on which characteristic is driving the relationship between religious culture and compensation structure, I examine the forced turnover decisions of firms. If beliefs regarding locus of control is driving the main result, then I expect smaller turnover-performance sensitivities for firms in religious cultures. The logic is as follows. Forced turnover decisions are made based on the CEO's poor performance. But if the previous firm performance is less attributable to the actions of the

²³ "We can make our plans, but the Lord determines our steps" (Proverbs 16:9). "We may throw the dice, but the Lord determines how they fall" (Proverbs 16:33).

CEO, then it would be less likely for the firm to fire this CEO. That is, poor performance will still lead to greater likelihood of the CEO getting fired, but that relationship will be mitigated for firms in highly religious cultures. In contrast, if beliefs regarding extrinsic motivation is driving the main result, it is unlikely that the forced turnover decision will vary too much by the firm's religious culture.

Following previous studies in the religiosity and finance literature (e.g., Hilary and Hui 2009), I use the county-level religiosity as a proxy for the firm's religious culture. The rationale is that firm's decision makers are more likely to be from the area, and likely to share the cultural values predominant in the area. Even if the decision makers do not share the cultural values, the social identity theory suggests that they are likely to conform to the predominant values in the area.

The baseline regression results show that local religiosity significantly reduces the firm's use of performance-based compensation. Compared to firms in areas with no religious adherents, firms in areas where everyone is religious uses approximately 24.1% less performance-based compensation. The effect is even stronger when I divide the sample into terciles based on religiosity and compare the highest and lowest terciles. The results indicate that compared to the lowest tercile of firms, the highest tercile of firms use about 33.8% less performance-based compensation. Lastly, I examine a subsample of smaller firms. The rationale is based on the fact that larger firms have greater exposure and are able to recruit directors outside the local director pool (Knyazeva, Knyazeva, and Masulis 2013). This implies that smaller firms are likely to have board members who are from the community and are more likely to share the values of the community. Thus, I expect to

find stronger results in the subsamples of smaller firms and the results confirm my predictions. In the forced turnover tests, I find that local religiosity does not affect the turnover-performance sensitivity. This suggests that the primary driver behind the main result is the religious cultures' attitudes toward extrinsic motivation.

This study contributes to the literature in the following ways. First, I add to the religiosity and finance literature that documents relationships between firm culture and corporate decisions. Second, I present two unique characteristics of religious cultures that could affect individual and corporate behavior. This presents avenues for further research in the religiosity and finance literature.

Prior Literature and Hypothesis Development

Firm Culture and Compensation Structure

Religious Culture

Culture is broadly defined as a set of beliefs and ideas that are highly pervasive and persistent (La Porta et al. 1999). Recent finance literature documents the effect of corporate culture on various outcomes. Among many studies, Guiso, Sapienza, and Zingales (2015) show that a culture of integrity adds value, and Pan, Siegel, and Yue Wang (2020) document that corporate investment decisions are affected by the CEOs' cultural heritage.

Historically, religion has played a key role in forming a system of beliefs across different regions (Stulz and Williamson 2003). Consequently, religion has received particular attention from researchers across various disciplines. Recent finance literature also documents that religious culture has various effects on corporate behavior. For

example, Grullon, Kanatas, and Weston (2009) show that firms with religious culture engage in less corporate mis-behavior. Hilary and Hui (2009) document that firms in religious areas exhibit lower risk exposure and argue that this is because religious individuals are associated with risk aversion. Jiang et al. (2018) provide empirical evidence that firm's religious culture affects its cost of debt. Overall, these studies provide strong evidence that a firm's culture, measured by religion, affect a wide range of corporate outcomes. This paper extends the literature by examining how a firm's religious culture affects the structure of CEO compensation and turnover decisions.

Religiosity and Performance-based Compensation

Firms use performance-based compensation in an effort to mitigate agency problems (Frydman and Jenter 2010). By tying CEO compensation to firm value, firms incentivize CEOs to engage in behaviors that are consistent with shareholder value maximization. In this paper, I argue that firms in religious cultures will use less performance-based compensation due to fundamentally different perspectives on two concepts: extrinsic motivation and locus of control. In the context of compensation, extrinsic motivation relates to how sensitive a particular individual is to monetary rewards. And locus of control deals with the ability of the individual to affect the future outcome.

Inferring from the non-secular nature of most religions, it is not hard to imagine that religious people have less extrinsic motivation. That is, the primary purpose in religious people's lives is not wealth maximization. The concept of tithing in Christianity and zakat in Islam clearly provide support for this argument. Donating money to strangers is clearly an economically irrational behavior. However, it does not mean that religious

people are completely insensitive to financial rewards. In the context of performance-based compensation, less extrinsic motivation just means the change in effort per dollar change in additional compensation is just smaller. Another important point is that, in the absence of financial rewards, religious people are more likely to exert higher effort. For instance, the concept of ‘calling’ from God in Protestantism suggests that religious people are taught to work hard regardless of the financial benefits. How varying levels of extrinsic motivation affects the use of performance-based compensation is further discussed below and illustrated in Panel B of Figure 3.

Locus of control – the ability of humans to affect the outcome of the future – is another concept that religious people view differently. A popular saying among non-religious people is that ‘you make your own destiny’. This implies that outcome of the future can change according to your actions. In contrast, the major religions in the United States all share the view that God ultimately determines the future. This does not mean that human effort has no effect on future outcomes; however, the extent to which human effort can affect future outcome is limited from a religious perspective. This difference in attitude toward locus of control should have implications on the use of performance-based compensation. This is further discussed below using Panel C of Figure 3.

To understand why the two concepts matter in the optimal design of CEO compensation structure, I first examine the assumptions behind using performance-based compensation. Panel A of Figure 3 illustrates how ordinary firms (“secular firms”) perceive the effect of performance-based compensation. The darker line ($P(\pi|e_L)$) represents the perceived distribution of future firm value when the CEO exerts low effort, and the lighter

line ($P(\pi|e_H)$) represents the perceived distribution when the CEO effort level is high. By incentivizing CEOs to exert high effort through the use of performance-based compensation, the firm is able to shift the distribution to the right. The net expected gain in firm value (i.e., the perceived benefit of performance-based compensation) is then $E(\pi_{e_H}) - E(\pi_{e_L})$. Two assumptions are: 1) the CEO will exert low effort when she is not promised additional compensation and 2) CEO's effort will shift the distribution to the right, increasing the expected firm value. In Panels B and C of Figure 3, I illustrate how the perceived distributions are different for firms with religious cultures ("religious firms").

Panel B of Figure 3 represents the changes in perceived distribution of future firm value in religious cultures when the extrinsic motivation is low. It is important to note that this figure refers to religious individuals who are not just less sensitive to money but who are already exerting higher-than-ordinary level of effort. That is, $E_R(\pi_{e_L}) > E(\pi_{e_L})$. When religious individuals are motivated by additional compensation, they exert higher effort but the magnitude of the shift in the perceived distribution is smaller because they were already exerting higher-than-ordinary level of effort. That is, $[E(\pi_{e_H}) - E_R(\pi_{e_L}) < E(\pi_{e_H}) - E(\pi_{e_L})]$.²⁴ This indicates that the perceived effect of performance-based compensation in secular firms is greater than the perceived effect of performance-based compensation in religious firms. Thus, religious firms are likely to use less performance-based compensation compared to secular firms.

²⁴ For simplicity I set the expected firm values given high CEO effort to be equal for religious and secular firms. That is, the maximum CEO effort level and the distribution of firm value at that level of effort is the same for both types of firms.

Panel C of Figure 3 illustrates the perceived distributions of future firm value for religious firms with unique perspective on locus of control. Panel C assumes that CEOs in religious firms will exert low effort, just like ones in secular firms, in the absence of additional compensation. Performance-based compensation induces the managers in religious firms to exert higher effort, but the magnitude of the shift in the perceived distribution is smaller compared to secular firms. This is because the human ability to affect future outcome is limited from the perspective of religious cultures. Thus, $[E_R(\pi_{e_H}) - E(\pi_{e_L})] < [E(\pi_{e_H}) - E(\pi_{e_L})]$, and the perceived effectiveness of performance-based compensation is smaller in religious firms. Then, religious firms are likely to use less performance-based compensation compared to secular firms.

Hypothesis Testing

As previously discussed, my main hypothesis is that religious firms are likely to use less performance-based compensation in their CEO compensation packages. Formally, I analyze the following regression and examine β_1 :

$$Incentive\ Ratio_{it} = \beta_0 + \beta_1 \cdot religiosity_{it} + controls_{it} \cdot \beta + years_t + firm_i + u_{it} \quad (2)$$

Incentive Ratio is the ratio of performance-based compensation in the CEO's total compensation package. The main explanatory variable, *Religiosity*, measures the firm religiosity by taking the proportion of all religious adherents in the county in which the firm's headquarters is located. I expect β_1 to be negative since highly religious cultures are likely to view performance-based compensation as less effective as discussed in '*Firm Culture and Compensation Structure*' section.

The second test attempts to identify which one of the two concepts – extrinsic motivation and locus of control – is the main driver behind the first result. Since both characteristics associated with religiosity predict a negative β_1 in equation (2), I examine an outcome that could shed light on which attitude related to religiosity is influencing corporate decisions. Specifically, I examine forced turnover decisions by firms.

$$Forced\ Turnover_{it} = \beta_1 \cdot Past\ Perf_{it} + \beta_2 \cdot religiosity_{it} + \beta_3 \cdot PastPerf_{it} \times rel_{it} + u_{it} \quad (3)$$

If locus of control is driving the first result, I expect β_1 in the above equation to be negative and β_3 to be positive. β_1 has been documented to be negative in prior studies because good prior performance is negatively associated with the likelihood of forced turnover. β_3 is expected to be positive under locus of control story because, if religious groups view the observed outcome (past performance) to be less attributable to CEO's effort or ability then it would seem unfair to terminate the CEO for the poor firm performance. Thus, the relationship between past performance and forced turnover will be mitigated in religious groups.

Data

Religiosity Data - ARDA

The county-wise religion data is obtained from the Association of Religion Data Archives (ARDA). Figure 2 illustrates the geographical variation in religiosity at the state-level. Religiosity varies across the U.S. and the state of Utah has the highest religiosity score due to high concentration adherents of the Church of Latter Day Saints. Because the

religiosity data is only available for every ten years, I follow previous studies (e.g., Hilary and Hui 2009) and perform linear interpolation to estimate the values to form a panel data.

As it is customary in the religion and finance literature (e.g., Hilary and Hui 2009), I proxy firm religiosity by the degree of religiosity of the county in which the firm's headquarters is located.²⁵ The logic is as follows. First, the literature emphasizes the location of the headquarters because of its importance in setting corporate policies and culture. Although firm operations are often spread across different locations, the culture of the headquarters is especially appropriate in this study because executive compensation policies are mostly likely determined at the headquarters.

Compensation Data – Execucomp

Executive compensation details are obtained from the S&P Execucomp database. The main dependent variable of this study is the ratio of performance-based compensation. I use two measures of performance-based compensation to capture the proportion of pay that is not 'fixed'. First measure is calculated as $(\text{Total Compensation} - \text{Base Salary}) / \text{Total compensation}$. Second measure is calculated as $(\text{Total Compensation} - \text{Base Salary} - \text{Annual Bonus}) / \text{Total compensation}$. I examine the second measure because while components other than the base salary are mostly performance-based, annual bonus is a reward for previously realized performance. In other words, annual bonus is not there to induce future effort by the CEOs.

²⁵ This raises a possible concern because Compustat only reports the current location of the firm's headquarters. However, number of firms that relocate their headquarters is very small – less than 3% according to Pirinsky and Wang (2006)

Control Variables

Firm characteristics are obtained from Compustat Fundamentals Annual database. Firm-level controls that I include in my tests are firm size, leverage, ROA, and volatility of share price. Financial firms (SIC codes 6020 through 6799) and public utilities (SIC codes 4812, 4813, 4911 through 4991) are excluded from the sample as it is customary in the literature and because government regulations potentially affect executive compensation. The location of the headquarters, in the form of ZIP codes, are obtained from this dataset. These are matched with the FIPS (county identifier) codes to merge with the religiosity dataset. Board characteristics are obtained from BoardEx. The controls related to board of directors are percentage of independent directors, board size, and CEO-board chair indicator. Since the main explanatory variable – religiosity – is measured at the county-level, I control for county characteristics that could affect executive compensation. The controls I include are county population, county income level, and percentage of rural area in the county.

Descriptive Statistics and Results

Table 13 provides descriptive statistics of the final sample. The overall religiosity of the sample has a mean and a median of about 51%. The standard deviation of 10.8% indicates a wide distribution of religiosity scores. Incentive ratio 1, the first measure of performance-based pay, has a mean of about 72.3%. This indicates that, in a given year, firms in the final sample assigned about 72.3% as performance-based compensation in their CEO compensation packages. Incentive ratio 2 has a mean of 60%. The control variables

– firm characteristics, board characteristics, and county characteristics – are all similar in magnitude compared to those found in other studies (e.g., Knyazeva et al. 2013).

Main Results

Table 14 reports the main regression results. The main explanatory variable in Table 14 is the proportion of religious adherents in the county. Column (1) uses the log of total compensation as the dependent variable and shows that the proportion of religious adherents in the county does not significantly affect the level of total CEO compensation. Columns (2) and (3) show results consistent with my prediction that religious firms will use less performance-based compensation in their compensation packages. The economic magnitude of the results is significant. Using incentive ratio 1 as the dependent variable, the Table 14 shows that a change from 0% religiosity to 100% religiosity is associated with a 24.1% decline in the use of performance-based compensation (statistically significant at 5% level). Using incentive ratio 2 as the dependent variable, the statistical significance is weaker (significant at 10% level), but the magnitude of the coefficient is bigger (-0.285). Overall, the baseline regressions show that higher religiosity is associated with less weight on performance-based compensation.

Table 15 tests the same predictions as in Table 14 but uses a slightly different specification. Instead of using the proportion of religious adherents in the county as the explanatory variable, I do the following to better capture the effect of religious culture on CEO compensation structure. First, I rank each county by the religiosity measure and divide the sample into 3 groups – highly religious, middle, and less religious. I drop the middle group from the sample and create an indicator variable that takes on a value of 1 if

the firm is in a highly religious county and takes on a value of 0 if the firm is in a less religious county. Using this indicator variable as the main explanatory variable, I estimate the difference in compensation designs between highly religious firms and less religious firms. I argue that this specification better captures the effect of corporate culture on compensation policies. That is, the coefficients reported in Table 14 shows how an incremental increase in local religiosity affects compensation structure. However, it is hard to argue that a 1% increase in religiosity represents a change in corporate culture. In contrast, the explanatory indicator variable used in Table 15 provides a sharper comparison of how firms with highly religious culture differ from firms with more secular culture.

Column (1) of Table 15 shows that firms with highly religious cultures provide significantly lower total compensation compared to similar firms with more secular cultures. The coefficient estimate is both economically and statistically highly significant. More importantly, Column (2) of Table 15 shows that firms with highly religious cultures use about 33.8% less performance-based compensation in their CEO compensation packages compared to firms with secular cultures. The estimate is statistically significant at 1% level, providing support for my argument that the specification used in Table 15 better captures the relationship between firm culture and compensation policies.

Table 16 shows how the results from Table 14 vary when I examine different sub-samples based on firm size. Sub-sample tests are performed to provide indirect evidence that local culture is indeed affecting firm-level compensation policies. The rationale is as follows. If cultural values affect the board's decision-making, then the relationship between local religiosity and compensation policy will be stronger when the board members share

the local cultural beliefs. In contrast, if board members do not share the local cultural beliefs then the relationship will be weaker or will not exist. Knyazeva, Knyazeva, and Masulis (2013) argues that larger firms have greater exposure to the public and are able to attract talented directors from other geographic regions. This implies that larger firms are likely to have more board members who are from other regions, increasing the likelihood that they have different values. In such firms, the association between local religiosity and compensation policies might be weaker.

Table 16 results confirm my prediction that the relationship between local religiosity and compensation structure is strongest in the subset of smaller firms. In columns (1), (2), and (3) of Table 16, I use a subset of firms whose size is under 50th percentile, under 75th percentile, and above 75th percentile in the original sample, respectively. The results show that the association between local religiosity and compensation structure is very strong in the subset of smaller firms, but non-existent in the subset of larger firms. Overall, the results from Tables 14, 15, and 16 show that firm culture, as proxied by local religiosity, affects the firm's use of performance-based compensation.

Turnover-performance Sensitivity

Table 17 presents the turnover-performance sensitivity regression results. The dependent variable is an indicator variable that takes on a value of 1 if a forced turnover occurred in that year and 0 otherwise. I use the linear probability model in column (1) and the logit model in column (2) to examine how a firm's religious culture affects turnover-performance sensitivity. Both results show that past performance is negatively correlated with the likelihood of forced CEO turnover and that local religiosity does not affect the

relationship. As discussed in the *'Hypothesis Testing'* section, if beliefs regarding locus of control differentiates religious firms from secular firms, then turnover-performance sensitivity should be smaller in religious firms. Table 17 results show that this is not the case and provides support for the argument that attitudes toward extrinsic motivation is the primary differentiator between religious and secular firms.

Endogeneity Concerns

As with all empirical corporate finance studies, there are concerns of endogeneity in this study. That is, while I document a negative association between local religiosity and the proportion of performance-based compensation, I cannot argue that the relationship is causal. In this section, I provide arguments that mitigate the common endogeneity concerns.

Reverse Causality

Reverse causality or simultaneous causality is a well-documented form of endogeneity (Roberts and Whited 2013). Specifically, even when there is an association between the explanatory variable and a dependent variable, one cannot draw a causal conclusion because the dependent variable might also affect the level of the explanatory variable. However, the explanatory variable in this study – county-level religiosity – is unlikely to be subject to reverse causality issues. That is, it is arguably impossible for a firm's compensation policy to affect the overall religious participation in the surrounding county. Thus, I only need to address other common forms of endogeneity.

Omitted Variables Bias

Omitted variables bias is another pervasive form of endogeneity in empirical corporate finance. When a determinant of the dependent variable that is also correlated with the explanatory variables, it leads to inconsistent estimates. To address this concern, I first control for an array of control variables that have been found in the previous studies to affect compensation policies. In addition, I include firm-fixed effects to control for any unobservable firm-level characteristics and year-fixed effects to control for any systematic shocks that affect all firms across different years. I also include some county-level controls – population, median income, and percentage of rural area – since my religiosity variable is measured at the county level.

Conclusion

The main objective of this paper is to document a relationship between corporate religious culture and the structure of CEO compensation. Prior research finds that religion plays an essential role in forming cultural beliefs. These cultural beliefs have been found to have important implications on organizational behavior. This paper examines how a firm's religious culture affects CEO compensation structure. Specifically, I show that firms with highly religious cultures use less performance-based compensation. I present two possible reasons why religious firms would use less extrinsic motivation using concepts called *extrinsic motivation* and *locus of control*. Further tests reveal that different attitude toward extrinsic motivation is likely to be the reason why religious firms use less performance-based compensation. While I cannot establish a causal relation, I take various steps to mitigate the endogeneity concerns.

Table 13

Summary Statistics

Variable	Mean	Median	SD
<i>Firm Characteristics</i>			
ln(MV of Equity)	7.569	7.401	1.598
Std Dev of Stock Return	0.026	0.022	0.013
Leverage	0.204	0.194	0.173
ROA	0.138	0.136	0.105
<i>Board Characteristics</i>			
CEO Tenure	8.153	6.000	7.350
CEO-Chairman	0.585	1.000	0.493
Independent Directors (%)	70.998	73.333	15.625
Board Size	8.976	9.000	2.315
<i>County Characteristics</i>			
ln(Population)	13.823	13.882	1.011
Rural Area (%)	5.270	2.124	9.326
ln(Median Income)	10.899	10.866	0.249
Total Religiosity (%)	50.787	51.133	10.849
<i>CEO Compensation Package</i>			
ln(Total Compensation)	8.060	8.087	1.033
Incentive Ratio 1	0.723	0.793	0.222
Incentive Ratio 2	0.600	0.670	0.274
N	8,489		

This table provides the descriptive statistics using all observations from 1990 to 2010. Total Religiosity is the total percentage of religious adherents per population. Total Compensation is the 'Total Direct Compensation' (tdc1 variable from Execucomp). Incentive Ratio 1 is (Total Compensation – Base Salary) / Total Compensation. Incentive Ratio 2 is (Total Compensation – Base Salary – Annual Bonus) / Total Compensation.

Table 14

Relationship between Religiosity and the Use of Performance-based Compensation – A

Variables	(1)	(2)	(3)
	DV: ln(tdc1)	DV: Incentive Ratio 1	DV: Incentive Ratio 2
Religiosity	0.261 (0.683)	-0.241** (0.046)	-0.285* (0.084)
Firm Size	0.260*** (0.000)	0.0446*** (0.000)	0.0392*** (0.000)
Firm Risk	3.299** (0.026)	0.509 (0.147)	1.150** (0.010)
Leverage	-0.315** (0.019)	-0.0741** (0.024)	-0.0399 (0.301)
ROA	0.753*** (0.001)	0.278*** (0.000)	0.0200 (0.718)
CEO Tenure	-0.00516* (0.074)	-0.00348*** (0.000)	-0.00423*** (0.000)
CEO-Chair	-0.0233 (0.478)	-0.0157** (0.038)	-0.00889 (0.315)
Indep. Ratio	0.204 (0.195)	0.0916*** (0.003)	0.0990*** (0.009)
Board Size	0.00629 (0.517)	-0.00107 (0.593)	-0.000224 (0.934)
County Population	0.608 (0.133)	0.189* (0.051)	0.228* (0.086)
Rural (%)	0.863 (0.667)	1.115* (0.081)	1.449* (0.059)
County Income	-0.421 (0.226)	-0.193** (0.035)	-0.233** (0.047)
Year FE	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Adj. R ²	0.088	0.066	0.151
N	8,489	8,489	8,489

This table reports the OLS estimates using the full sample from 1990 to 2010. The dependent variables are as follows. Incentive Ratio 1 is (Total Compensation – Base Salary) / Total Compensation. Incentive Ratio 2 is (Total Compensation – Base Salary – Annual Bonus) / Total Compensation. Religiosity represents the % of religious adherents in the county. Robust standard errors are used and are corrected for clustering by firms. T-statistics are reported in parentheses. ***, **, and * indicate statistical significance at 1%, 5%, and 10%, respectively.

Table 15

Relationship between Religiosity and the Use of Performance-based Compensation – B

Variables	(1)	(2)
	DV: ln(tdc1)	DV: Incentive Ratio 1
Highly Religious	-1.369*** (0.000)	-0.338*** (0.000)
Firm Size	0.257*** (0.000)	0.0410*** (0.000)
Firm Risk	1.795 (0.283)	0.289 (0.512)
Leverage	-0.321** (0.014)	-0.0843** (0.030)
ROA	0.619*** (0.003)	0.245*** (0.000)
CEO Tenure	-0.00472* (0.095)	-0.00367*** (0.000)
CEO-Chair	-0.0483 (0.193)	-0.0191** (0.040)
Indep. Ratio	0.187 (0.211)	0.0859** (0.023)
Board Size	0.00918 (0.401)	0.000786 (0.758)
County Population	-0.0910 (0.816)	-0.0131 (0.907)
Rural (%)	-0.269 (0.923)	1.075 (0.133)
County Income	0.141 (0.729)	-0.0604 (0.596)
Year FE	Yes	Yes
Firm FE	Yes	Yes
Adj. R ²	0.086	0.055
N	6,075	6,075

This table reports the OLS estimates using the full sample from 1990 to 2010. The dependent variables are as follows. Incentive Ratio 1 is (Total Compensation – Base Salary) / Total Compensation. Incentive Ratio 2 is (Total Compensation – Base Salary – Annual Bonus) / Total Compensation. Highly Religious is an indicator variable that takes on a value of 1 if the county-level religiosity is in the highest tercile and takes on a value of 0 if it is in the lowest tercile. Robust standard errors are used and are corrected for clustering by firms. T-statistics are reported in parentheses. ***, **, and * indicate statistical significance at 1%, 5%, and 10%, respectively.

Table 16

Relationship between Religiosity and the Use of Performance-based Compensation – C

	(1)	(2)	(3)
DV: Incentive Ratio 1	Size: below 50%	Size: below 75%	Size: above 75%
Religiosity	-0.818*** (0.000)	-0.336** (0.035)	-0.0191 (0.923)
Firm Size	0.0657*** (0.000)	0.0643*** (0.000)	-0.00745 (0.777)
Firm Risk	1.848*** (0.000)	1.141*** (0.005)	-1.740* (0.073)
Leverage	-0.00395 (0.936)	-0.0655* (0.067)	-0.166** (0.028)
ROA	0.373*** (0.000)	0.308*** (0.000)	0.221*** (0.005)
CEO Tenure	-0.00348*** (0.007)	-0.00394*** (0.000)	-0.00239* (0.071)
CEO-Chair	-0.0266* (0.064)	-0.0215** (0.028)	-0.0119 (0.311)
Indep. Ratio	0.0757 (0.112)	0.104*** (0.003)	0.0509 (0.432)
Board Size	-0.00649 (0.164)	-0.000865 (0.774)	-0.00235 (0.359)
County Population	0.320* (0.073)	0.306** (0.015)	0.0362 (0.822)
Rural (%)	1.374 (0.237)	1.376* (0.097)	0.883 (0.176)
County Income	-0.330** (0.036)	-0.257** (0.024)	-0.0159 (0.924)
Year FE	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Adj. R ²	0.073	0.078	0.042
N	3,511	5,867	2,622

This table reports the OLS estimates using the full sample from 1990 to 2010. The dependent variable, Incentive Ratio 1, is (Total Compensation – Base Salary) / Total Compensation. Religiosity represents the % of religious adherents in the county. Robust standard errors are used and are corrected for clustering by firms. T-statistics are reported in parentheses. ***, **, and * indicate statistical significance at 1%, 5%, and 10%, respectively.

Table 17

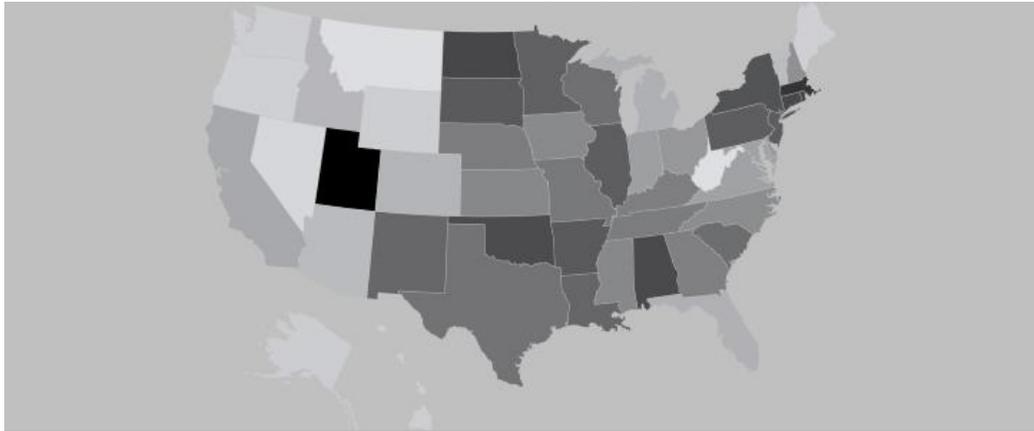
Turnover-performance Sensitivity and Religiosity

Variables	(1) LPM	(2) Logit
Past Return	-0.0109*** (0.007)	-0.722*** (0.000)
Highly Religious	-0.0176 (0.331)	0.00905 (0.917)
Past Return x Highly Religious	-0.00280 (0.620)	-0.0563 (0.775)
Firm Size	-0.0154** (0.026)	0.0329 (0.300)
Firm Risk	1.265*** (0.004)	10.51*** (0.003)
Leverage	-0.00155 (0.948)	0.148 (0.479)
ROA	-0.0701 (0.143)	-0.547 (0.132)
CEO Tenure	0.00265*** (0.000)	-0.0138** (0.045)
CEO-Chair	-0.00675 (0.446)	-0.119 (0.170)
Indep. Ratio	-0.0283 (0.317)	-0.0786 (0.773)
Board Size	0.00283 (0.183)	0.0266 (0.147)
County Population	0.00693 (0.935)	-0.0525 (0.298)
Rural (%)	-0.673 (0.269)	-1.083* (0.087)
County Income	-0.101 (0.256)	0.000686 (0.997)
Year FE	Yes	Yes
Firm FE	Yes	No
Industry FE	No	Yes
Adj. R ²	0.018	
N	6,043	5,571

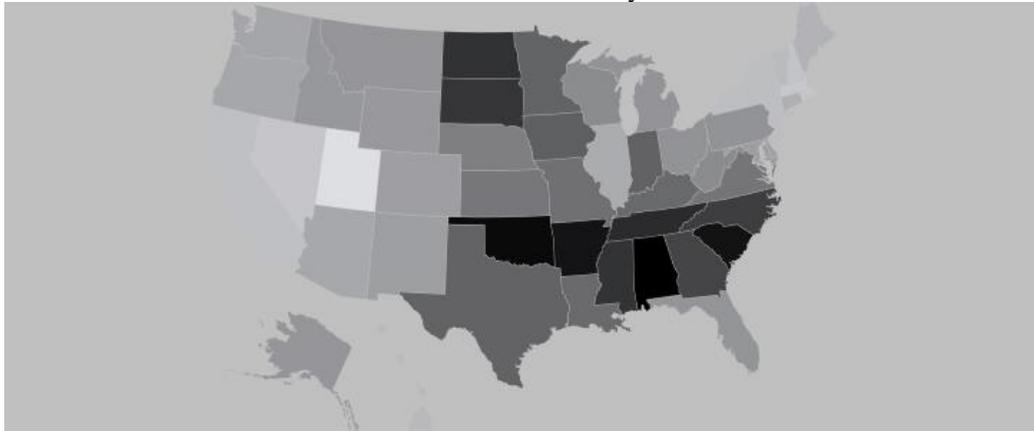
This table shows how turnover-performance sensitivity depends on the county-level religiosity. The dependent variable is an indicator variable that takes on a value of 1 if the CEO was terminated by the firm in that year. Column (1) reports the results using the Linear Probability Model, and Columns (2) and (3)

reports the Logit regression results. Past Return is the previous 2-year excess return of the company's stock. Highly Religious is an indicator variable that takes on a value of 1 if the county-level religiosity is in the highest tercile and takes on a value of 0 if it is in the lowest tercile. Robust standard errors are used and are corrected for clustering by firms. T-statistics are reported in parentheses. ***, **, and * indicate statistical significance at 1%, 5%, and 10%, respectively.

Panel A: Total Religiosity by State



Panel B: Protestant Ratio by State



Panel C: Catholic Ratio by State

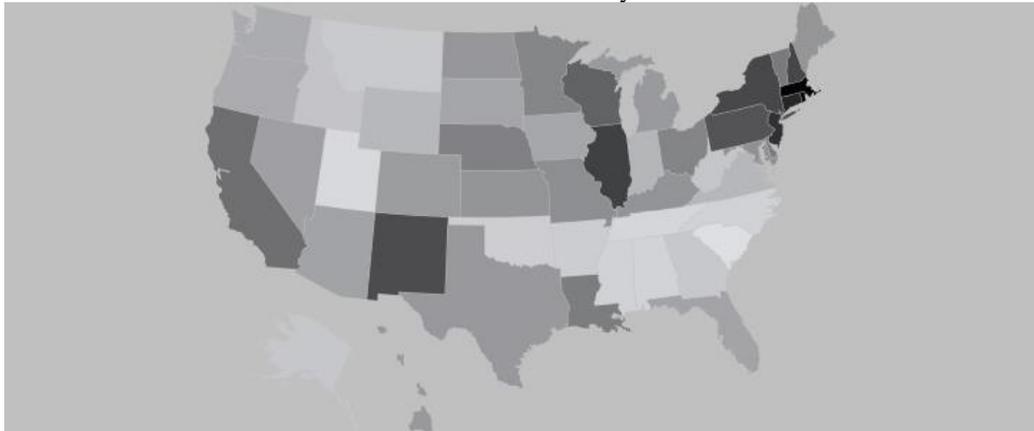


Figure 2. Religiosity at the State-level

The bounded areas represent states that include each of the 3,140 county and county-equivalent regions. The shades indicate the degree of religiosity in each state, with darker areas being more religious. Panel A shows the total religiosity, measured by the ratio of adherents to any religious group to total population. Panel B shows the ratio of Protestants and Panel C shows the ratio of Catholics.

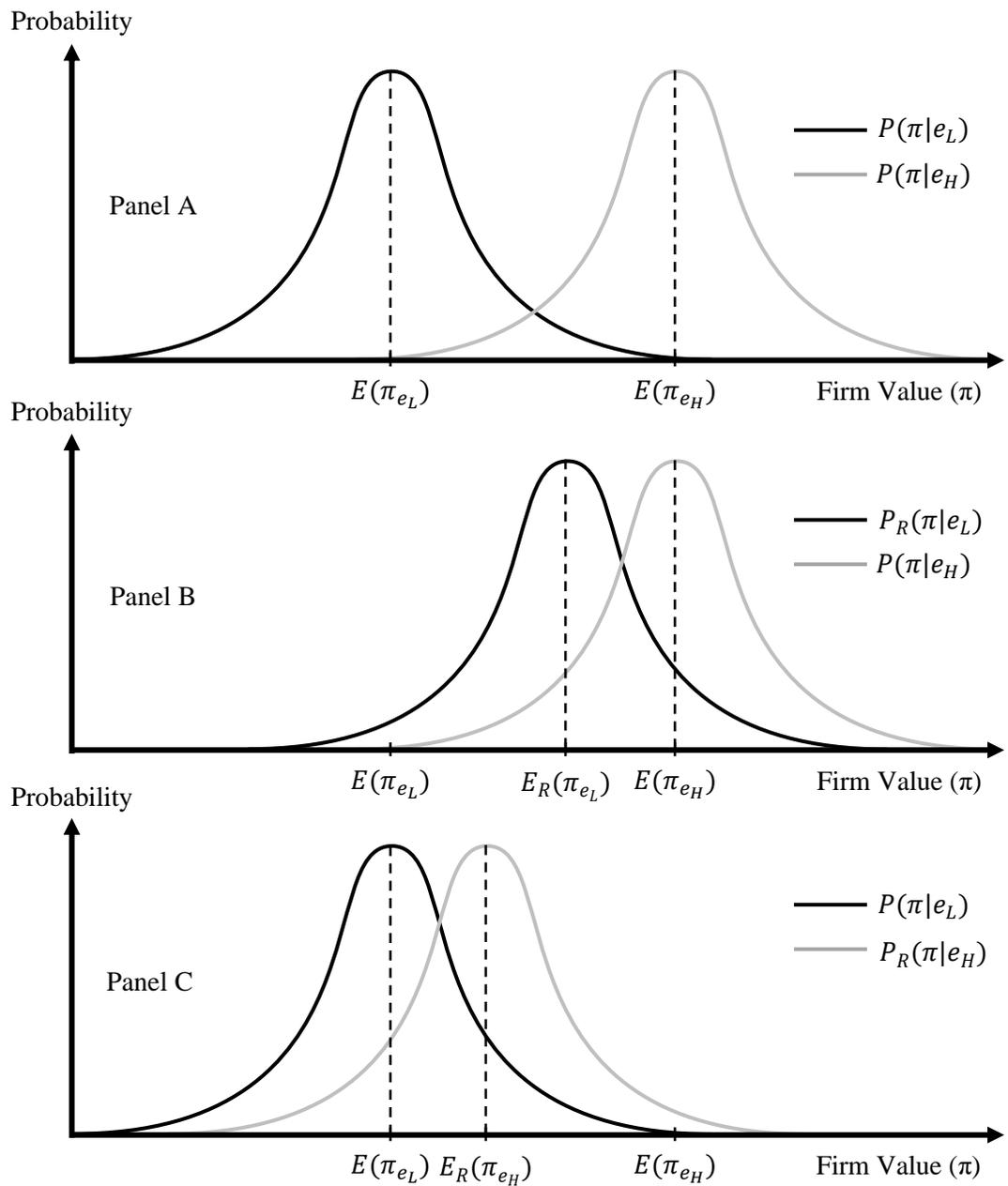


Figure 3. Perceived Probability Distributions of Firm Value

Panel A shows how regular (secular) firms perceive the distribution of future firm value based on CEO effort. The difference of the expected values represents the perceived effectiveness of performance-based compensation. Panel B shows how religious firms perceive the distribution of future firm value under the extrinsic motivation framework. Panel C shows how religious firms perceive the distributions under the locus of control framework. Panels B and C both show that the perceived effectiveness of performance-based compensation is smaller for religious firms compared to that of secular firms.

CHAPTER 3

INSIDER BOARD CONTROL AND SHAREHOLDER VALUE

Introduction

A fundamental issue in board governance is who controls the board – firm insiders or independent directors. The consensus among market participants seems to be that boards composed of majority independent directors better serve shareholder interests. In line with this view, U.S. regulators have mandated a majority of independent directors (henceforth ‘independent boards’) for all publicly listed firms. However, how board control affects shareholder value is still not fully understood. Despite the general preference for independent boards, some theories predict that insider-dominated boards may sometimes be optimal for shareholders (e.g., Harris and Raviv 2008). Surprisingly, there is little empirical evidence evaluating the theories on board control. This paper empirically evaluates how an exogenous change in board control affects shareholders.

Unlike numerous studies that examine the incremental value of independent directors and insider directors (e.g., Duchin, Matsusaka, and Ozbas 2010; Masulis and Mobbs 2011), this paper provides empirical evidence on how an exogenous shift in *board control* affects shareholder wealth. Having a majority in numbers is crucial because a majority vote decides the outcome when a consensus cannot be reached in the board room. As such, the optimal board design will maximize the probability that the majority of the board will vote in a manner consistent with shareholder value maximization (Raheja 2005).

Prior to the NYSE and Nasdaq listing requirements in the early 2000s, about 29.7% of the firms in the IRRC universe had insider-dominated boards.²⁶ This statistic raises the following questions. Why did such a large proportion of firms choose insider-dominated boards? Wouldn't the competitive market forces drive board structures to their optimal levels? Also, what effects did the mandatory board independence requirement have on firms that chose to have insider-dominated boards prior to the regulations? These are the questions that I attempt to answer in this paper.

Critics of board reforms argue that existing board structures are the equilibrium outcome of the competitive market forces. Also, Boone et al. (2007) show that various elements such as the nature of firm's competitive environment and idiosyncratic factors affect optimal board composition. Thus, imposing universal restrictions on board structure forces some firms to deviate from their optimal structures. If firms with certain characteristics are better off with insider-dominated boards as some theories suggest, then the board independence mandate should have hurt shareholder value in such firms. This paper empirically evaluates whether board reforms in the early 2000s negatively affected some firms that had theoretically optimal insider-dominated board structure.

The literature proposes the following characteristics that might affect the optimal structure of the boards: firm size, proprietary information, and information flow between insiders and outsiders. The first characteristic that could affect the efficacy of independent boards is firm size. The literature finds that board structure is different for small versus large firms. For example, smaller firms tend to have smaller board size and more insider-

²⁶ Specific requirements are discussed in the *'Board Reforms'* section.

dominated boards (Linck, Netter, and Yang 2008). Further, smaller firm size may be related to less severe agency issues (Boone et al. 2007) and less need for external contracting relationships (Coles, Daniel, and Naveen 2008). Regarding board independence mandates, Holmstrom and Kaplan (2003) argue that smaller firms have a higher cost of compliance and it may be harder for them to attract qualified directors. Taken together, prior evidence suggest that smaller firms might choose insider-dominated boards because there is less need for independent boards, and mandatory board restructuring could be costly for such firms.

Firms' proprietary knowledge is the second characteristic that could determine whether insider or outsider control of the board is optimal. Insider presence on corporate boards is especially important when the firm possesses high levels of proprietary knowledge (Fama and Jensen 1983). Further, Raheja (2005) argues that higher proportion of insider directors are optimal for firms when it is difficult for outsiders to gather proprietary information and verify projects. Harris and Raviv (2008) develop a model of optimal control of board of directors, in which shareholders prefer an insider-controlled board when the benefits of retaining insiders' information outweigh the direct agency costs. These theories suggest that shareholders of firms with high levels of proprietary information may be better off with insider-dominated boards.

The third characteristic that has been found to be important in the literature is firms' information transparency. Theoretical studies argue that information environment plays a crucial role in the effectiveness of independent directors (Hermalin and Weisbach 1998; Raheja 2005; Adams and Ferreira 2007). These studies argue that independent directors

will be less effective when the firms they are supposed to monitor and advise are informationally opaque. Duchin, Matsusaka, and Ozbas (2010) show that independent directors are less effective when information acquisition cost is high. Thus, it seems arguable that insider-dominated boards may be better for firms in informationally opaque environments.

Despite the possible benefits associated with insider control of the board, the agency theory literature suggests a negative impact of insider-dominated boards on shareholder value. The argument is based on the idea that insider directors are captured by the CEO because their job security, compensation, and private benefits are heavily influenced by the CEO. Consequently, most researchers presume that inside directors are reluctant to take challenging positions against the CEO (Masulis and Mobbs, 2011). According to this agency perspective, enhanced monitoring by independent boards will improve shareholder value.

Overall, the literature suggests that, for firms with certain characteristics, mandatory board restructuring might have some negative value implications by forcing them to deviate from equilibrium board structure. Another perspective is that agency concerns associated with insider board control will be mitigated with independent boards. Ultimately, which force dominates on average and whether insider-controlled board is actually better for firms with above-mentioned characteristics is an empirical question that I address in this study.

The primary obstacle in establishing a causal relationship between board structure and firm value is that board structure is endogenous (Adams, Hermalin, and Weisbach

2010). To address this issue, I utilize the series of regulatory changes in the early 2000s that eventually led to the adoption of Sarbanes-Oxley (SOX) Act. Previous studies using SOX-related regulations have been criticized because the ‘treatment’ affected nonrandom group of firms. That is, firms that were already in compliance with the regulations are likely to be systematically different from ones that were not in compliance. In this paper, I restrict the sample to only those firms who were not in compliance ex-ante. By restricting the sample to only those firms who had insider-dominated boards as of 1999, ‘control’ group is firms who have yet to switch to independent boards as of year t . ‘Treated’ group is the firms who switched to independent boards as of year t . The years in which individual firms complied with the SOX board independence criteria ranges from 2000 to 2006.²⁷ This staggered compliance with the requirements allows for the use of staggered difference-in-differences framework (e.g., Bertrand and Mullainathan 2003). This staggered nature of compliance affects different firms at different points in time, alleviating the concern that other contemporaneous events might confound the results.

I first examine whether firms with insider-dominated boards, on average, gained shareholder wealth by switching to independent boards. Results are statistically insignificant. This is not surprising for the following reason. There are two main reasons why a firm might have insider-dominated board. First, some firms might have chosen insider-dominated board because it is the optimal structure given firm characteristics such as size, proprietary knowledge, and information transparency. Second, some firms may have kept insider dominance in order to extract private benefits at the expense of

²⁷ SOX was adopted in 2002, and NYSE and Nasdaq listing requirements were put in place in 2003. However, the series of regulatory changes began in 1999 and firms had a grace period to comply with the requirements. Further discussed in ‘Literature Review and Hypothesis Development’ section.

shareholders. In the former case, mandatory board restructuring would have hurt shareholder value. In the latter case, improved monitoring after compliance would have benefitted shareholders. Thus, the overall result is likely to be contaminated, and heterogeneous treatment effects should further be analyzed.

In the next set of tests, I examine whether the impact of mandatory transfer of board control from insiders to outsiders varies depending on the previously discussed firm characteristics. That is, I check for heterogeneous treatment effects based on firm size, level of proprietary information, and information transparency. The results show that 1) the effect of board restructuring on shareholder value is significantly negative when firms are larger, 2) there is no heterogeneous treatment effect based on the level of proprietary information, and 3) the treatment effect on shareholder value is significantly positive when information transparency decreases. Overall, the preliminary empirical evidence is not consistent with the theoretical predictions that highlight possible benefits of having insider-dominated boards.

While I address the issue of lack of a control group associated with SOX-related studies, it is important to note that the timing of compliance is still a choice variable. To address this issue, I check 1) whether firm characteristics are significantly different for earlier versus later complying firms, and 2) whether main results change if I use various subperiods. Results show that timing of compliance does not change the main conclusions of this study.

This paper contributes to the literature in several important ways. First, it contributes to the literature on corporate boards and provides causal evidence on whether

who controls the board affects firm value. To the best of my knowledge, many studies have examined the value of adding certain types of directors to boards, but no study has provided causal evidence of how board control affects shareholder value. Second, the paper provides evidence on how certain firm characteristics – firm size, proprietary knowledge, and information transparency – affects the relationship between board control and firm value.

Literature Review and Hypothesis Development

Literature on Board of Directors

A large literature in finance examines the role of board of directors in modern corporations.²⁸ Earlier studies focused on the determinants of board structure (e.g., Hermalin and Weisbach 1998; Raheja 2005; Boone et al. 2007; Linck, Netter, and Yang 2008) and found that various firm characteristics are associated with different board structures. In the studies that followed, researchers have shown how various aspects of corporate boards affect firm value – these characteristics included board size (Coles, Daniel, and Naveen 2008), value of independent directors (e.g., Duchin, Matsusaka, and Ozbas 2010), value of insider directors (Masulis and Mobbs 2011), and busyness of directors (Fich and Shivdasani 2006; Falato, Kadyrzhanova, and Lel 2014). While many aspects of boards have been studied there is no causal evidence of how insiders' or outsiders' *control of the board* affects firm value.

Who controls the board is one of the fundamental issues in corporate governance (Raheja 2005; Harris and Raviv 2008; Harris and Raviv 2010). The general consensus is

²⁸ See Adams, Hermalin, and Weisbach (2010) for a comprehensive review.

that boards that consist of majority of independent directors are better for shareholders. For example, the CFA Institute states that company boards should have a majority of independent directors. Regulators in the U.S. also seem to think that independent directors should hold the majority position in corporate boards.²⁹ However, some theories predict that insider-dominated boards are sometimes optimal for shareholders (Harris and Raviv 2008). Moreover, prior to the mandatory board requirements in the early 2000s, about 30% of the firms in the IRRC universe had insider-dominated boards. Naturally, one has to wonder what the primary reason is for these firms to choose insider-dominated boards. Another important question is what effects the mandatory board requirements had on the firms that chose to have insider-dominated boards ex-ante.

Previous studies show that governance mechanisms often have heterogeneous effects on firms, depending on various firm characteristics. For example, scholars have found that effectiveness of various forms of governance depends on the competitiveness of the industries in which the firm operates (Giroud and Mueller 2011), the information acquisition cost for outside directors (Duchin, Matsusaka, and Ozbas 2010), and the firm's financial slack (John, Li, and Pang 2017). Regarding corporate boards, Coles, Daniel, and Naveen (2008) show that firm characteristics such as firm complexity has been considered when choosing optimal board size. Taken together, it seems reasonable to question whether the mandatory board independence rule benefited all publicly listed firms.

²⁹ Details of the regulations are discussed in the 'Board Regulation and Identification Strategy' section.

Firm Characteristics that Affect Optimal Board Structure

Many firm characteristics have been studied in relation to board structure. In this section, I examine three firm characteristics – firm complexity, proprietary knowledge, and information transparency – that could affect the effectiveness of mandatory board reforms on firm value.

Firm Size

Firm size is the first firm characteristic that may determine the optimality of having majority of independent directors. The literature finds that firm size leads to systematically different board structures. For example, smaller firms tend to have smaller board size and more insider-dominated boards (Linck, Netter, and Yang 2008). This may be because firm size is directly related to the severity of agency problems (Lehn, Patro, and Zhao 2009); thus, there is less need for enhanced monitoring by independent directors in less complex firms. Also, as firm size is correlated to the need for external contracting relationships (Coles, Daniel, and Naveen 2008), there is greater need for outsider directors for larger firms but not for smaller firms. These arguments suggest that smaller firms may choose insider-dominated boards because it is optimal for them to do so. Regarding the SOX-related mandatory board requirements, Holmstrom and Kaplan (2003) argue that smaller firms have a higher cost of compliance and it may be harder for them to attract qualified directors. Taken together, universal board requirements could be costly for smaller firms because it forces them to deviate from potentially optimal board composition and it is more costly for smaller firms to comply.

Proprietary Knowledge

The second characteristic that could affect optimality of independent boards is firm's proprietary knowledge. Fama and Jensen (1983) argue that insider directors are the most influential board members because of their firm-specific knowledge. Then, insider director's impact will be amplified in firms with high levels of proprietary knowledge. Theories also provide support for this argument. Raheja (2005) develops a model that shows that higher proportion of insider directors are optimal when it is difficult for outside directors to gather proprietary information and verify projects. Harris and Raviv (2008), in their model of optimal control of board of directors, show that insider-majority boards are optimal for shareholders when the benefits of retaining insiders' proprietary knowledge outweigh the potential agency costs associated with insider-control. These studies show that requiring firms with high levels of proprietary knowledge to become independent might have negative shareholder value implications.

Information Transparency

The third firm characteristic examined in this paper is information transparency. Specifically, it refers to how easily independent directors can obtain information about the company. The literature finds that necessary information is often not readily transferred to outsider directors. For instance, Adams and Ferreira (2007) argue that CEOs are less willing to communicate firm-specific information to boards that are too independent. This kind of information asymmetry hinders the ability of independent directors to accomplish their advisory roles (Lehn, Patro, and Zhao 2009). Duchin, Matsusaka, and Ozbas (2010) provide empirical evidence that independent directors are less effective when it is costly

for them to acquire information. Taken together, these studies suggest that independent directors are less effective in informationally opaque firms. Hence, firms with low information transparency might be better off with insider-dominated boards.

Benefits of Having Independent Directors

While there are possible benefits of insider-dominated boards, benefits of having independent directors are well-documented. In addition to their advisory roles, their greatest value comes from enhanced monitoring of the CEO. That is, independent directors are able to mitigate the agency problem associated with captured boards. According to this agency perspective, having majority of independent directors will enhance monitoring, which in turn would improve shareholder value. To summarize, the independent board requirement has two opposing effects on firms with previously discussed characteristics: 1) loss in value associated with insider-control of the board and 2) gain in value from improved monitoring. Which force dominates is ultimately an empirical issue.

Board Regulations and Identification Strategy

Board Reforms

In my empirical analysis, I utilize a series of regulatory reforms in the early 2000s that affected the structures of corporate boards of directors. In response to growing concerns regarding financial misreporting, NYSE and NASD in 1999 required that listed firms maintain fully independent corporate audit committees. Prominent corporate scandals that soon followed (e.g., Enron, WorldCom, and Tyco) substantiated the governance concerns and eventually led to the Sarbanes-Oxley Act (SOX) of 2002 and stricter listing standards for NYSE and Nasdaq. This series of regulations addressed the

importance of dominant presence of independent directors on the boards and clarified the definition of director independence.³⁰ SOX required public firms to maintain 100% independent audit committee, and the NYSE and Nasdaq listing rules further required majority independent board of directors as well as 100% (NYSE) and majority (Nasdaq) independent compensation and nominating committees. The requirement that is the main focus of this study is the majority independent directors requirement as it represents the shift of board control from firm insiders to outsider directors.

Empirical Issues with SOX-related Studies

Numerous studies have used SOX-related regulations to examine the effect of board restructuring on various corporate outcomes. While the regulations presented an external shock to firms that were not in compliance with the requirements, there are two problems associated with existing studies that use this setting. First, studies that use a particular year as the treatment year overlook the fact that the series of regulations took multiple years to come to fruition and firms were given time to comply. This lack of clear treatment year is illustrated by the fact that various studies use different years as the treatment year.³¹ As shown in Figure 4, firms switch to independent boards over many years as response to the series of regulations.³² Figure 5 further shows that the year of compliance with the board independence requirement is spread out over the 2000 to 2006 period. Thus, in studies that use a single treatment year, some firms that complied prior to the particular year will

³⁰ Definitions of independence according to SOX and NYSE/Nasdaq listing rules are not precisely identical. However, in essence, a director is independent if the director does not accept any significant compensation (other than the director's fee) and is not an affiliated person of the firm or its subsidiaries.

³¹ Balsmeier, Fleming, and Manso (2017) uses 2001 as the treatment year; Banerjee, Humphery-Jenner, and Nanda (2015) uses 2002 as the treatment year; and Guo and Masulis (2015) uses 2005 as the treatment year.

³² The primary reason why not all firms became independent boards is because the definition of 'independent' directors is different for regulators, stock exchanges, and data providers (Chen, Cheng, and Wang 2015).

mistakenly be categorized in the ‘pre-treatment’ group even when they changed board structure and some firms that complied after the particular year will mistakenly be categorized in the ‘post-treatment’ group although they have not changed board structure. The second problem associated with existing SOX-related studies is that the control group consists of firms that were already in compliance with the new regulatory requirements. Since firms choose their board structure, it is reasonable to argue that there might be a systematic difference between firms that were in compliance and firms that were not prior to the regulations. That is, while the shock may be exogenous, it affected a non-random group of firms. This lack of comparable control group presents a serious concern when assessing a treatment effect.

I address these two issues using the following empirical design. First, I incorporate a staggered difference-in-differences methodology because firms complied to the regulatory requirements in different years. While SOX was written into law in 2002 and the stock exchange listing requirements were adopted in 2003, the regulatory movement towards independent boards began as early as December 1999 when SEC approved new exchange listing standards. In terms of the deadline for compliance, some firms had as late as December 31, 2005 to comply with the regulations.³³ By recognizing the staggered nature of compliance across firms, I am able to provide a clean identification of pre-treatment and post-treatment periods for each firm. Second, I address the issue of having a systematically different control group by excluding all firms that were already in compliance. In this setting, the control group is firms with insider-dominated boards that

³³ Firms with classified boards, for example, had until December 31, 2005 to comply with the new NYSE and NASDAQ listing rules (Guo and Masulis 2015)

have yet to comply with the board independence requirement as of year t . Since my research question attempts to answer whether insider-controlled boards benefit shareholder value, excluding ex-ante compliant firms from the sample is appropriate.

Empirical Model

Equation 4 is the baseline empirical model, where i indexes a firm, t indexes a year, V is a measure of shareholder value, and $Treated_{it}$ is a dummy variable that takes on a value of one if firm i has switched to independent board as of year t and zero otherwise. β_1 represents the average effect of transfer of board control to independent directors in the sample of firms that had insider-dominated boards prior to the regulations.

$$V_{it} = \beta_1 Treated_{it} + Controls_{it} \cdot \beta + firm_i + year_t + e_{it} \quad (4)$$

Equation 5 is the empirical model for the main tests of this paper. Var is the measure of firm characteristic – size, proprietary knowledge, and information transparency – that are likely to affect the effectiveness of insider-dominate boards. A statistically significant β_3 would indicate that the particular firm characteristic affects whether insider-dominated boards benefit shareholder value.

$$V_{it} = \beta_1 Treated_{it} + \beta_2 Var_{it} + \beta_3 Treated_{it} \cdot Var_{it} + Controls_{it} \cdot \beta + firm_i + year_t + e_{it} \quad (5)$$

Measures of Firm Characteristics

Measure of Firm Complexity

To proxy firm complexity, I use firm size. Firm size is likely to be correlated with firm complexity. Large firms are often involved with more diverse business activities, uses

more sophisticated financial and marketing techniques, and deals with greater volume of activities (Lehn, Patro, and Zhao 2009). Thus, firm complexity can be proxied by firm size.

Measure of Proprietary Knowledge

The level of proprietary knowledge in the firm is difficult to measure. I use three measures that are likely to be correlated with firm-level proprietary knowledge: knowledge capital, innovation level, and R&D expense. For knowledge capital, I use the measure developed by Ewens, Peters, and Wang (2019). Conceptually, it is a measure that considers the value of accumulated knowledge from previous R&D investments. To measure firm's innovation level, I use the innovation score which captures the market value of patents in a given year (Kogan et al. 2017). To proxy the innovation level for a firm at a given point in time, I use the average annual innovation score in the past 6 years.³⁴ The argument is that the average innovation output in recent years is probably highly correlated with the intensity of innovation in the given year. Since the intensity of innovation is unobservable until patents are realized, the historical annual average is used. Using the innovation score for the given year can produce misleading results because not all firms produce patents every year. Manual inspection of the data confirms that even innovation-active firms do not necessarily produce patents every year. The final proxy for firm's proprietary knowledge is the reported R&D expense. Although this is a least sophisticated measure of the three, previous studies have used this measure to capture similar constructs (e.g., Coles, Daniel, and Naveen 2008).

³⁴ I use the innovation measure that is scaled by firm size to make comparisons across firms (equation 10 of Kogan et al. 2017). The average annual innovation in the past 6 years. 6 years is arbitrarily chosen because data on board information is available from 1996. Results do not change when the timespan to calculate recent annual average is reduced.

Measure of information transparency

As a measure of information transparency, I use a measure similar to those of Krishnaswami and Subramaniam (1999) and Duchin, Matsusaka, and Ozbas (2010).³⁵ The goal is to measure how difficult it is for independent directors to acquire firm-specific information. Using mean analyst forecast error, analyst forecast dispersion, and size-adjusted number of analysts following the firm, I construct an information cost index similar to that of Duchin, Matsusaka, and Ozbas (2010).

Data and Results

Data and Sample Selection

All data used in this study is from publicly available sources. Board information is obtained from the Investor Responsibility Research Center (IRRC). Firm characteristics are obtained from Compustat. Stock price information is from CRSP. CEO characteristics are from Execucomp. Analyst forecast information is from IBES. To construct the proprietary knowledge measure, I use the innovation scores from Kogan et al. (2017). I exclude firms in financials and utilities as is standard in the literature. Also, in an attempt to precisely capture the effect of shift in board control, I exclude firms that had CEO turnover during the sample period.

³⁵ Krishnaswami and Subramaniam (1999) attempts to measure ‘information asymmetry’ between the market and firm insiders. Duchin, Matsusaka, and Ozbas (2010) constructs an ‘information cost index’ that captures an outsider’s cost of becoming informed.

Main Results

The main results of the paper are presented in Table 18. Examination of the overall effect of board independence on previously insider-dominated firms shows an insignificant result. In columns (2) – (5), I examine heterogeneous effects of shift in board control on shareholder value. Column (2), using firm size in the interaction, indicates that the coefficients on the treatment dummy is significantly positive and the coefficient on the interaction term is significantly negative. That is, the positive effect of board independence on firm value is diminished as firm size increases. However, the net effect is still positive even for larger firms. This result is contrary to the theoretical predictions that insider-dominated boards might be optimal for smaller firms. Column (2) result suggests that smaller firms actually benefitted more from forced board restructuring compared to larger firms. Results from columns (3) and (4) show statistical insignificance in most coefficients of interest, indicating that the level of proprietary knowledge in the firm does not play a significant role in determining the efficacy of insider-control of the boards. Column (5) shows interesting results. Since the information cost index ranges from 0 to 1, the interpretation of the results are as follows. For firms with insider-dominated boards that were fully transparent, switching to independent boards hurt shareholder value by about 13.6%. However, for informationally opaque firms, switching to independent boards had a net increase of 22.6% in shareholder value. This suggests the possibility that informationally opaque firms had more severe agency issues, which were mitigated as a result of board restructuring, leading to a net increase in shareholder value. Table 19 presents results from the same models as Table 18, with ROA as the dependent variable.

The results indicate that mandatory board restructuring did not have significant effects on operating efficiency.

The Parallel Trends Assumption

A critical assumption in the difference-in-differences framework is the parallel trends assumption. That is, I need to demonstrate that the pre-treatment trends in firm value of ‘control’ group is not different from those of ‘treatment’ group. The test of the parallel trends assumption is shown in Figure 6. Using the information transparency as the firm characteristic of interest, I examine when the pre-treatment and post-treatment trends. Figure 6 clearly shows that changes in firm value occurs after the treatment year.

Further Issues

Timing of Compliance

While I addressed the some of the issues with SOX-related studies, it is important to note that the timing of compliance is still a choice variable. That is, firms that choose to comply with the board independence requirement earlier might be systematically different from those that choose to comply near the deadline. To address this issue, I check 1) whether firm characteristics are significantly different for earlier vs later complying firms, and 2) whether main results change if I use various subperiods. Results shown in Table 20 and Table 21 indicate that earlier and later complying firms are not statistically different in terms of various firm characteristics and that the main results do not change when various subperiods are used.

The Channel Driving the Results

While the results are statistically strong, I cannot completely rule out other channels that might be driving the main results. That is, shift in board control might not be the only channel behind the observed relationship. To illustrate, SOX-related regulations not only affected the overall board composition but also specified other requirements. First, the audit committee of public firms had to be fully comprised of independent directors. In addition, NYSE required all listed firms to have fully independent compensation and nominating committees and Nasdaq required independent (50% or more independent directors) compensation and nominating committees. Change in composition in these key committees are likely to have significant shareholder value implications. Going forward, I plan to provide additional evidence that rules out the above-mentioned channels and strengthen my argument that shift in board control is the driver of the main result.

Conclusion

This paper examines the theoretical predictions that insider-dominated boards are optimal for firms with certain characteristics. Using three characteristics – firm size, proprietary knowledge, and information transparency – that has been shown to affect the value of insiders on corporate boards, I examine how SOX-related regulations in the early 2000s affected shareholder value. Preliminary results indicate that firms that are likely to benefit from insider-dominated boards actually benefitted more from the regulations in terms of shareholder value. I conclude that the benefits of enhanced monitoring outweighed any loss in value associated with insider control of the board.

Table 18

The Impact of Board Control Shift on Shareholder Value

DV: ln(Q)	W/O Interaction	Firm Complexity	Proprietary Knowledge		Transparency
		Var: Size	Var: Know-Capital	Var: Innovation	Var: Inform Cost
	(1)	(2)	(3)	(4)	(5)
Treated	0.004 (0.852)	0.502*** (0.000)	0.000 (0.994)	-0.002 (0.941)	-0.136*** (0.001)
Var		0.466*** (0.000)	0.679*** (0.003)	-0.016 (0.847)	-0.129 (0.224)
Treated x Var		-0.068*** (0.000)	0.018 (0.858)	-0.056 (0.367)	0.362*** (0.000)
Controls	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes
N	1,750	1,750	1,726	1,087	1,191
R ²	0.220	0.230	0.282	0.213	0.268

This table presents the results from OLS regressions of shareholder value on shift in board control. The dependent variable is the natural logarithm of Tobin's Q. Treatment is the indicator variable equal to one if the firm has switched to independent board as of year t. Var indicates the firm characteristic that is used in the particular model. Column (1) shows the results without any interaction effects. In column (2), firm size (log of assets) is used to proxy firm complexity. In column (3), knowledge capital measure is used to proxy proprietary knowledge. In column (4), innovation score is used to proxy proprietary knowledge. In column (5), information cost index is used to proxy information transparency. All specifications include firm fixed effects and year fixed effects. Standard errors are corrected for heteroskedasticity and clustering at the firm level. P-values are reported below the coefficient estimates. ***, **, * denote significance at the 1%, 5%, and 10% levels, respectively.

Table 19

The Impact of Board Control Shift on Operating Efficiency

DV: ROA	W/O Interaction	Firm Complexity	Proprietary Knowledge		Transparency
		Var: Size	Var: Know-Capital	Var: Innovation	Var: Inform Cost
	(1)	(2)	(3)	(4)	(5)
Treated	0.001 (0.806)	-0.030 (0.128)	-0.003 (0.557)	0.000 (0.982)	0.005 (0.588)
Var		0.041*** (0.000)	0.008 (0.862)	-0.016 (0.311)	-0.020 (0.328)
Treated x Var		0.004* (0.094)	0.031 (0.240)	0.011 (0.393)	-0.005 (0.812)
Controls	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes
N	1,846	1,846	1,822	1,142	1,275
R ²	0.072	0.076	0.064	0.095	0.097

This table presents the results from OLS regressions of return on assets on shift in board control. The dependent variable is the ROA. Treatment is the indicator variable equal to one if the firm has switched to independent board as of year t . Var indicates the firm characteristic that is used in the particular model. Column (1) shows the results without any interaction effects. In column (2), firm size (log of assets) is used to proxy firm complexity. In column (3), knowledge capital measure is used to proxy proprietary knowledge. In column (4), innovation score is used to proxy proprietary knowledge. In column (5), information cost index is used to proxy information transparency. All specifications include firm fixed effects and year fixed effects. Standard errors are corrected for heteroskedasticity and clustering at the firm level. P-values are reported below the coefficient estimates. ***, **, * denote significance at the 1%, 5%, and 10% levels, respectively.

Table 20

Firm Characteristics of Early vs. Late Compliance Firms

Variable	Compliance Year		Diff in means (p)
	2000-2003	2004-2006	
Firm Size	7.28	7.53	0.28
Firm Age	2.75	2.93	0.09
Leverage	0.34	0.36	0.71
Firm Risk	0.03	0.03	0.01
Board Size	8.78	9.34	0.21
Indep Directors	0.38	0.43	0.08
CEO Tenure	10.42	11.02	0.69
CEO-Chair	0.79	0.71	0.24
CEO Ownership	0.17	0.11	0.28
Director Ownership	0.39	0.33	0.63
Institutional Ownership	0.59	0.62	0.25
ln(Q)	0.61	0.67	0.54
ROA	0.16	0.17	0.24

Table 21

Sub-sample Period Tests

DV: ln(Q)	1999- 2006	1999- 2005	1999- 2004	2000- 2006	2001- 2006	2000- 2005
Treated	-0.136*** (0.001)	-0.139*** (0.001)	-0.123** (0.010)	-0.121*** (0.003)	-0.0791** (0.040)	-0.122*** (0.003)
Index	-0.129 (0.224)	-0.066 (0.544)	-0.066 (0.579)	-0.091 (0.422)	-0.051 (0.532)	-0.019 (0.872)
Treated x Index	0.362*** (0.000)	0.389*** (0.000)	0.386*** (0.000)	0.290*** (0.001)	0.147* (0.054)	0.318*** (0.000)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
N	1,185	1,029	876	1,079	949	923
R ²	0.572	0.598	0.591	0.576	0.584	0.609

This table repeats column (5) of Table 18, using various sub-periods. Each column indicates which sub-periods were used in the models. The dependent variable is the natural logarithm of Tobin's Q. Treatment is the indicator variable equal to one if the firm has switched to independent board as of year t. All specifications include firm fixed effects and year fixed effects. Standard errors are corrected for heteroskedasticity and clustering at the firm level. P-values are reported below the coefficient estimates. ***, **, * denote significance at the 1%, 5%, and 10% levels, respectively.

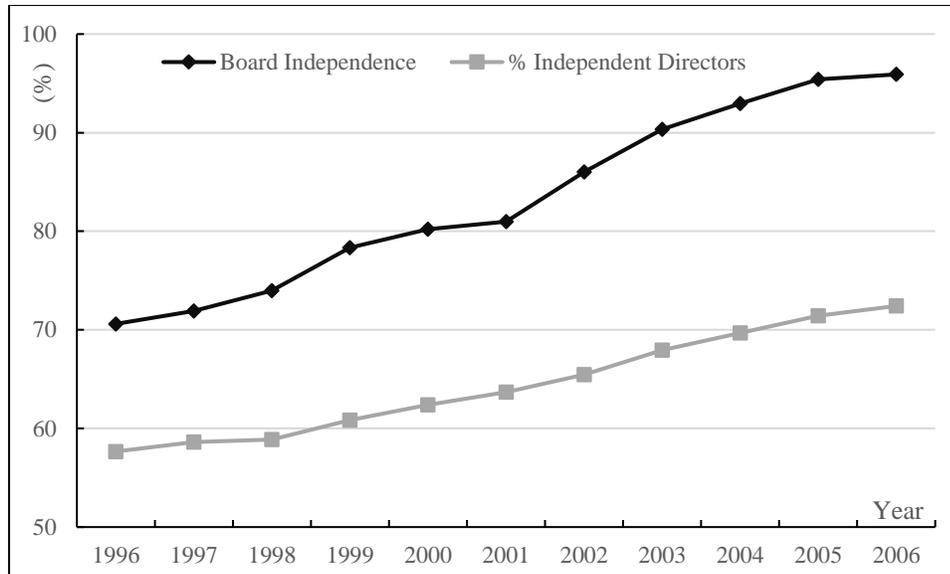


Figure 4. Changes in Board Structure from 1996 to 2006

The mean percentage independent directors and the percentage of independent boards in the final sample. The sample consists of firm-year observations with valid information on board characteristics and firm characteristics.



Figure 5. Staggered Compliance of Firms

326 firms switched to independent boards during the 2000-2006 period. The graph shows the proportion of firms in the sample complying with the requirement each year.

$$\ln(Q)_{i,t} = \sum_{k=-4}^4 \beta_k D_{i,t=k} + \sum_{k=-4}^4 \theta_k D_{i,t=k} \cdot Info_{i,t=k} + Controls_{i,t} \cdot \gamma + \alpha_i + \alpha_t + \epsilon_{i,t}$$

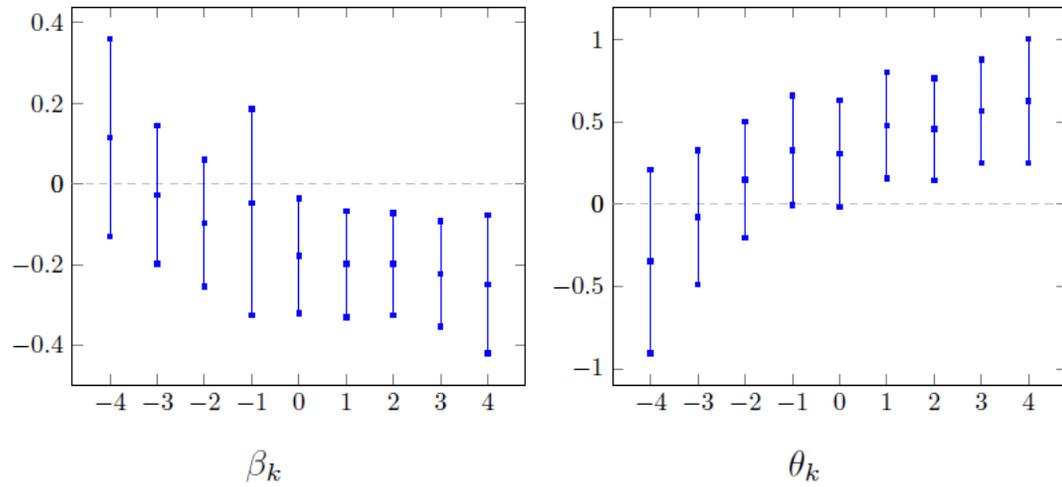


Figure 6. Parallel Trends Assumption

Plots of the coefficients in the equation above shows that there as a clear shift in shareholder value after firms complied with the board independence requirement.

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